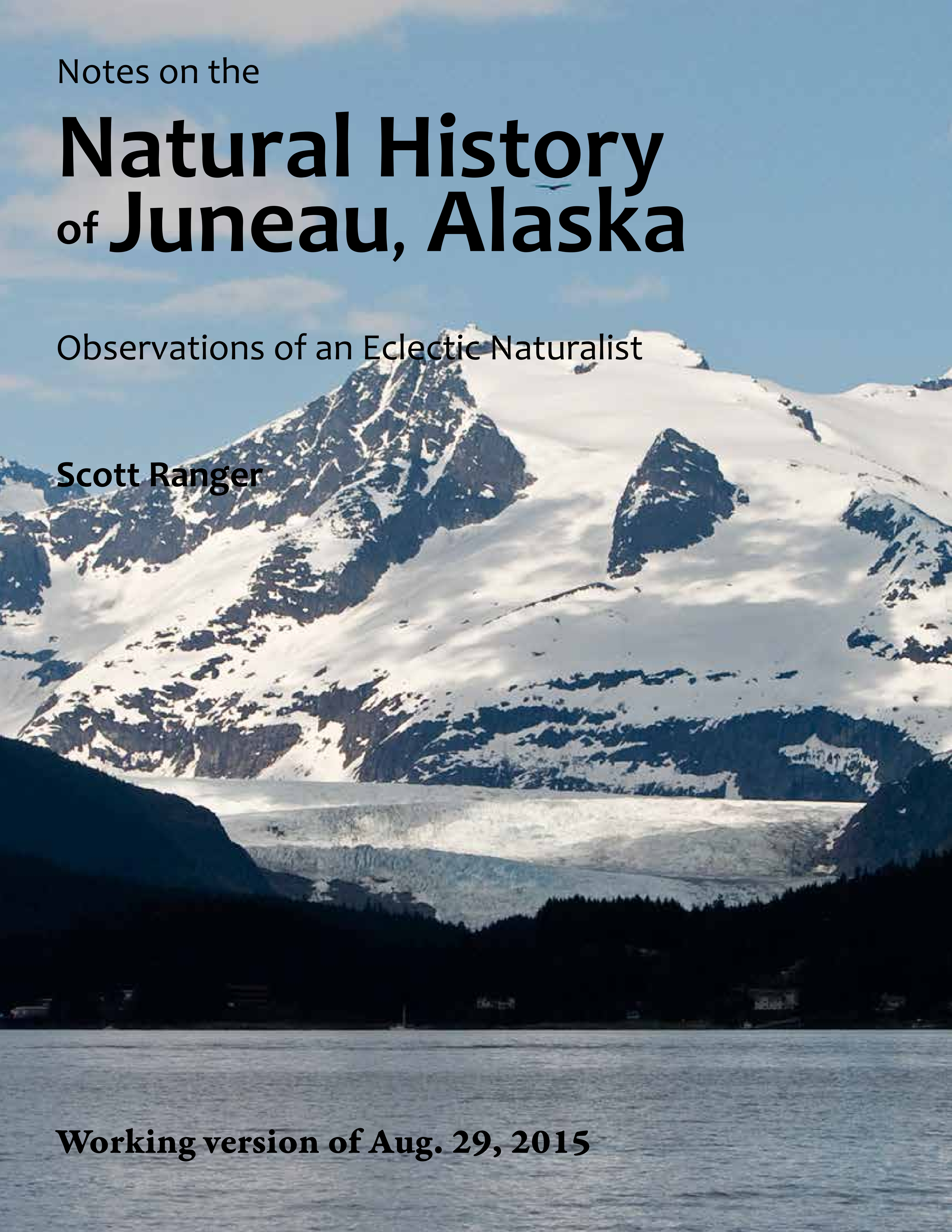


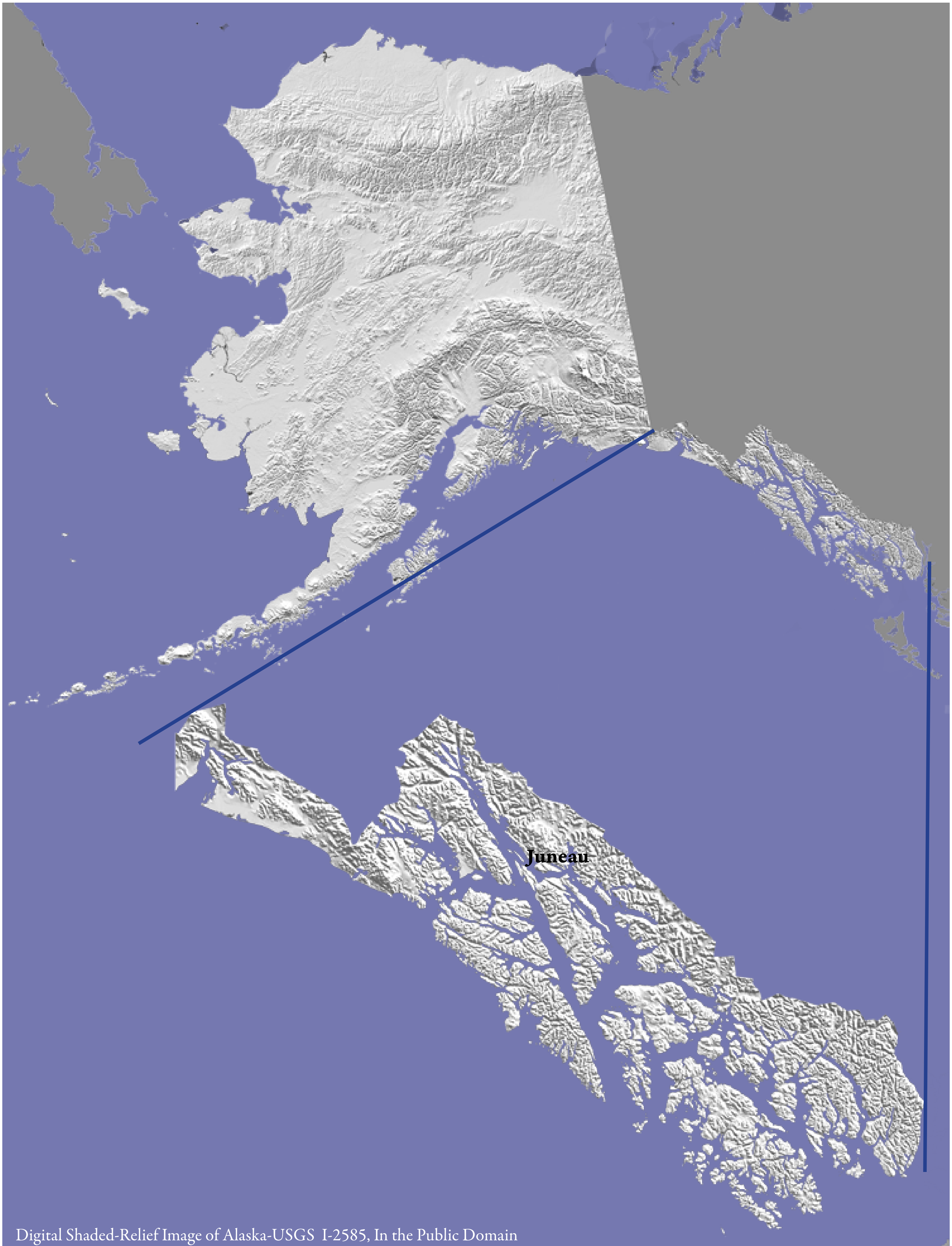
Notes on the

Natural History of Juneau, Alaska

Observations of an Eclectic Naturalist

Scott Ranger

Working version of Aug. 29, 2015


Juneau
Digital Shaded-Relief Image of Alaska-USGS I-2585, In the Public Domain

Notes on the

Natural History of Juneau, Alaska

Observations of an Eclectic Naturalist

Scott Ranger

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Production Notes

This is very much a work under construction.

My notes are composed in Adobe *InDesign* which allows incredible precision of all the elements of page layout. My choice of typefaces is very specific. Each must include a complete set of glyphs and extended characters. For my etymologies the font must include an easily recognized Greek and the occasional Cyrillic and Hebrew. All must be legible and easily read at 10 points.

Adobe Garamond Premier Pro is my specifically chosen text typeface. I find this Robert Slimbach 1989 revision of a typeface created by Claude Garamond (c. 1480–1561) to be at once fresh and classic. Long recognized as one of the more legible typefaces, I find it very easy on the eye at the 10 point size used here. I simply adore the open bowls of the lower case letters and find the very small counters of my preferred two-storied “a” and the “e” against its very open bowl elegant. Garamond’s ascenders and decenders are especially long and help define the lower case letters with instant recognition. The glyphs (particularly double f, ff) are simply gorgeous. The upper case letters are unique and identifiable at a glance by the typeface connoisseur with their serifs both obvious yet elegant. The open letters are exceptionally open yet very controlled and deliberate. The double V that forms the W with its bold left and fine right angles is at once comforting and challenging as it almost seems too heavy to the left, yet it “makes sense”. Q may be the finest letter as its descender usually underlines the next letter in the word. The angled right leg of the R beginning to the right of an almost uncompleted bowl with a most delicate of lines that teases they eye is a close second. Having a last name beginning with R of course has no bearing on my feelings for it! The italic forms are nothing short of inspired in their exquisite elegance. It has a complete set of diacritical marks that I’ve taken full advantage in names from foreign languages like Tlingít.

Candara Bold is for titles and headings. A font created by Gary Munch specifically for Microsoft, I find it wonderfully complements the finishing touches of Garamond yet is a sans serif typeface that is incredibly legible and easy on the eye. The very open bowls and stroke cutoffs and varying width of line strongly resemble Garamond while being distinct. It’s first feeling is a freshness yet it hearkens back to other times and is not bound to strict geometries of circles and lines.

Arial is for etymologies for two overwhelming reasons: readability at 8 points with it high x-height is second to none; and, it has a complete character set for many languages, especially the Greek used here. It is a typeface that one doesn’t realize they’re looking at and fades into the background. With foreign letters, this is very helpful. A boring font leads to better understanding of complicated graphics.

> ***Vital Note on Page flow***: As a collection of on-going field notes, this is a never-ending document. I’m primarily concerned that my notes and photographs remain together during composition, so they are anchored to each other. This means that they flow where they might when new material is added before it and for this reason may not remain together across page breaks. If, and when, this is completed for publication, these odd breaks will be taken care of. In its current condition, they are a necessary evil. It is a “working” version.


Mendenhall Glacier aerial above Mount Wrather


Thunder Mountain fog

Contents

Introduction

This is a personal account of the landscapes and things that live on them—my definition of *natural history*—that I've encountered and made note of during my time in the Juneau area of Southeast Alaska (SEAK). My first visit here was from July 20 to August 1, 2007 visiting my daughter who recently moved here. In 2008 I spent a month from July 4 to August 4 when it rained every day. In 2009 I took a job as a Naturalist Guide for Gastineau Guiding and lived in Juneau from April 11 through October 4. I returned for a second season in 2010 and again in 2011 when my wife and I bought a condominium here. It is now in the rhythm of my life to spend half the year here. These notes are an accumulation of experiences and observations throughout the Juneau area from that time.

As a guide, I've had the wonderful opportunity to repeatedly visit many of the wonderful places around Juneau throughout the growing season of plants. I've observed the overwintering forms as they emerge from under a blanket of snow, the new shoots reaching up out of the ground toward the life-giving light, their flowering, fruiting and finally their senescent stage as the cool winds of winter approach. I've been out on the waters of Stephen's Passage and the Lynn Canal experiencing first had the marvels of the creatures of the sea. From the behemoth of the humpback whale to the microscopic plankton that form the base of the food chain, I've observed far more than I ever expected and feel incredibly blessed. I've walked with bear, shared a path with a pine martin and never cease the simple joy of watching Chestnut-backed Chickadees hang upside down while gleaning the leaves for food. Sharing the magnificence of SEAK with guests is a thrill and an honor. I hope the joys of curiosity and a sense of wonder of the world is in every one of my tours and can be discerned in these notes.

This account is not intended to be a comprehensive treatment and most certainly is not. I'm sure there are things I've seen that didn't get noted or photographed and things I should have seen but missed. Every time I revisit my field notes I realize how many notes and photographs I *should* have taken! This is not an edited selection of what things to include and exclude that characterizes the decisions field guide authors have to make, but includes *all* that I have observed and made note of with my SEAK experiences. It is not intended as a field guide to identification, a taxonomic treatment or anything similar. It is simply the collected notes and photographs of what I've seen and noted. I am an eclectic naturalist with more than five decades of field study. After a solid grounding in college, I've learned that the most important thing a formal education can do is to teach one how to learn. It began with my first botany class when we had to keep field notes. I've continued that for decades and use them to jog my memory and solve arguments with my wife as our shared memories are no longer the same! Keeping notes greatly increases my chances of remembering something, and when I don't, I've got a "written memory". I've used these techniques observing the world as I've encountered it.

Botany is the realm where I'm most comfortable with my knowledge, but geology isn't far behind and the connections between the two—ecology—really hold my interest. This document is in no way definitive and is surely full of misunderstandings and outright error, all of which are mine. It is rather the notes of an eclectic naturalist—one who studies natural history—with wide-ranging interests, done in the style of the great natural historians of the past (though I do not in any way put myself in their league). Like them, it is largely observational rather than experimental in nature but does represent a vast amount of study.

I'm quite humbled to read in *Steller's Island, Adventures of a Pioneer Naturalist is Alaska*, that between 10:00 a.m. and 8:00 p.m. on July 20, 1741 Georg Steller recorded 140 species of plants on Kayak Island on the first scientific excursion to Alaska.

On naming things

I have a near compulsion to put a name on the things I see. Let me state here at the beginning that this is a pathology that can lead to nothing but depression as there is far more out there—even in the simplest ecosystems—to name than can be named by any one person, or even many groups of people. We don't know everything about anywhere on planet Earth. But, little by little, people are observing, noting and we know more and more about the planet we call home.

The word for the science of observing, identifying, naming and classifying, *taxonomy*, comes from the Greek τάξις *taxis*, meaning order or arrangement and νόμος *nomos*, meaning law, rule or code. This very definition includes an natural order of progression; more on that later.

Observation

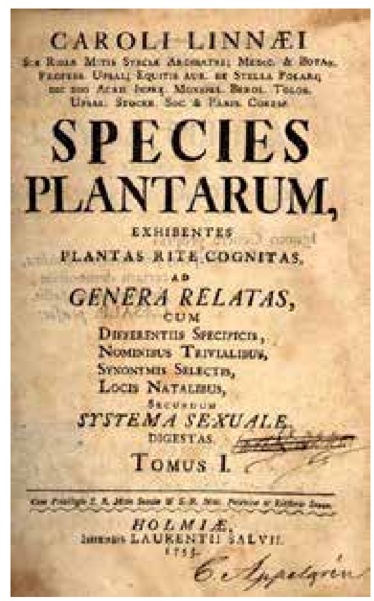
Look! How many times in our lives do we experience when someone observes something and wants to share it with those around and shouts this word out? They usually have their arm up and pointer finger out in the general direction of what they see. Unless the thing is huge, we often have a hard time finding it and the person has a hard time describing first how to find it and then what it looks like. Spotting things that interest us is usually pretty easy. Everything after that gets harder and requires work and practice. What really becomes hard is to force ones self to spot the things one doesn't know. When a certain level of skill is attained, we tend to spot only the things we know, probably in a bit of self-congratulation. It certainly serves to learn those well, but hinders new observations. For this reason I enjoy being with novice naturalists as everything is new to them and their eyes are open to all. With my many decades of experience observing nature, I still have to be careful not to let the familiar get in the way of the unfamiliar.

Identification

When observation meshes with previous experience, some sort of recognition usually occurs: "I know this!" or "I don't know this" or something in between. We've all experienced this with faces of friends, acquaintances and strangers. Recognition is the identification of something already known. Much in these notes is a compilation of observations where I've used my previous experience to recognize and add to what I know. Identification adds the new, the things outside of previous experience. Here I use my observation skills to study and put a pre-existing name on what I see that I do not recognize. The more familiar one becomes with an area of study, recognition becomes a great tool to sort through all the "noise" and choose a quicker path to identification and learn the various tools available for the task.

Once identified and put into the brain for future recognition, the "thing" pretty much demands a name, if for no other reason than it being a tool for recognizing the "thing" in future encounters. As soon as a second person enters the scene, the name becomes the medium of communication. For communication to be effective, the description of the "thing" must be clearly understood by all who use the name; the name must conjure up the same image to all who use it. This is more difficult to achieve than most believe and is the reason taxonomy requires a complete description of the "thing" being named and a "type" specimen established as a sort of "hard copy" of the description that can later be examined.

Names carry great power. In the Judeo-Christian world naming things rests in the deep past of creation. The name of the first man in the Bible, known as Adam in English, comes from the ancient Hebrew אדם. This seems to be a play on words for the name of the man is extremely close to the ruddy color of hair or skin and the ground or earth that the creation story tells us he was made from. His name is then inextricably entwined with his very being. Names become real and strong. Then "...Adam gave names to all cattle, and to the fowl of the air, and to every beast of the field..." (Genesis 2:20 KJV, in the public domain). To call something by a name included the very essence of that thing, be it an animal or a person. Once two or three learn a thing, a name naturally develops as a kind of shorthand that encapsulates their understanding of it that they agree on and mutually understand. This allows communication.



The most significant development with naming things in a scientific context came in 1753 when ***Carolus Linnæus*** (1707–1778) published *Species Plantarum*, "the species of plants". It catalogs, describes and names some 7,300 species of the plants known to Europe, greatly surpassing all previous systematic treatment of plants.

With its publication the current system of binomial ("two names") nomenclature in Latin was established, now universally accepted. The name consists of the genus and a specific epithet based on some descriptive element of the organism. This is very much like a human name with the family name, analogous to the genus, first and followed by the given name, analogous to the epithet, as in Doe John. The words can come from any language but are Latinized and comply with Latin grammar and allow for universal recognition in a language that doesn't change.

A Swede born Carl Nilsson Linnæus, he draws his family name from the Latin name of a large linden tree on his father's land. The variant Carl von Linné came with his ennoblement in 1761. With his use of Latin in nomenclature, he Latinized his name to Carolus Linnæus and its cognate, Caroli Linnæi. In English it is usually spelled without the ligature *æ*, but since he always used it, I do as well. The single letter L. is at the end of all the organisms Linnæus named as the honorific referring to his authorship of those names when it is not spelled out. His classification scheme has largely been replaced but his naming convention remains. As you peruse these notes you will find a large number of such names as many things found in Alaska were known to him one way or another (especially those with a circumboreal—around the top of the world—distribution).

Classification

Classification has a deep past, perhaps deeper than names as "...God made the beast of the earth after his kind, and cattle after their kind, and every thing that creepeth upon the earth after his kind..." (Genesis 1:25 KJV). Almost as soon as a handful of names are given there develops a need to arrange them into convenient groups using some sort of relationship. The ancient "kind" reflects this as there is something inherent that can be a character "type". So in a can of buttons one can sort them into those that are round or square, two-holed or four-holed, or into their various colors. This leads to an immediate problem when "types" overlap. Do you divide the buttons by shape first so all the round ones are together? Or do you gather them into their color groups or by the number of holes? A similar problem exists in the natural world and the question becomes what is the basis of the classification.

Linnæus was the first to develop a nested system of hierarchies, the beginnings of which he published in ten volumes of *Systema Naturæ* beginning in 1735 with a twelve page work concluding with volume 10 in 1758 where he classified 4,400 species of animals and 7,700 species of plants. His included five ranks: class, order, genus, species, and variety. He based his groupings on the simple counting of flower parts, his *systema sexuale*. Now almost totally dismembered as it created highly unnatural (unrelated) groups, it remains seminal in the world of *systematics*, the study of the relationship of organisms through time.

The first to publish a "natural" system was ***Antoine Laurent de Jussieu*** (1748–1836) in his 1789 *Genera Plantarum, secundum ordines naturales disposita juxta methodum in Horto Regio Parisiensi exaratam*. Being familiar with Linnæus' work of similar name, he expanded on the simple counting of the sexual parts of flowers using multiple characters to recognize groups that are "naturally" related. We use many more of de Jussieu's family names than Linnæus' as his system was a great improvement.

Jean-Baptiste de Lamarck (1744–1829) was the first to publish the idea that characters could be inherited, foreshadowing the ideas of Wallace and Darwin

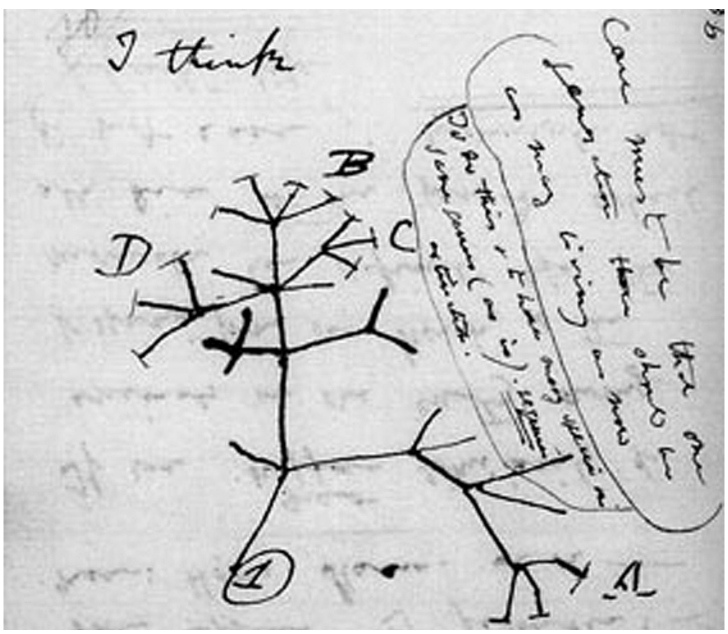
Augustin Pyramus de Candolle (1778-1841), whose authority abbreviation is DC, spent most of his life working on a complete "natural system" of classification that reached seven volumes and with *Théory élémentaire de la botanique* in 1813 he advocated a codification of naming conventions based on priority—the earliest name—beginning with Linnæus.

These early classifications are based on phenetics, a classification based on overall similarity of morphology.

The Tree of Life

The work of Lamarck, Wallace and Darwin have lead to a very different manner of classifying life based not simply upon morphological similarity but on ancestry and the passing of traits from ancestors. Family trees were well known and now this idea was extended to plants and animals.

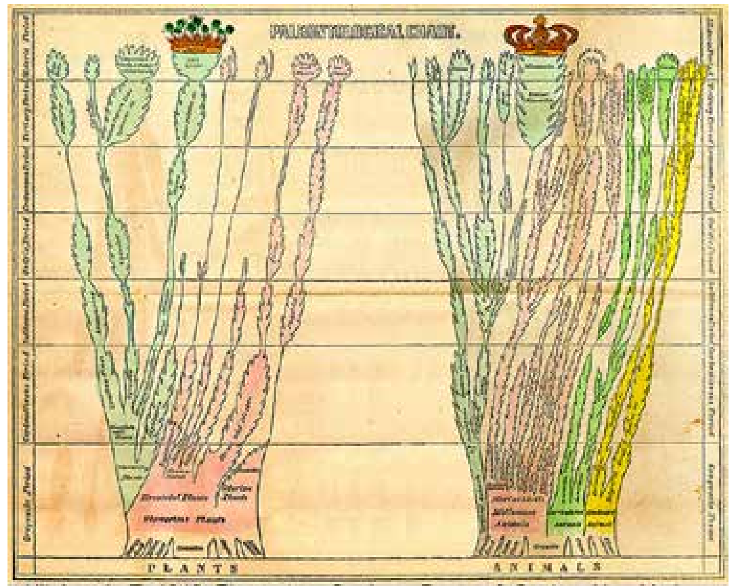
Because I have a deep need to explore relationships and place a name that is in context with the observation, these notes attempt to follow a phylogenetic arrangement. This linear pattern requires an attempt to follow the evolutionary history of organisms that brings them to their present forms on Planet Earth. It is an attempt fraught with difficulty. It purports to begin with the simplest—presumably the most primitive or original—organisms and works its way to the most complex—presumably the most advanced and modern. This is based on the very old idea of a "tree of life" where all of life is related and arises from some common ancestor in the deep past that can be traced to the present and reflects both a religious and scientific view of natural history that resonates deep within my soul and psyche.



Charles Darwin (1809-1882) jotted down this tree in one of his notebooks around July of 1837 (In the Public Domain). Note the words at the top, "I think..." demonstrating the way the mind of a curious observer of nature works when he places the older organisms at the base and the more modern branching off an obvious "tree". When his *On the Origin of Species* was published in 1859 it included only one diagram, a more fully fleshed out "tree". He made this note in the 6th edition of 1872:

The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during former years may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have at all times overmastered other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was young, budding twigs; and this connection of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear the other branches; so with the species which lived during long-past geological periods, very few have left living and modified descendants. From the first growth of the tree, many a limb and branch has decayed and dropped off; and these fallen branches of various sizes may represent those whole orders, families, and genera which have now no living representatives, and which are known to us only in a fossil state. As we here and there see a thin straggling branch springing from a fork low down in a tree, and which by some chance has been favoured and is still alive on its summit, so we occasionally see an animal like the *Ornithorhynchus* (Platypus) or *Lepidosiren* (South American lungfish), which in some small degree connects by its affinities two large branches of life, and which has apparently been saved from fatal competition by having inhabited a protected station. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications.

Edward Hitchcock (1793–1864) produced a tree in his 1840 book *Elementary Geology*. As a devoutly religious person (an ordained Congregationalist pastor) and geologist, he was concerned more with the fossil forms he was familiar with and called the tree a "paleontological chart". It is the first tree based upon this source of information but included his understanding that organisms were created by a deity at the opportune time while rejecting a six day creation. It is obvious in following the "two kingdom" view that dates back to at least Aristotle, but what leaps out to the careful observer is that both bases include speculation about multiple origins of the organisms in his "Graywacke Period" at the bottom as the "roots" of the tree splay outward. With the rise of interest in Darwin's work, Hitchcock's diagram became to be understood as a sort of phylogenetic tree. In his 1851 book, *Religion of Geology and its Connected Sciences*, he attempts a synthesis:

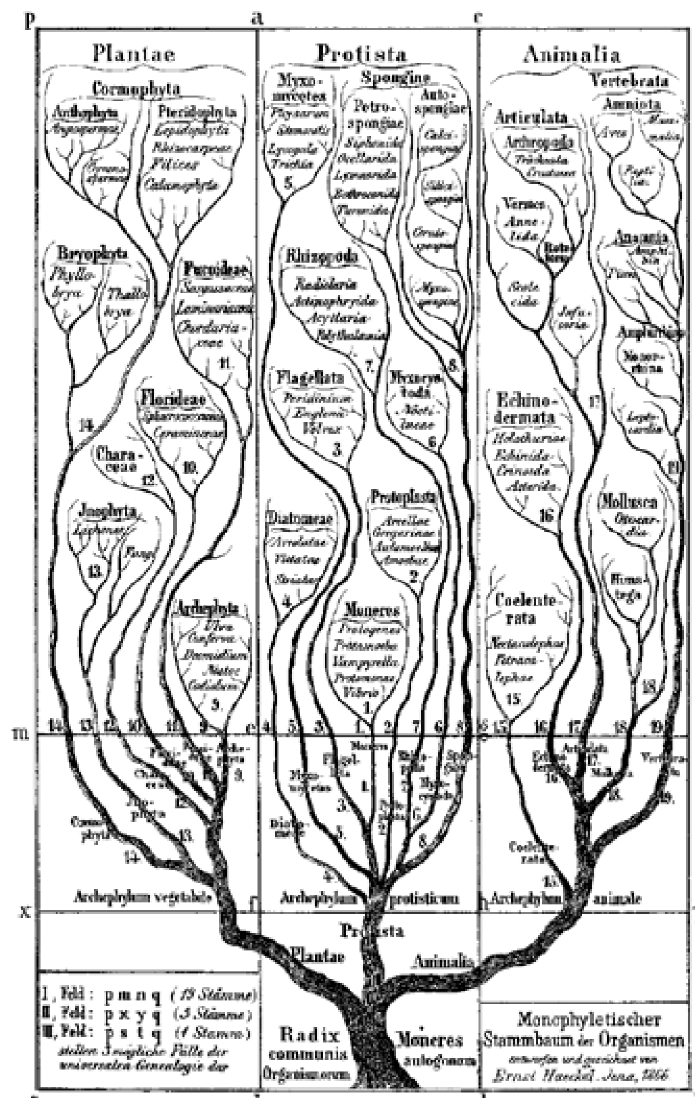


Hitchcock, E. 1840. Elementary Geology. Dayton & Saxton, New York. (In the Public Domain)

> Science has a foundation, and so has religion; let them unite their foundations, and the basis will be broader, and they will be two compartments of one great fabric reared to the glory of God. Let the one be the outer and the other the inner court. In the one, let all look, and admire, and adore; and in the other, let those who have faith kneel, and pray, and praise. Let the one be the sanctuary where human learning may present its richest incense as an offering to God; and the other the holiest of all, separated from it by a veil now rent in twain, and in which, on a blood-sprinkled mercy seat, we pour out the love of a reconciled heart, and hear the oracles of the living God."—*M'Cosh*.

Following and popularizing Darwin's work was ***Ernst Heinrich Philipp August Haeckel*** (1834-1919), a flamboyant zoologist prone to great leaps of conclusions, some based on evidence, some not. He is credited with coining several words now in the common vernacular of science: ecology (his "oekologie"), phylum and phylogeny. He is perhaps most infamous for his *theory of recapitulation* where *ontogeny recapitulates phylogeny* and human embryos pass through their entire evolutionary forms during development.

Haeckel's 1866 tree—his second—is far more fully branched and leafed out than Darwin's. His evidence was based primarily on morphology, the structure and form of organisms, and precious little in the use of fossil life forms. His extreme interest, observation and accurate drawings of the embryology of animals undoubtedly contributed to his view. "Embryology rises greatly in interest, when we thus look at the embryo as a picture, more or less obscured, of the common parent-form of each great class of animals" (Morpholgie).

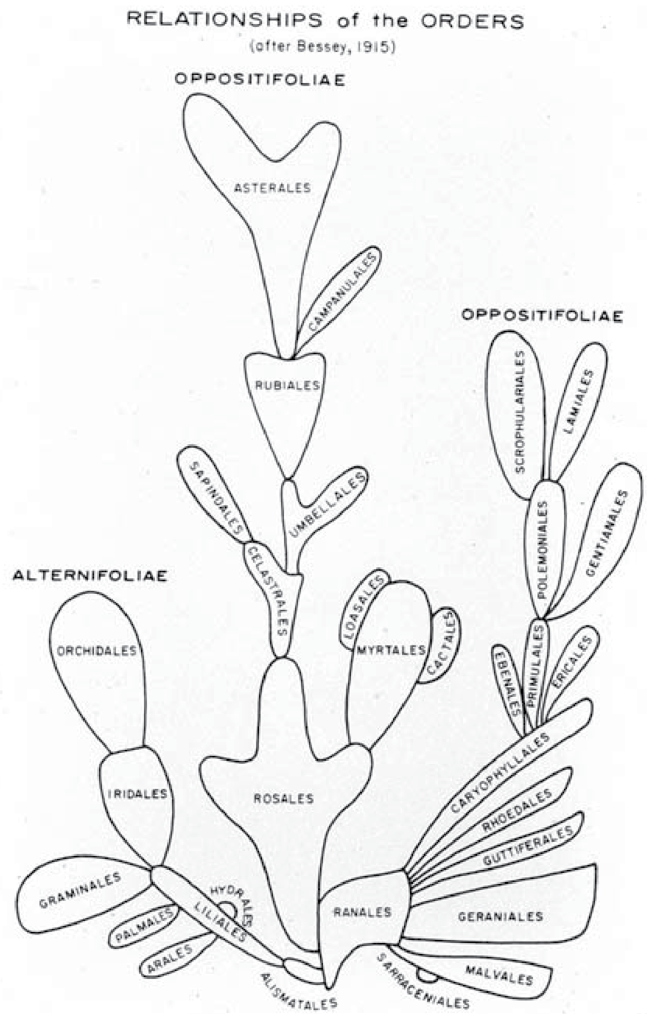


Haeckel, E. H. P. A. 1866. *Árbol de la vida según*. Generelle Morphologie der Organismen: allgemeine Grundzüge der organischen Formen-Wissenschaft, mechanisch begründet durch die von C. Darwin reformirte Decendenz-Theorie. Berlin. (In the Public Domain)

Like many before and after, his view was cosmic in that he wished to make a synthesis of all he experienced: science, religion and art. Today he remains as an influential teacher of the idea of evolution and an illustration of how careful one must be to base conclusions not just on accurate observations but on a careful methodology to test those conclusions.

His tree includes what seems to be a new, third, kingdom, *Protista* alongside the traditionally accepted *Plantae* and *Animalia* where he deals with those organisms that don't neatly fit into the two kingdom division in that they express characters of each. He attempts to answer the question "Is a euglena a plant or an animal?" with the answer "Neither, it's a protist!" Euglena, a single-celled organism has an "eye-spot" that responds mechanically to light, a chloroplast that utilizes photosynthesis for the production of food, and a flagellum that allows the cell to move. Two of these morphologies are fundamental to animals and the other fundamental to a plant. What is it?

Adolf Engler (1844-1930) and ***Karl A. E. Prantl*** (1849-1893) were the first to create a complete classification system based on evolutionary history. Their *Die Natürlichen Pflanzenfamilien* (The natural plant families) was produced in 23 volumes from 1887–1915. So monumental and influential, their work is retained in a substantial number of herbaria that arrange their plants in the Engler and Prantl order to this day. The only other arrangement system that approaches theirs in daily use is a simple alphabetic arrangement where any phylogentetic relationship is obliterated.



Bessy's Cactus. We approach a more modern understanding of phylogenetics with ***Charles Bessey*** (1845-1915). In 1915 his *The Phylogenetic Taxonomy of Flowering Plants* was published with a drawing of his idea of the relationship of plants. When one looks at it, how the name "Bessy's Cactus" came to be applied to it is pretty obvious. Much of his thinking was based on the idea of what structures were the most primitive and thus the oldest in geologic history. The simultaneous advantage and shortcoming of his "cactus" is that he understood that he could not resolve the end branches of his system and thus made them look like the broad leaves of a cactus plant.

Bessey's "dicta" are based on the idea that flower evolution is based on reduction (elimination of unnecessary parts), fusion (merging of similar parts such as the gynandrium or column of orchids), specialization (the incredible variety of nectaries), and changes in symmetry (radial to zygomorphic). He believed that simplicity did not necessarily indicate primitive but that flowers became more simple as a direct result of reduction from far more complex forms.

Bessy was the first to suggest that the magnolias are among the most primitive of plants. His basis was their large and showy nature; completely independent (no connections) parts; arrangement in a simple spiral; and, the utter simplicity of form.

While flawed, his thinking was seminal and formed the basic structure of understanding for those who followed, and his "cactus" form was carried forward by several mid-20th century botanical systematists.

The mid to late 20th Century has several celebrated phyogeneticists with seminal ideas based largely on morphology. ***Armen Takhtajan*** (1910-2009) of Russia and ***Arthur Cronquist*** (1919-1991) of the United States, lived and developed their ideas totally independently, yet when their systems—before meeting—are compared, the amount of shared conclusions is nothing short of astounding. The primary difference is that Takhtajan is a splitter on Cronquist is a lumper.

Taktajan published Система и филогения цветкорых растений (*Systema et Phylogenia Magnoliophytorum*) (1967); with Arthur Cronquist *Floristic Regions of the World* (1986); *Evolutionary Trends in Flowering Plants* (1991); *Diversity and Classification of Flowering Plants* (1997); and *Flowering Plants* (2009).

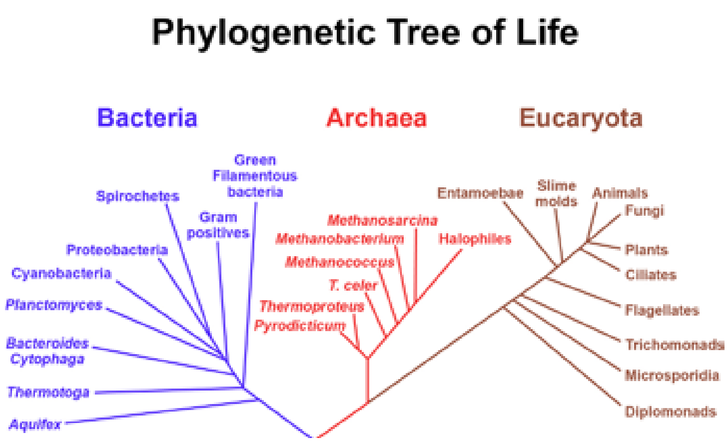
Cronquist, primarily a student of the Asteraceae, began to question the basis and details of the Engler and Prantl system that dominated phylogenetics of his day. He published the *Evolution and Classification of Flowering Plants* (1968; 2nd edition, 1988) and (1981) *An Integrated System of Classification of Flowering Plants*, both of which established the "Cronquist System". Learning of Taktajan's work in the 1960's, he decided to learn Russian and he and Taktajan became close friends. The Conquist system was adopted by the *Jepson Manual* (1993), *Flora of North America* (1993 +), *Flora of China*, *Flora of Australia* and Gleason and Cronquist's *Manual of the Vascular Plants*, which (1991) and is still is widespread use today. He was a serious critic of the developing tool of cladistics and a scathing rebuttal of it is included in his 1988 edition. The Cronquist System is now being replaced by that of the Angiosperm Phylogeny Group.

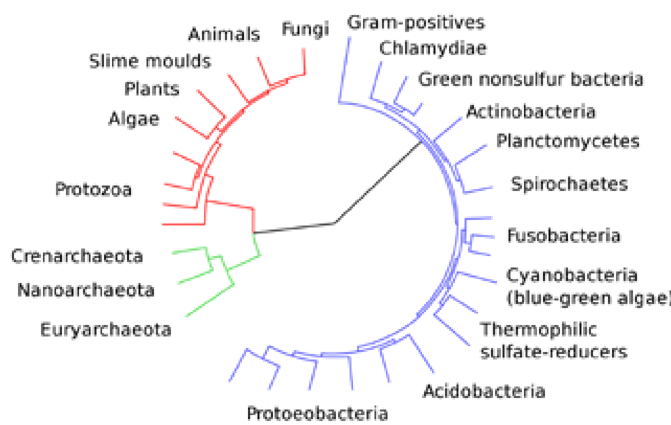
Robert F. Thorne (1920 to present) still works at Rancho Santa Anna Botanical Garden in Claremont, California and created his first system, the "Thorne System" in 1992 with *Classification and geography of flowering plants*. It was greatly expanded and modified with the publication of *A Phylogenetic Classification of the Angiospermae* and published with J. L. Reveal *An updated classification of the Class Magnoliopsida ("Angiospermae")* in 2007.

Modern understandings

Traditional phylogenetics is based almost exclusively on phenetics, the attempt to classify things based upon their morphological similarity. This tool has been largely replaced by genetics with the belief that the genome creates the morphology and the genetic code thus answers the question of phylogeny. Unfortunately, this has created a generation of scientists who can recognize ATCG codes but little or nothing in the wild. Our understanding of genetics is not yet adequate to the task of fully understanding phylogeny and I trust people who recognize things they can see first, then match that as best they can with the genome.

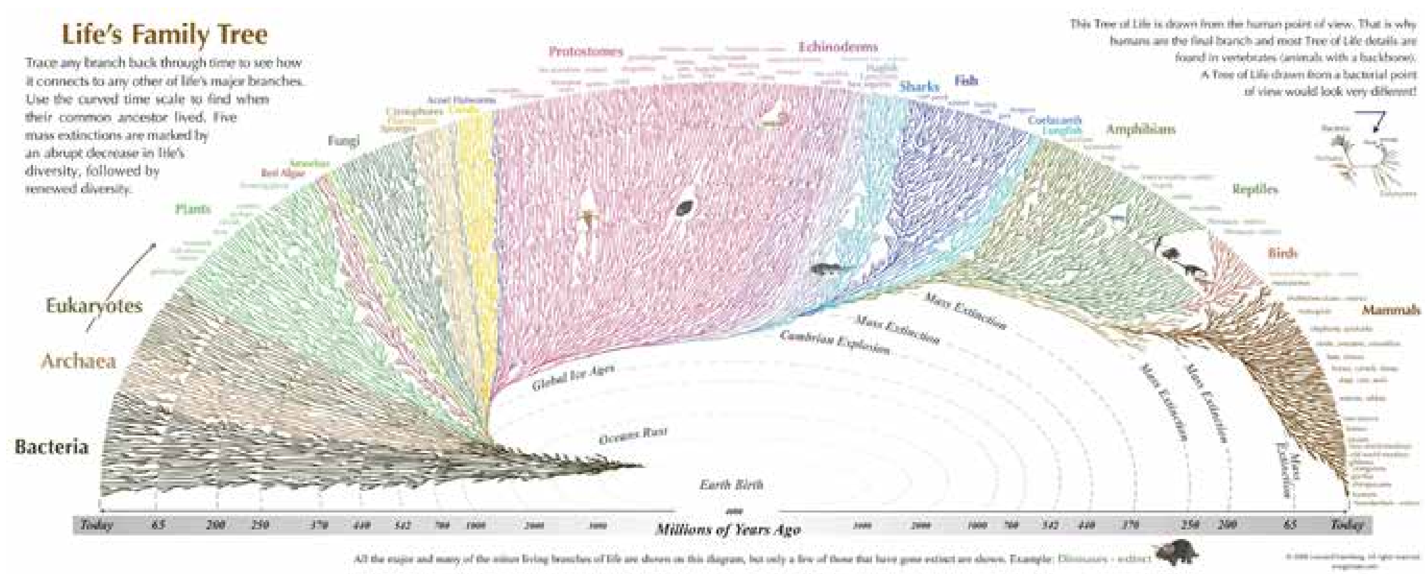
The usefulness of the concept of a "tree of life" remains robust. Current thinking finds that the most primitive organisms (prokaryotes, single-celled without organelles) are so varied and interconnected that it is difficult to consider them "kingdoms" in any traditional sense of the word. The concept remains somewhat useful for the more advanced organisms (eukaryotes, single and multiple celled with organelles) but in a state of uncertainty.





A highly resolved Tree Of Life, based on completely sequenced genomes [1]. The image was generated using iTOL: Interactive Tree Of Life [2], an online phylogenetic tree viewer and Tree Of Life resource. Eukaryotes are colored red, archaea green and bacteria blue. PNG image traced by hand to produce SVG version. 1. ↑ Ciccarelli, F.D. 2006. *Toward automatic reconstruction of a highly resolved tree of life.* Science 311(5765): 1283-7. 2. Letunic, I 2007. *Interactive Tree Of Life (iTOL): an online tool for phylogenetic tree display and annotation.* Bioinformatics 23(1): 127-8.

In some modern schemes, "kingdoms" are replaced by "domains" as the chart on the left based on the work of Carl Woese who used ssrRNA sequencing. Here the "domains" are Bacteria, Archaea and Eukarya. The chart on the right uses these three broad groupings in the color coding of the tree (Bacteria are blue, Archaea are green and Eukarya red) but emphases the next level down, which can be compared to the traditional "kingdom" but is far removed from what most people conjure up in their minds what that word means. There is significant controversy about the separation of Archaea from Bacteria. (Both charts are in the public domain.) The tree below is the most amazing and beautiful I've ever seen and can be found at http://biologylair.tumblr.com/post/29010573907/brilliant-diagram-depicting-the-phylogenetic-tree



The species problem

Are species real? In my grand attempt to synthesize what I see, much in the manner of those before me, I simply assume that species exist. My notes are utterly meaningless if species don't exist since they are based entirely on the idea of definable species. In everyday life the word is used and most people understand what it means. When one delves deeply into naming "things", the concept of species turns out to be anything but precise. Darwin's comment from *Origin of Species* (1859 p. 48) "... I was much struck how entirely vague and arbitrary is the distinction between species and varieties" could be said by just about any serious student of any of the hierarchical levels we were taught. He came to understand the word species "as one arbitrarily given for the sake of convenience to a set of individuals closely resembling each other ... It does not essentially differ from the word variety, which is given to less distinct and more fluctuating forms. The term variety, again, in comparison with mere individual differences, is also applied arbitrarily, and for convenience sake." He viewed the development of species through natural selection as a gradual process and with this understanding recognized a certain messiness of what a specific species is.

There then is perennial question "where does one draw the line?" It betrays in its very asking the arbitrariness of a human concept. From such, many maintain that the idea of a "species" is entirely artificial and hold that in nature they do not exist. What follows from that is the question, what *does* exist? At the most basic level, most seem to agree ***evolution occurs only at the local population*** level where they live to reproduce and pass on their genetic information or die and leave it in the dust of death. Some argue that this can, and does, happen at the generic level, but they are in the minority.

Georges-Louis Leclerc, Comte de Buffon (1707–1788), who today simply is known as Buffon, may have been the first to consider species based upon reproductive compatibility, but the idea became fully formed with the biological species as a theoretical concept advocated by Ernst Mayr (1904–2005) in his 1942 *Systematics and the origin of species from the viewpoint of a zoologist*. He considered "a species consists of populations of organisms that can reproduce with one another and that are reproductively isolated from other such populations". This matched with his observations of many populations. For example, in the Basin and Range of Nevada, different species of chipmunk inhabit geographically isolated mountains; their speciation is assumed to be from geographic isolation. He noted that since different scientists have different ways of identifying species, they actually have a very different concept of what a species is. He went on to identify five distinct ideas or concepts of exactly what a species is, then advocated his own, the biological species concept.

This concept, while recognized as have some reality to it, has been criticized for its inability to determine new species, particularly when the geographic isolation is not strict. If it is a true scientific theory, there should be an ability to test and falsify the hypothesis. One of its great problems is when different species reproduce when placed together such as horses and donkeys, or genera with lions and tigers, or even families with domestic fowl being crossed with guineafowl.

This represents part of the "species problem". It leads many to ask the question beginning this section—are species real—and answer it, no, they are creations of the human mind and not found in nature. There is a great reluctance to accept this idea, both by scientists and the general public. Is there a definition of species that is a true hypothesis, testable and falsifiable? This holy grail of systematics has not been achieved and with all the advances of molecular taxonomy we are truly no closer to a "scientific" definition of species than we ever were.

We slowly progress in our understanding of what we all see. Many have noted that local groups have at least some interaction with other local groups, no matter how rare. This came to be known as a "population of populations", now known as a "metapopulation". This word was coined by and based upon the ideas of mathematical ecologist Richard Levins (1930 to present) in 1970. The concept holds that local populations will at some point go extinct due to fluctuations in population size from random demographic events and that the smaller the population, the more prone it is to extinction. While these local populations may suffer a demise, the metapopluation usually survives as remnants join with other populations and repopulate the available habitat. This idea is obviously based on at least some minimal contact between populations.

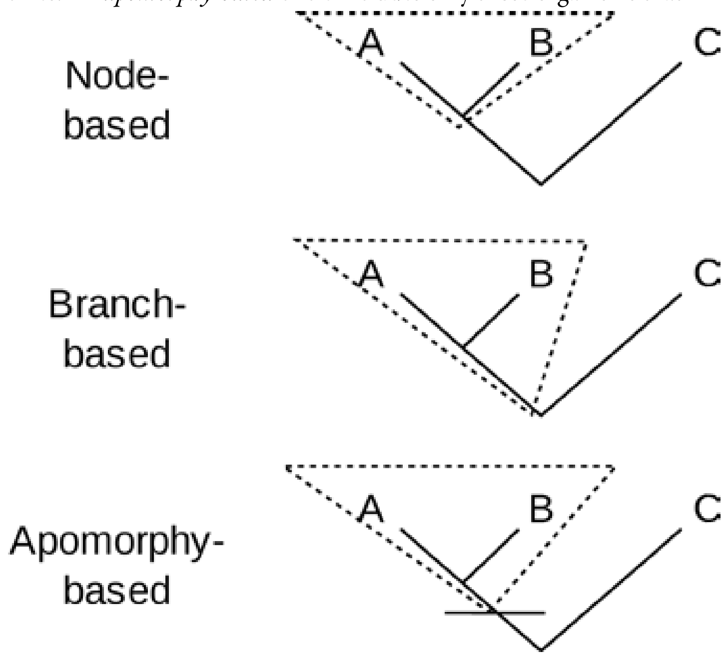
Since one of the most common concepts of the idea of species is based upon a group of organisms that can, and do, reproduce within themselves, species can evolve. Any group higher than a species has no mechanism for evolving and by this definition are not "natural". Just as any real tree one looks at today, there are big branches, little branches and branches coming off everywhere. Where one circles a group of branches to be a "related group" and place a name upon them is a task fraught with peril.

There is a strong move to abandon all hierarchical categories based upon the fact they are all the creation of the human mind and therefore are not "natural". This has given rise the phylogenetic species concept, based upon the concept of a single line of descent from a common ancestor. With this idea, the concept of hierarchies must fall by the wayside as totally artificial. While true in the specific, there remains the fact that hierarchies are well established and well known and even if not scientifically defensible with a testable hypothesis, serve very well in the communication of ideas. If you believe, as I do, that communication is the single most important goal of scientific advance, this is no bad thing.

Cladistics

Entomologist ***Willi Hennig*** (1913–1976) wrote *Phylogenetic systematics* in 1966 and emphasized a classification based upon insects that shared derived characters (*synapoporphies*) and created a graphical tree to illustrate his classification. In its simplest form, a *clade* (from the Greek κλάδος, *klados*, branch which gives rise to the alternate name *cladistics*) is a single branch on the Tree of Life. It contains the most distant ancestor known and all of its descendants which is defined as a *monophyletic* group.

In this diagram (in the public domain) illustrating the relationship between A, B, and C, three very different views of how to "circle" the tree to give supraspecific names are seen. With a *node-based* (top, A+B) system, only the "crown groups" are circled as being the last ancestors. Strict cladists consider each of these nodes as worthy of a name, but they bear no resemblance to the Linnæan hierarchy. A *branched-based* (sometimes called stem-based) circling includes the "stem" below A+B for all organisms that are not an ancestor of C. Including the branch below the last common ancestor is closer, but still far removed from the Linnæan hierarchies. An *apomorphy-based* circle includes only those organisms that share a specific derived character (shown on the chart by the horizontal line)



Those with a more traditional, morphologic (Linnæan) view rebel as this produces a chaotic population of names that cannot be compared across the tree. A large number of workers today combine what they consider the best of both systems and retain the Linnæan hierarchies as being useful for communication, if not particularly "real" in a natural sense, as they are well-entrenched and widely used.

With the exception of biological soil crusts and photobionts in lichens (cyanobacteria), my notes deal entirely with the Eukarya. When the "tree" of Eukarya is branched and leafed out as in the ***Tree of Life Web Project*** [http://tolweb.org/tree/], it becomes so complex that one must literally dive deeply into the branches for them to make sense with our cursory knowledge of life.

For plants, the ***Angiosperm Phylogeny Group*** (***APG***) has produced, by consensus of the participating botanical scientists, three trees of angiosperm phylogeny, called APG I (1998), II (2003), and III (2009). While not universally accepted, their classifications have received widespread interest if not acknowledgement. This classification is largely based on molecular evidence using the principle that a clade (a line of continuous ancestry) should be monophyletic, including only the direct line. The trees that result from this can be difficult to reconcile with the Linnæan hierarchy. Where the circles are drawn around the branches can be a more a matter of preference than evidence-based science. This has led to some massive lumping and splitting of groups from family up. Many modern floras use APG III as a base classification but add their own interpretations when they disagree. I'm mostly following my botanist friend and author Alan Weakley and his arrangement of families. Curiously, Darwin's sketch more closely matches the more modern concept of an impenetrable thicket than a neat and tidy tree.

How my notes are arranged

My notes are arranged phylogenetically, in a linear sequence. I begin with the simplest organisms I've found, the cyanobacteria in biological soil crusts and some lichens, and work my way to the vastly more complex mammals. I use the six kingdom system where slime molds, fungi, algae, plants and animals are in their own. I'm not quite ready to abandon them, but recognize that the protozoans make a mess of it. I make ample use of these suprafamilial groupings: kingdom, phylum, class and order. In many branches of the tree of life each of these is often divided into subgroups that I usually ignore but sometimes include. Where the traditional hierarchal structure fails to describe the phylogeny I feel free to abandon it and use a less formal group name, such as "Magnoliids and Primitive Angiosperms". I use what I can determine as the most reliable source for current thinking on phylogeny and the order that it dictates and pretend no expertise. At the level of family and below there is far less resolution to the question of phylogenetic order. Some groups have the families arranged phylogenetically but most are simply alphabetized when phylogenetic information is unavailable or hopelessly incomplete at this time.

There are no divisions by color, leaf, or anything easy. White flowering plants are not together and whales are not in the same place as seals and sea lions. The advantage of the phylogenetic approach is that all entries follow a family pattern where everything related is near its closest relatives, at least as I understand it today. This can lead to an integrated view of life here, not so different in many ways from the synthesis of those who took notes before me.

Names

The only purpose for a name is effective communication. Let this principle guide all who read the following.

Scientific Names

Scientific names in their current form come from Linnæus. The name is a binomial, "two names". The first is the genus and the second is the specific epithet, hence the name for our species is *Homo sapiens* Linnæus. By strong tradition, the name, *Homo sapiens*, is italicized but the author, Linnæus, is not.

Each entry begins with my best attempt at matching my observations with available literature to come up with a name for the organism. There are surely misidentifications where my either my observations or available literature are inadequate to the task. Where I'm aware of this I indicate in my notes, so beware. All misidentifications are my responsibility.

The applied name is what I determine is the organism's most currently accepted scientific name, complete with author's full last name, and where available, the date named. These last two are not usually included in field guides but I find them as fascinating at the historical level and they give a wonderful indication of the work done by those who came before us. Anyone who gives more than a casual glance at these notes will find many names repeated and I encourage a bit of research into those people.

There are several systems for "rules" of nomenclature. There is the *International Code of Nomenclature of Bacteria*, the *International Code of Nomenclature for algae, fungi, and plants*, and, the *International Commission on Zoological Nomenclature*. They all have different standards for naming and none regulate the names higher than order so there is mass confusion there. All the names and authorities I include follow the rules of the appropriate organization as best I can determine from sources I indicate in the references for each section.

For authorities (the author of a scientific name), when a name is in parentheses it means the name has been changed, at least once. For plants, the name in parentheses is the first to use the basionym (literally, "base name") and the name after and outside it is the author of the current name. The date of the name is not prescribed for plants. For animals, the name in parentheses is the name of the author of the given name and indicates that it had another name in the past whose author is not included. The date of the name at hand is prescribed for animals.

References that I use for identification, taxonomy and nomenclature are included at the beginning of each section of life since they tend to be highly specific for that grouping of organisms and each has their own rules for naming and formatting of those names.

Pronunciation

Scientific names are defined as being Latin, or, more accurately, Latinized. Latin pronunciation is a bit controversial. In my experience, the three forms of Latin I'm familiar with—classical, scientific and liturgical—frequently disagree with each other on pronunciation. There are some basic rules of Latin that can help one at least approach what may be truly Classical Latin, the language spoken by Cicero (106 BC - 3 BC):

- The letter "c" is <u>always</u> hard, so Cicero is *KIH - ker - oh* instead of the common American *SIH - sir - oh*. This rule is rarely, if ever, followed in America.
- The combination of "ch" is almost always hard as it comes to Latin from the Greek letter X*, chi*, which is a hard "k" sound. This rule is used sometimes, ignored in others, in common American usage.
- Syllables <u>always</u> begin with a consonant. American pronunciation tends to split the syllables with their etymology or roots rather than a fixed position.
- In Latin words of two syllables, the stress is on the first syllable. In words of three or more syllables, the stress is on the penultimate (next to the last) syllable if this is heavy (containing a long vowel), otherwise on the antepenultimate (third from the end) syllable. The only way to determine if the vowel is long or short is to consult a Latin dictionary. More often than not, the accent is antepenultimate.

I attempt to give a Classical Latin pronunciation followed by what I more commonly hear in America. I've spelled out the syllable in a manner that attempts the pronunciation using common words or sounds. The accented syllable is in all caps. I am no Latin scholar and there was no one alive to hear or record Cicero talking so the matter is not going to be settled. My best advice is to simply not worry about it and if you run into a Latinophobe, start speaking Klingon! Americans are often laughed at when speaking scientific names at European meetings, so join them and laugh it off.

Etymology

I have attempted to discern the meaning of each scientific name from its etymology. This is fraught with peril as the author may have had some other and very different reason for choosing a name that I'm totally unaware of. Most original descriptions do not include explanation for the choice of the name. Since they are based largely on Greek and Latin, many are readily available. Many remain abstruse and my attempts to determine them will fall short of perfection. I have used a great many resources for these names, far too many to acknowledge here, but the *Flora of North America* has proven a wonderful resource for generic names for plants, Schalkwikjk-Barendsen for fungi and the *Helm Dictionary of Scientific Bird Names* for birds. I have made extensive use of several online etymological, Latin, and Greek dictionaries. I long for a comprehensive dictionary of scientific names since they give at least a glimpse into the mind of the person who named the organism. Full references are given for each section of treatment.

Taxonomy notes

Because scientific names are based upon relationships, if the understanding of the relationship changes and an organism is found to be in a new genus, the name is required to change to the new genus and the specific epithet must match the grammar of the new genus. This is a vexing problem for many, especially those who were taught that scientific names were "more stable" than common names. As the evidence from molecular studies accumulates, some of our older, phenetic (classification based upon the similarity of identifiable traits; gross morphology) ideas prove wrong or misleading. Names change, get used to it.

Where "taxonomy" notes occur in the accounts, I attempt to explain the rationale for the currently accepted name. I include many other names (synonyms) and date of publication that have been used for that organism. I find they provide bit of history of how the organism has been viewed over the years.

Synonyms

Synonyms (different names for the same organism) are included and illustrate the thinking of various workers. For many organisms, the history of nomenclature is complex. I try to include the rationale for the change when I can determine it. These complexities arise for many reasons including:

- orthographic variants (spellings and misspellings)
- several workers on an organism giving different names to it (the earliest validly published name has priority). Many organisms in Southeastern Alaska have a circumpolar distribution and with such a wide range, have had their various populations given unique names by different workers from Europe, the Americas and Asia. Many remain unresolved and there are significant differences in interpretation between the *Flora of China* and the *Flora of North America* with plants that live in both ranges (*Aruncus*, for example).
- "lumping" and "splitting" circumscriptions (where and how big—or small—one draws a circle around a group)
- a completely new understanding about the phylogeny of the organism.

English Common Names

As common names are *not* proper nouns, they are not capitalized except for birds, where the American Birding Association (ABA) and American Ornithological Union (AUO) usage calls for their capitalization. There is a long-standing tradition in botany not to capitalize common names yet many do.

I believe "common" names must be exactly that. By that I mean they must be in the common vernacular of the local area. I dislike names created for English usage by simply transliterating the Latin scientific name and I try hard not to use them unless they fit my understanding of the word common. Even where fitting into the common vernacular, I despise the use of "false" when appended to any organism as each deserves its own name as nothing in nature is "false". I include them only because they occur often in the popular and scientific press, but attempt to include another, less pejorative, appellation. I include a few new common names that seem to be developing a foothold, at least locally ("shy maidens") or one I'd like to become common ("candy corn mushroom").

If discerning the meaning or origin of a scientific name can be "abstruse", it is far much more so with common names, and many explanations of their origin may be as fanciful as the name.

Tlingít Names

The indigenous people of this area, the Tlingít, "People of the Tides", have a rich heritage and relationship with the land and a unique language. While related to the Athabascans from the interior of Western North America, they share no cognates—words with a similar origin. Their geographical isolation from ancestral stock, for perhaps as long as 4,000 years, has resulted in essentially a new language. I have used many sources for Tlingít names, but these three have proven the most useful.

Edwards, K. 2009. *Dictionary of Tlingit*. Sealaska Heritage Institute, Juneau, Alaska.
Institute of Social and Economic Research, University of Alaska Anchorage. *Interactive Alaska Native Languages Dictionary*. http://www.alaskool.org/language/dictionaries/akn/dictionary.asp.
The Kayaaní Commission. 2006. *Ethnobotany field guide to selected plants found in Sitka, Alaska*. The Kayaaní Commission of the Sitka Tribe of Alaska (abbreviated Kayaaní).

My Tlingít friends in Juneau, Andra Martin and Yarrow Varra, have provided much help in understanding Tlingít naming conventions, names, culture and the very difficult pronunciation of Tlingít words. As hard as I try to make the sounds, Andra always laughs—lovingly—at my mispronunciations.

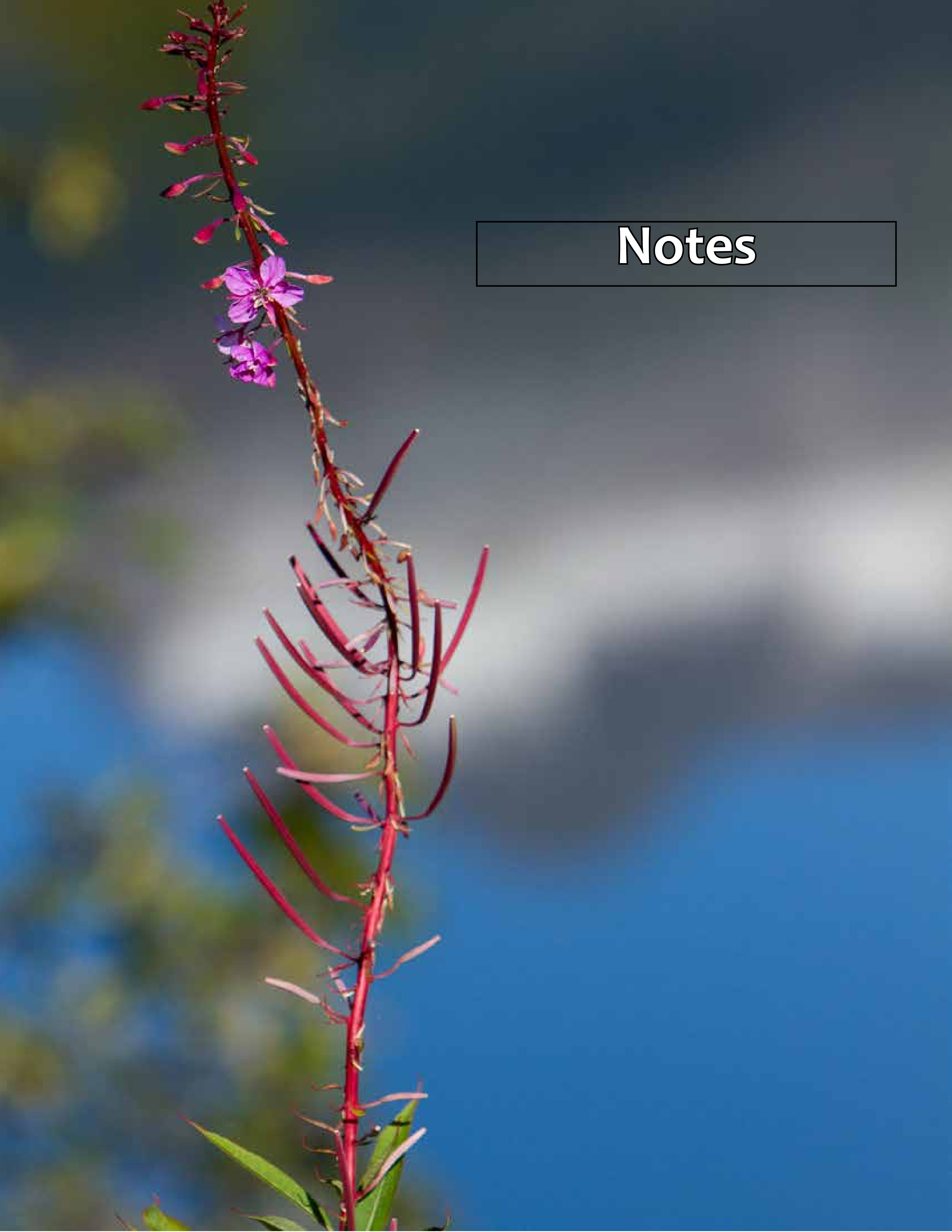
Alien Species

Those species not native to the Juneau area are marked with an asterisk. The Juneau area is blessed with a decided lack of invasive—those that take over from native—species. Most of our aliens are "well-behaved" in that they limit themselves to ruderal (disturbed) areas.

Photography

In addition to my ever present field notes book, my cameras are a primary note-taking tool as I'm terrible at drawings. All photographs are mine with a few by my wife, Annette Ranger, where noted. My intent is to provide an illustration that is pleasing to the eye yet a good representation of the organism and where it lives so that others might find it a bit easier to identify. I am not a photographer. I'm a naturalist who uses a camera as a tool to record and remember. I have taken well over 100,000 photographs. This means that occasionally a photograph rises to something greater than a "record shot", but don't look for art in my photography here. If you find it, enjoy it. I am an opportunistic photographer: I take photos when I have the opportunity. I have more interest in the natural history than the photography and take pictures where I am, when I'm there. I don't have the time or inclination to plan to be at some location at the "golden hour" as I'm too busy observing nature. For this reason my photography is uneven. Since these are *my* notes, I feel fully justified to us *my* photography. Criticize at your own peril. All photographs are from my study area in Alaska.

Notes



Kingdom Bacteria (Cohn, 1870) Cavalier-Smith, 1983 ex T. Cavalier-Smith, 2002

Greek βακτηρία *baktēria*, staff, cane; referring to the rod shape of the first discovered.

Bacteria are single cell *prokaryotes* which lack any membrane-bound internal organelles, including a nucleus. I'm following the more traditional circumscription of all such organisms even though modern genetic studies have shown them to by polyphyletic. After all, I'm only including one very specific form of bacteria that I'm familiar with in the field. The division into more than one kingdom—or domain—has been controversial and numerous synonyms are in use that confuse rat than elucidate. The Bacteriological Code deals primarily with the genera and species and not suprafamilial names.

Phylum Cyanobacteria Stanier, 1974 ex Cavalier-Smith, 2002

There is no consensus nor official taxonomy of cyanobacteria. Most of the names used are not validly published under the Bacteriological Code. They used to be called "blue-green algae" but the fact that they are single-celled organisms without any multiple cell structure, they most certainly do not belong with algae. While many are colonial and can form aggregates large enough to see with the naked eye, they remain unicellular organisms lacking organelles with the exception of being able to photosynthesize, that is, convert light energy into food energy. They do this with the chemical phycocyanin that is bluish in color and gives them their name (κυανὀς *kyanós*, blue) that occurs in the folds of the cell membrane but is not a developed organelle. They also have the ability to aerobically convert atmospheric nitrogen (N_2) into the nitrate (NO_3) form that plants can utilize. Cyanobacteria account for as much as 30% of the earth's oxygen!

Biological Soil Crust, unidentified cyanobacteria

Our recently deglaciated areas come close, at least at times, to being arid, the "normal" habitat for biological soil crusts. The outwash plain of the Mendenhall Glacier on the Moraine Ecology Trail has been downright arid several times in my experience here as the photo on the left illustrates. The other "arid" habitat is the high alpine as atop Mount Roberts for the photo on the right. These photos show the shrink cracks that form as the soil crust dries, very similar to mud cracks. In both cases, the crust is about 1 cm thick and the largest intact spreads are about 10 cm across. There is a distinct blueness to this mass, both when dry and fully hydrated that surely derives from a large amount of cyanobacteria. I find this in the areas furthest from what are normally called "plants" and often forms atop the sand of the outwash plain and the primitive soil (not rock) of the alpine, as a uniform mass. Both of these are pioneer environments where few living things dare to tread.

> Crusts are formed by living organisms and their by-products, creating a surface crust of soil particles bound together by organic materials. Above ground crust thickness can reach up to 10 cm. The general appearance of the crusts in terms of color, surface topography, and surficial coverage varies. Mature crusts of the Great Basin and Colorado Plateau are usually darker than the surrounding soil This color is due in part to the density of the organisms and to the often dark color of the cyanobacteria, lichens, and mosses. Crusts generally cover all soil spaces not occupied by vascular plants, and may be 70% or more of the living cover.
>
> These crusts are characterized by their marked increase in surface topography, often referred to as pinnacles or pedicles. The process of creating surface topography, or pinnacling, is due largely to the presence of filamentous cyanobacteria and green algae. These organisms swell when wet, migrating out of their sheaths. After each migration new sheath material is exuded, thus extending sheath length. Repeated swelling leaves a complex network of empty sheath material that maintains soil structure after the organisms have dehydrated and decreased in size. Frost heaving, subsequent uneven erosion, and lack of surface plant roots results in high pedicles. In in warmer regions such as the Sonoran, Mojave, and Chihuahuan deserts, lack of frost heaving has been used to explain the absence of pinnacles. In northern deserts, where most rain falls in the winter and surface plant roots are plentiful, crusts are generally rolling or smooth.[www.soilcrust.org]

Cyanobacteria colonies in ***Peltigera britannica***, freckle pelt

This lichen has two *photobiont* (a photosynthetic life form) associates, a green algae (*phycobiont*) that gives the thallus its grassy green color; and, a cyanobacteria (*cyanobiont*)—probably in the genus *Nostoc* [1]—that grows in *cephalodia* on the upper surface of the lichen. These are the wart-like structures that form raised pustules on the surface of the thallus housing the cells of the cyanobacteria visible in the photo and give the lichen its common name. Identification of the cyanobacteria requires culturing and microscopic examination. These cephalodia apparently function as vegetative reproductive bodies as the cells are easily dislodged allowing the cyanobacteria to grow on its own or find another fungus to call home.

This lichen is abundant growing in the moss carpet of glacial outwash plains, abandoned stream beds and disturbed areas that are being recolonized by moss and vascular plants. In these areas it is often subjected to periods of dessication of several weeks where the green color of the thallus is replaced by an ashy blue-white. The cyanobiont requires liquid water to perform photosynthesis to produce glucose.

[1] Rikkinen, J. 2002. *Cyanolichens: an evolutionary overview*. in Rai, A.R., B. Bergman & U. Rasmussen, eds. 2002. *Cyanobacteria in symbiosis*. Kluwer Academic Publishers, New York.

Kingdom Protozoa (Goldfuss, 1818) R. Owen, 1858

While recognized and named long ago, this "kingdom" is so full of problems that many prefer to abandon it. The idea of linear transfer of genes, that is from ancestor to descendant, is at work here, but there is a great deal of lateral gene transfer as well. Single celled organisms don't just divide and produce offspring directly, but can include the genes of other individuals as well. The kingdom as circumscribed simply represents a convenient category to place the myriad of single celled organisms that may, or may not, be related to each other in a ancestor-descendant relationship. It is surely polyphyletic.

Phylum Amoebozoa (Lühe, 1913) Corliss, 1984

Greek ἀμοιβή, *amoibė*, change

Amoeba have long been recognized (discovered by August Johann Rösel von Rosenhof in 1757) as single-celled organisms without a traditional cell wall allowing the cytoplasm to move and change shape. Early on, they were called *Proteus animalcule* from the Greek god Proteus, a very early "shape shifter".

Some, especially Thomas Cavalier-Smith (Professor of Evolutionary Biology in the Department of Zoology, at the University of Oxford), elevate this section of single-celled organisms to Kingdom rank where it would be Amoebozoa Lühe, 1913 emend. Cavalier-Smith, 1998. Others leave it unranked or call it a "supergroup" and await further study to properly place it.

Below this is the unranked Mycetozoa (de Bary, 1859 ex Rostafinski, 1873) Cavalier-Smith, 1998, that has been considered both a phylum and in "infra" phylum containing three classes of lime molds: Dictyostelia, Myxogastria, and Protostelia)

Class Myxogastria (E.M. Fries, 1829) J. Feltgen, 1889, orthography emended, slime molds

Greek μυχα *myxa,* mucus, to Classical Latin *mucus*, mucus + Greek γαστρικός, *gastrikos*, stomach extended to eater or devourer, for "slimy devourer".

Once one has seen a slime mold (especially if a finger is placed upon it!) it takes little imagination to make a connection between this most bizarre actual organism and the alien creature featured in the 1958 movie "The Blob" where Steve McQueen made his screen acting debut. Some reviews of the movie call it an "amoeba", foreshadowing modern understandings of just what this strange organism is.

Slime molds are enigmatic and have been placed into three kingdoms: Fungi, Protozoa and Amoebozoa. Their taxonomy is poorly understood and the nomenclature of its divisions are not uniformly accepted. *Index Fungorum* (my main source for fungus taxonomy) and the *Integrated Taxonomic Information System* (ITIS) still classify them as fungi with suffixes referring to plants, hence the name "molds". If one considers them such, their hierarchy would be: Kingdom Fungi; Division Myxomycota; Class Myxomycetes.

Because these acellular (lacking cell walls or membranes) organisms seem to behave more like a collective of single celled organisms, the more recent treatments [1] consider them protists with suffixes referring to animals rather than plants, a decision I follow here. This is due to their amazing behavior as a mass of individual cells swarm together and fuse into what appears to be a massive single cell of cytoplasm with thousands of diploid nuclei. There are three main evolutionary paths they've taken: plasmodial slime molds, cellular slime molds and slime nets.

Warning: this is a world where my knowledge is extremely limited! I'm improving at spotting, but not identifying slime molds.

[1] Baldauf, S.L. & W.F. Doolittle. 1997. *Origin and evolution of the slime molds (Mycetozoa)* in Proceedings of the National Academy of Science USA 94: 12007–12012
Stephenson, S.L. & H. Stempen. 1994. *Myxomycetes: a handbook of slime molds*. Timber Press, Portland, Oregon.

Order Physarida Macbride, 1922

Family Physaridae Rostafinski, 1873

Physarum Persoon 1794

FEYE-zahr uhm New Latin, modification of the Greek φῡσάριον *physarion* small bellows; diminutive of φῦσα *physa,* a pair of bellows. It can also mean breath, wind, blast; wind in the body, flatus; breaking of wind. Since these relate to foul smells, this could be the derivation of the name.

Physarum polycephalum Schweinitz 1822, rotten egg slime mold, scrambled egg slime mold




poly-SEE- fah-lum   Greek πολλοί, *polloi*, many + κεφάλι, *kefalos*, head hence “many headed” referring to the acellular plasmodium with many nuclei.

In 2009 I came upon this obvious slime mold on the East Glacier Trail just before the pile of lumber and metal rings and a week later there was no visual evidence it was ever there. When I touched it with my finger, the slime stuck to it and pulled away in a mass. It appears to be simply sitting atop the moss layer and not penetrating into it. In 2010 I encountered it several times on East Glacier Trail, always in deep shade atop big red-stem moss (*Pleurozium schreberi*) and completely encasing some of the stems. One day I led two hikes on the same day and found the slime mold had increased in size between my two observations. In 2011 I find it in the exact same location, leading me to the conclusion that spores of this are released and remain in the same area to grow a new organism each year. Each year it always appears as a slime over big red stem moss. Unlike *Fuligo septica*, this slime mold is less continuous and seems to extend deeper into the moss layer rather than simply covering the top of it as both of these photographs illustrate. This slime mold seems to move somewhat randomly in all directions, and when it find something to eat, it sends more protoplasm and forms the globular blobs of plasmodium at that spot.

I took the top left and bottom right photos on August 19, 2012 and this one of the lower patch on September 8. The yellow plasmodium has done its job and now is a blackened and dry sooting patch atop the moss, the now dead leftover of the plasmodium as it occupied a random pattern on the moss and not the normally circular or elliptical of fully rotted inky cap mushrooms. Just before this stage the plasmodium apparently forms masses of spores that are then released into the air to grow new organisms.

Fuligo Haller 1768

FOO-lih-gō Latin *fuligo*, soot; presumably from the black residue that forms when the organism dies.

Fuligo septica (Linnæus) F.H. Wiggers 1780, dog vomit slime mold

SEHP-tih-kah Latin *septicus*, from Greek ςεπτικος, *sēptikos*, from *sēpein* to putrefy

What an incredibly fitting common name for this amazing slime mold! The exterior of this mass of plasmodium has a structure to it that reminds me a bit of the exoskeleton of a "Bucky Ball" in that there appear to be many hundreds of strands of dried plasmodium that radiate out from centers forming a roughly spherical pattern that give it a slightly hairy appearance. Is this simply the result of drying out or is there an "organization" to it from the plasmodium? I suspect it is simply the pattern that randomly develops from drying. It just cries out for a touch, so in the second photo I dip my forefinger into the goo, exposing an interior that for all the world looks like lemon custard!

I'm curious about the specific epithet, *septica*, as it implies the organism has some antibiotic ability. Wikipedia makes this note:

> Extracts from *F. septica* show antibiotic activity against *Bacillus subtilis* and *Candida albicans*, and cytotoxic activity on KB cells (a cell line derived from a human carcinoma of the nasopharynx). [http://en.wikipedia.org/wiki/Fuligo_septica]

The plasmodium is eaten in Cofre de Perote in the state of Veracruz, Mexico where it called *caca de luna*, the "moon's excrement" or "poop of the moon" or more literally, "shit of the moon", apparently because the plasmodium appears overnight.

Keller, H.W. & S.E. Everhart. 2010. *Importance of Myxomycetes in Biological Research and Teaching*. Fungi 3 (1).

Instead of the usual bright yellow, sometime it is mass of slime mold is an ashy pink. This is because it is making a change from a feeding mass, the plasmodium, into a reproductive structure, the *aethalium*. Here the upper surface forms a network of dried plasmodium that creates something like a net over the hydrated plasmodium below that reminds me of a brain. As more plasmodium dries, it forms a hard crust that presumably protects the plasmodium underneath as it changes by meiosis from a mass of cytoplasm with scattered or aggregated nuclei into discrete nucleated haploid cells that form multi-celled spores. When the spores have been created, the entire mass dries and the spores become a mass of dry powder that is easily spread by wind or various crawling creatures. Judging by the freshness—and sliminess—of this mass when I put my finger in, it has several days to go before sporogenesis is complete.

I find this curious slime mold each season on almost every trail I hike, usually in late July or August. It becomes a favorite simply because of its common name, one that immediately justifies interest!

Trichiales T. Macbride 1922

Family Trichiaceae Chevallier 1826

Hemitrichia Rostafińsky 1873

he-mih-TRIH-kee-uh Greek ἡμι- *hemi-*, half + τρίχα, *tricha*, hair.

Hemitrichia calyculata (Spegazzini) M.L. Farr 1974 (?)

Latin cah-lih-CUE-lah-tah, American cah-lick-you-LAY-tah Latin *calyculus*, a small cup.

This identification is tentative, but what I see matches many reports and photographs that I find [http://m.discoverlife.org/mp/20q?search=Hemitrichia seems especially close and authoritative]. I first spot this unique salmon-orange slime mold on the Trail of Time on September 10, 2011 and only recognize it as a slime mold. On September 26, 2011, while hiking on the Amalga Trail I came upon an almost eye-level 2-foot downed log missing most of its bark and heavily covered with moss. On the mostly bare wood section this collection of very obvious orange balls sitting atop a pale white to cream stalk grabs my attention, even though they are tiny. The orange color is dramatically different than anything else I've seen today so it caught my eye. The largest of the balls is only 1 mm across. If I'm interpreting what I see correctly, these are a very young stage of "fruiting" for this slime mole when the sporangia—the orange balls—are raised up on stalks to spread the spores. When ripe, the orange balls form tiny balls of spores that sit in a cup atop the stalk (hence the specific epithet).

This find made me go back and look at my photo (on right) of a similar slime mold on the Trail of Time taken two days before. While more crowded and not on stalks, I'm sure they are the same species with this one earlier in its growth stage.

Unidentified slime mold plasmodia



I've gotten pretty good at spotting unusual things while hiking the trails of Juneau and on August 3, 2011 I spotted this (left photo) unique creamy yellow massing of pear-shaped slime mold sporangia atop a mix of *Pleurozium schreberi* (small leaves on the right) and *Plagiomnium insigne* (larger, translucent leaves on the left) on East Glacier Trail near "the flats". With my very limited knowledge and experience with these very strange organisms, they remind me of the *Stemonitis* I've seen in Georgia. The slime mold is simply using the moss as a platform for living as there is no visible connection inside the moss and the yellow sporangia are held above the moss leaves by a thin white stalk. I spotted what seems to be the same mold, probably earlier in its life cycle (based upon the more creamy rather than tan color) on September 16, 2011 also on East Glacier Trail, here in "the green area" of the switchbacks before A.J. Falls. On August 7, 2012 the deep orange-red color of the mass on *Pleurozium schreberi*, big redstem moss catch my eye for the lower left photo, also on the East Glacier Trail in very much the general vicinity of the other two.

These is probably in the Trichiales as the previous species based upon the bright colors (most others are gray or brown) and the morphology of the sporangium.

Phytoplankton

This group of organisms is defined not by their phylogeny but by their niche in the marine aquatic system. They can be found in two kingdoms with the protozoans (here the Myzozoa) and the algae. Their name comes from the Greek πλαγκτός *planktos*, which is often rendered in English as "drifter" as these organisms are at the mercy of the motion of the ocean currents. As a group, phytoplankton are important as the photosynthetic component of all the "drifters" in the ocean and account for half of all the photosynthetic activity on Planet Earth! They are thus the single most significant source of atmospheric oxygen.

These notes result from my participation in Gastineau Guiding's "Whales & Glaciers - Citizen Science Adventure" where, as a part of the program, we make a 100 foot deep plankton pull, collect our sample and examine some with a microscope on the boat. Some days this is easy, most it isn't as the boat isn't exactly a stable viewing platform when looking at microscopic creatures at 100 to 400 power!

Phytoplankton are marked with a superscript P (^{P}) in front of the genus or species name.

References

Gano, S. 2011. *Phyto*, A Phytoplankton App for the iPod Touch and iPhone. Center for Coastal Environmental Health and Biomolecular Research division of the U.S. National Oceanic and Atmospheric Administration (NOAA).

Phytoplankton Monitoring Network — http://www.chbr.noaa.gov/pmn/
PLANKTON*NET - a global plankton resource — http://planktonnet.eu/
Smith, D.L. & K.B. Johnson. 1996. *A Guide to Marine Coastal Plankton and Marine Invertebrate Larvae*, 2nd ed. Kendall/Hunt Publishing, Dubuque, IO.
WoRMS: World Register of Marine Species — http://www.marinespecies.org/index.php [my primary source for nomenclature]

Phylum Myzozoa Cavalier-Smith & Chao, 2004

Class Dinophyceae (Bütschli, 1885) Pascher, 1914

Order Gonyaulacales Taylor, 1980

Family Ceratiaceae Kofoid, 1907

P ***Ceratium longipes*** (Bailey) Gran, 1902

Greek κεράτιον keration, something horned; referring to the three horns common to the genus.

This is the only species I'm able to put a name to, largely because the folks at NOAA here tell us this is the only three-pronged *Ceratium* found in SEAK waters. When searching the slide, when one comes upon this dinoflagellate, one stops and utters an audible "whoa!" as these are striking in morphology.

Alga

The phylogeny of algae are in a great state of flux and the nomenclature used for it confusing. The same name is often used to circumscribe a very different collection of organisms depending upon the worker. For this reason, and the fact that I know little of this realm and its Alaskan members, I leave it in the broad sense and use only the common name. It remains a useful, if not natural, grouping as most people have at least some fundamental understanding of the word: those mostly photosynthetic organisms that are not plants. This includes brown algae (Phaeophyceae), diatoms (Bacillariophyceae), dinoflagellates (Dinoflagellata), red algae (Rhodophyta) and green algae (Chlorophyta). Because this grouping does not include green land plants, it is paraphyletic with regard to the red and green algae as they share a common ancestor.

References
Guiry, M.D. & Guiry, G.M. 2011. *AlgaeBase*. World-wide electronic publication, National University of Ireland, Galway. http://www.algaebase.org/
Lindeberg, M.R. & S.C. Lindstrom. 2010. *Field Guide to Seaweeds of Alaska*. Alaska sea Grant College Program, University of Alaska Fairbanks, Fairbanks, Alaska.
WoRMS: World Register of Marine Species — http://www.marinespecies.org/index.php
http://www.seaweedsofalaska.com/http://www.beachwatchers.wsu.edu/ezidweb/seaweeds/index.php

Algae found on rocks is ý aatl'; ocean algae is káas'

Phylum Bacillariophyta Engler & Gilg, 1924 *diatoms*

Class Bacillariophyceae Haeckel, 1878

Order Bacillariales Hendey, 1937

Family Bacillariaceae Ehrenberg, 1831

P ***Nitzschia*** Hassall, 1845, undetermined species

Honorific for German biologist Christian Ludwig Nitzsch (1782-1837)

Class Coscinodiscophyceae F.E. Round & R.M. Crawford, in F.E. Round et al., 1990

Order Coscinodiscales F.E. Round & R.M. Crawford, in F.E. Round et al., 1990

Family Coscinodiscaceae Kützing, 1844

P ***Coscinodiscus*** Ehrenberg, 1839, undetermined species

Greek κοσκινίζω *koskinizo*, sieve + δίσκος diskos, disc; referring to the disc-shaped shell full of holes.

Class Mediophyceae Jousé & Proshkina-Lavrenko, in Medlin & Kaczmarska, 2004

Order Chaetocerotales F.E. Round & R.M. Crawford, in F.E. Round et al., 1990

Family Chaetocerotaceae Ralfs, in Pritchard, 1861

Chaetoceros Ehrenberg, 1844, undetermined species

Greek χαίτη *chaitē*, hair or bristle + κέρας *keras*, horn; referring to the spikes common to the genus.

Order Thalassiosirales Glezer & Makarova, 1986

Skeletonemaceae (Lebour, 1930) F.E. Round, R.M. Crawford & D.G. Mann, 1990

P ***Skeletonema*** Greville, 1865, undetermined species

Greek σκελετός *skeletos*, dried up, dried; hence skeleton, referring to the spine-like appearance of the genus.

Phylum Ochrophyta (Cavalier-Smith, 1986) T. Cavalier-Smith, 1995

Taxonomy: This grouping perhaps becoming more commonly known as Heterokontophyta, the heterokonts or stramenopiles. Here, this includes the diatoms and brown algae. The name derives from the motile stage's two different flagella.

Class Phaeophyceae Kjellman, 1891 brown algae

Order Fucales Bory de Saint-Vincent, 1827

Family Fucaceae Adanson, 1763

Fucus Linnæus, 1753

Latin FOO-cuss, American FEW-cuss   Ancient Greek φῦκος *fūkos*, seaweed.

Fucus gardneri P.C. Silva 1953, rockweed, laak'ásk, tayeidí


gard-nair-ee   Honorific for phycologist George Gardner (1812–1849).

Taxonomy: If the Pacific, Arctic and North Atlantic algae are the same species, the name is *F. gardneri.* If the Pacific is separate from the others, it is *F. distichus* Linnæus, the name I learned it years ago at Humboldt State College. This population would then be ssp. *evanescens* (C. Agardh) H.T. Powell. *Field Guide to Seaweeds of Alaska* and Washington State University beach watchers indicate that the trend seems to be to consider it separate.

Notes: Abundant and omnipresent on all beaches, here illustrated by a photo of my daughter Bess in a mess of rockweed at Echo Cove. Broken off dry pieces form prominent lines of brown paralleling the shoreline and are excellent at defining extreme high tide as well as each intervening tide. Being capable of surviving and obviously thriving in the intertidal zone means this species can tolerate a wide range of salinity and desiccation. After storms broken pieces often collect in lee currents on the surface of the water in swirls of many sizes and complexity. It would be an interesting study to plot and analyze the patterns from aerial photography and see where the seaweed comes from and is headed to.

> The tips of mature individuals swell up and provide flotation for the plant as well as reproductive chambers for developing sperm and eggs. During low tide, the swollen tips dry up squeezing out sperm and eggs which unite into a zygote during the next flood tide and settle onto a substratum. Native Americans historically harvested the dried swollen tips of *Fucus* - sometimes referred to as "Indian pop corn". [http://www.beachwatchers.wsu.edu/ezidweb/seaweeds/Fucus.htm]

I've eaten many a freshly exposed rockweed tip and find it almost pleasant. Perhaps the fact that it comes "pre-salated" adds to the flavor.

Order Laminariales Migula, 1909

Family Laminariaceae Bory, 1827

Nereocystis Postels & Ruprecht, 1840

Latin nehr-eh-ah-KISS-tiss, American nair-ee-oh-sis-tiss   Greek Νηρεύς *nereus,* sea nymph and κύστη *kysti*, bladder hence "mermaid's bladder".

Nereocystis luetkeana (K. Mertens) Postels & Ruprecht 1840, edible kelp, bull kelp, bullwhip kelp, ribbon kelp, giant kelp, bladder wrack, sú (kelp in general is geesh)


loot-key-ann-ah Honorific for "...Fjodor Petrowitsch Lütke, Russian naval officer and commander of the corvette Seniavin during the Russian expedition of 1826-1829 to North America." [Algaebase]

Taxonomy: The orthographic variant *luetkeanus* appears regularly. Apparently this kelp might have its name changed due to the priority of *N. priapus* (S.G. Gmelin) D.A. Saunders.

Notes: While out on nearly every Whales and Trails sea portion, I encounter bull kelp many times in the 2 hours and 15 minutes we spend on the water, especially in mid summer. Loose fronds litter the ocean as the bulb lifts them from the depths. In September of 2010 I found hundreds washed up on the rocky beach of Admiralty Island south of Point Symonds. They were in an amazing display of decomposition. I was on the beach as part of a clean-up campaign and had my eye out more for trash than nature and kept seeing what looked like white plastic straws. All but one turned out to be a thin—straw-sized—section of the underwater stem of the kelp that had been dead and exposed long enough to be bleached white.

Daughter Bess (in the photo above) made a dozen jars of delicious salsa from a mess she gathered the summer of 2008.

> The sporophyte blades, up to 10 m (33 feet) long, grow in two bunches attached to a gas-filled bulbous float at the upper end of the stipe. The bulb, which buoys the photosynthesizing blades to the surface, contains a mixture of gases including 10% carbon monoxide. *Nereocystis* is an annual kelp but some individuals survive for more than one year. At maturity the sporophyte blades produce spore patches called sori which separate from the blades and drop to the ocean floor eventually releasing millions of gametophyte producing spores. Eggs and sperm from the microscopic gametophytes give rise to the following year's giant sporophytes. Bull kelp growth rates are among the fastest of all photosynthesizing organisms reaching 14-17 cm (5.5-7 in.) per day. [http://www.beachwatchers.wsu.edu/ezidweb/seaweeds/Nereocystis.htm]

Phylum Rhodophyta Wettstein, 1922 *red algae*

Class Florideophyceae Cronquist, 1960

Order Ceramiales Oltmanns, 1904

Family Rhodomelaceae J.E. Areschoug, 1847

Neorhodomela Masuda, 1982

Latin neh-ah-row-DAW-mell-ah, American nee-oh-row-doe-mell-ah Greek νέος, *neos*, new + Ancient Greek ῥόδον, *rhodon*, rose + Greek μελανός, *melanos*, dark-colored.

Neorhodomela oregona (Doty) Masuda 1982, Oregon pine

oar-eh-go-nah   Of or pertaining to Oregon.

Identified by going one-by-one through the images on the Seaweeds of Alaska web site, when this one popped up it was pretty obvious. This algae isn't quite as common as rockweed and grows in with the rockweed in the same upper tidal zone where it is submerged two times a day with our diurnal tides. I find dozens of references to the name of the seaweed and its locations, I find nothing on its natural history! This photo was taken on Point Luisa about two feet below the "normal" high tide line, evidenced by two lines of rockweed washed up on the rocks.

Kingdom Fungi T.L. Jahn & F.F. Jahn, 1949 ex R.T. Moore, 1980

Classical Latin *fungus*, fungus or mushroom)

The idea that fungi are plants—what I was taught—now seems nearly preposterous to me. Never *autotrophic* (a self-feeder, able to create nutrition through photosynthesis) but *heterotrophic* (getting nutrition from many external sources), they have developed an amazing diversity of methods to find and use the energy they require to live from nearly every other living thing on the planet. They formed some one billion years ago. During sexual reproduction, individual fungi communicate with one another! They do this with *pheromones* (a chemical given off by an organism to elicit a social response in another individual) including sesquiterpines, oligopeptides and carotenoids (Blackwell et al 2012). They are so distinct, and so distantly related to anything else, and basically equal to plants and animals that they deserve their own Kingdom.

Physiologically, fungi use chitin [$(C_8H_{13}O_5N)_n$, a long chain polymer derived from glucose] and glucan [polysaccharide of D-glucose monomers] instead of cellulose [$(C_6H_{12}O_5)_n$, a polysaccharide chain of glucose units] for their cell walls. The word chitin is derived from the Greek χίτον *chitōn*, mollusk, since their exoskeleton is also made of this substance demonstrating the shared common ancestor of both plants, animals and fungi.

With the ability to break down biopolymers (long chain molecules produced by living organisms) like animals with hydrolytic enzymes (breaking chemical bonds with water), fungi have taken the route of simply living in their host instead of developing stomachs. They grow into new areas when the food supply dwindles. Fungi feed by absorption of nutrients from their environment by way of tiny—usually a single cell wide—filamentous structures called *hyphae* (collectively *mycelium*). Being so small and incredibly numerous, the mycelium allows the fungus to have a huge surface area in direct contact with its environment. The cells secrete enzymes into their surroundings to decompose and absorb nutrients. Only fungi produce the enzyme that can decompose the lignin in wood. If a fungus lives in dead and decaying plant material it is a *saprophyte*; if living, it is a *parasite*.

Many plants have developed a relationship with fungi that helps them gain nutrition. They used to be considered saprophytes, but no plant can gain nutrition from its environment on its own and the word is imprecise. They are now considered *mycoheterotrophs* since it is the fungus that actually produces the usable nutrition for the plant. Orchids, especially yellow coralroot (*Corallorhiza trifida*) are especially noted for being mycoheterotrophs. It seems that almost every plant carefully examined has an intimate relationship with a fungus. Some fungal partners, like that of the vanilla orchid, are well-known and cultivated, but the vast majority remain unidentified. New mycoheterotrophic relationships are discovered almost daily, and it may be that nearly all plants have one or more!

Fungi exist primarily as mycelium, and can reach an incredible, if invisible, mass. An *Armillaria bulbosa* in the Malheur National Forest of Oregon in 1992 was found to occupy 8.9 km^2 (2,200 acres) [Smith & Anderson 1992]! It is only the reproductive structure that we see as it erupts from the feeding environment for its sporangium to produce spores (that can be produced both sexually and asexually) that dissipate in the winds. The mushrooms we see are "just the tip of the iceberg".

Taxonomy: When slime molds are excluded, this group is naturally monophyletic. Some 70,000 taxa have been named (Blackwell) yet there are estimates that there are more than 1,500,000 species (Hawksworth et al 1995)! While fungi are now placed in some eleven groups essentially equivalent to phylums, those that I encounter all fall under the subkingdom Dikarya.

All my identifications are based on macroscopic (eye level to 20 × hand lens) observations and must be understood with that information.

My notes follow the Tree of Life Web Project (ToL) classification. Modern molecular studies are leading to significant rearrangement of relationships with some taxa being abandoned (Gasteromycetes and Lycoperdales as examples) as unnatural groups and creation of or merging of new taxa. There remains much to be resolved and a significant number of fungi are placed *incertae sedis* "of uncertain placement". Suprafamilial names (categories higher than family) are in a state of flux with several alternate arrangements that have different names. There is no resolution of phylogenetic relationships below the family so my genera and species within are arranged alphabetically.

ON EATING FUNGI

Beware! I don't eat any wild fungi and rarely use taste as an observational character, something commonly used in several of my references. "There is no reliable rule that will tell you that a mushroom is edible. Poisonous mushrooms are no more likely to turn a silver spoon black than an edible species, nor will they change the color of rice they are cooked with. To be safe you must know how to identify each species that you choose to eat", so says eminent authority Michael W. Beug, Chair of the North American Mycological Association's Toxicology Committee. *DO NOT use this as a guide to identify edible fungi*.

References

Arora, D. 1991. *All that the rain promises, and more*. Ten Speed Press, Berkeley.
Arora. D. 1986. *Mushrooms demystified*, 2nd edition. Ten Speed Press, Berkeley.
Beug, M. 2010. *Trial Field Key to species of* Ramaria *in the Pacific Northwest*. Pacific Northwest Key Council. http://www.svims.ca/council/Ramar1.htm
Blackwell, M., R. Vilgalys, T.Y. James, & J.W. Taylor. 2012. *Fungi. Eumycota: mushrooms, sac fungi, yeast, molds, rusts, smuts, etc.*. Version 30 January

2012. http://tolweb.org/Fungi/2377/2012.01.30 in The Tree of Life Web Project, http://tolweb.org/
Emberger, G. *Mushrooms Growing on Wood* http://www.messiah.edu/Oakes/fungi_on_wood/index.htmHawksworth, D.L., P.M. Kirk, B.C. Sutton, & D.N. Pegler. 1995. *Ainsworth and Bisby's Dictionary of the Fungi (8th Ed.)*. CAB International, Wallingford, United Kingdom.
Index Fungorum, the global fungal nomenclator http://www.indexfungorum.org/Index.htm is my primary taxonomic and nomenclature reference.
Jacobsen, J.H. 2015, Musrooms and other fungi of Alaska. Windy Ridge Publishing, Haines, AK.
Kendrick, B. 2000. *The Fifth Kingdom* 3rd. ed. Focus Publishing, Newburyport, MA.
Kirk, P.M., P.F. Cannon, D.W. Minter & J.A. Stalpers, eds. 2008. *Ainsworth & Bisby's dictionary of the fungi*. CAB International, Oxfordshire, UK.
Kuo, M. MushroomExpert.com http://www.mushroomexpert.com/index.html
Miller, O.K. & H.H. Miller. 2006. *North American mushrooms: a field guide to edible and indelible fungi*. A Falcon Guide, Morris Book Publishing, LLC, The Globe Pequot Press, Guilford, CT.
Mushroom Observer http://mushroomobserver.org/
O'Clair, R.M., R.H. Armstrong & R. Carstensen. 1992. *The nature of Southeast Alaska, a guide to plants, animals and habitats*. Alaska Northwest Books, Anchorage.
Parker, H. 1994. *Alaska's mushrooms: a practical guide.* Alaska Northwest Books, Anchorage.
Petersen, J.H. 2012. *The Kingdom of Fungi*. Princeton University Pres, Princeton, NJ.
Phillips, R. 2005. *Mushrooms & other fungi of North America*. Firefly Books, Buffalo, NY.
Rogers Mushrooms http://www.rogersmushrooms.com/
Schalkwikjk-Barendsen, H.M.E. 1991. *Mushrooms of Northwest North America*. Lone Pine Publishing, Auburn, WA (abbreviated S-B in notes).
Smith, A.H. & H.D. Thiers. 1971. *The boletes of Michigan*. University of Michigan Press.
Smith, M., J. Bruhn & J. Anderson, 1992. *The fungus* Armillaria bulbosa i*s among the largest and oldest living organisms*. Nature 356: 428-431.
Thomson, A., W. Alexander, N. Sim, & T. Trofymow. 2009. *Matchmaker: Mushrooms of the Pacific Northwest (MMPNW)*. http://forestry-dev.org/biodiversity/matchmaker/index_e.html
Volk, T. *Tom Volk's Fungi*. http://botit.botany.wisc.edu/toms_fungi/
Wood, M. *Mycoweb, mushrooms, fungi, mycology*. http://www.mykoweb.com/

Subkingdom Dikarya Hibbett, T.Y.James & Vilgalys (2007)

Greek δι, *di*, two + Greek κάρυον *karyon*, nut, kernel; from the pair of nuclei.

This subset of fungi has the ability of cells to fuse their cytoplasm together while the nuclei remain distinct. It includes the Ascomycetes and Basidiomycetes and includes the vast majority of all the fungi.

Phylum Ascomycota (Berkeley 1857) H.C. Bold, 1957 ex T. Cavalier-Smith, 1998 ***sac fungi***

Greek: ἀσκός, *askos*, sac or wineskin + Greek μύκης, *mukes*, fungus.

These fungi produce an ascus where nonmotile spores are formed. It is by far the largest phylum of fungi with more than 64,000 species, and some 75% of all fungi. Cells in the ascus undergo meiosis producing haploid cells that then undergo mitosis producing identical "eight nuclei, and eventually eight ascospores. Ascospores are formed within the ascus by an enveloping membrane system, which packages each nucleus with its adjacent cytoplasm and provides the site for ascospore wall formation" (Blackwell et al 2012). Most ascospores are extremely resistant to the vagaries of earth's weather and can survive for long periods. Many members of this phylum are called "cup fungi" as they grow in that shape.

Class Neolectomycetes O.E. Eriksson & Winka 1997

Taxonomy: A monotypic class. This fungus is only distantly related to any other ascomycete and only weakly clusters with some rather bizarre ascomycetes at their very base as something of a "fungal dinosaur" or "living fossil".

Landvik S., E. Eriksson, M.L. Berbee. 2001. Neolecta—*a fungal dinosaur? Evidence from β-tubulin amino acid sequences*. Mycologia (Mycological Society of America) 93 (6): 1151–1163.
Lutzoni, F., et al. 2004. *Assembling the fungal tree of life: progress, classification, and evolution of subcellular traits*. American Journal of Botany, V.91 no. 10, 1446-1480.

Order Neolectales Landvik, O.E. Eriksson, Gargas & P. Gustaffson 1993

Taxonomy: A monotypic order.

Family Neolectaceae Redhead 1977

Taxonomy: A monotypic family.

Neolecta Spegazzini 1881

nee-o-lek-tuh   Greek νέω, *neo*, new + Latin *legō*, pick out, select.

Taxonomy: This class, order, family and genus contains only three species!

Neolecta vitellina (Bresàdola) Korf & J.K. Rogers 1971, egg-yellow earth tongue

Latin vih-TELL-lih-nuh, American vie-tuh-LEE-nuh Latin *vitellus*, yolk of egg; for the color of the hymenium.

Taxonomy: Originally placed with the "regular" earth tongues as *Geoglossum vitellinum* Bresàdola 1881

Notes: Walking back with a group on the East Glacier Trail is always relaxing as interpretation takes a back seat to the pleasant stroll. This gives me more opportunity to simply look around and see what's there. On a very low cloud day in September of 2014 I spot what I'm sure is scrambled egg slime mold. When I get down into the moss to examine it, I find it very puzzling as nothing about it is slimy and the orange bodies are mushroom-hard. It must be a fungus, but not one I've ever encountered, and it didn't take me long to identify it with my resources back home. This growth must be in a very fresh, young state, as most of the photos I've found are of much larger size, up to 7 cm. The largest of these is less than 1 cm.

The fungus has two very different parts: the hard egg-yolk colored main body and a somewhat gelatinous white mass that attaches the main body to the moss. It turns out this fungus is composed only of *hymenium* (spore bearing tissue) and *hyphae* (long branching threads that are the main structure of most fungi). It is apparently growing on the stems of *Pleurozium schreberi*, big redstem moss under a dense canpy of Sitka spruce (*Picea sitchensis*). Redhead reports it "grows from rootlets of its host" [2] and is edible! [1] Rootlets of the spruce are certainly very close by.

[1] Redhead, S.A. 1977. *The genus* Neolecta *(Neolectaceae fam. nov., Lecanorales, Ascomycetes) in Canada*. Canadian Journal of Botany 55 (3): 301–306.

[2] Redhead, S.A. 1979. *Mycological observations: 1, on Cristulariella; 2, on Valdensinia; 3, on Neolecta*. Mycologia (Mycological Society of America) 71 (6): 1248–1253.

Class Geoglossomycetes Zheng Wang, C.L. Schoch & Spatafora 2009

Order Geoglossales Zheng Wang, C.L. Schoch & Spatafora 2009

Family Geoglossaceae Corda 1838

Geoglossum Persoon 1704, earth tongue

Greek γεω- *geo-*, earth + Greek γλώσσα *glossa*, tongue = earth tongue

Geoglossum species unidentified, earth tongue

I have to be content to identify this only to genus. According to Michael Kuo's treatment, "the little black 'Earth Tongues' of the Geoglossaceae family are a nightmare to identify--but if you are a microscope geek, they often reward you with fascinating and funky microscopic features" [http://www.mushroomexpert.com/geoglossum_nigritum.html]. Today is the only time I've seen these in Alaska, yet they are widely scattered throughout North America and I've encountered them many times in Georgia. Here these seem to be saprobic on the organic layer beneath the living moss and are relatively out in the open.

Class Leotiomycetes O.E. Eriksson & K. Winka 1997

Order Helotiales Nannfeldt ex Korf & Lizon 2000

Family Helotiaceae Rehm 1892

Bisporella Saccardo 1884

buy-spore-ehl-lah   Latin *bi-*, two + spore + *-ella*, little.

Bisporella citrina (Batsch) Korf & S.E. Carpenter 1974, yellow fairy cups, lemon disco

sih-TRY-nah Latin *citrina*, of citrus, referring to yellow body color.

The large beaver cut black cottonwood (*Populus trichocarpa*) on the dike approach trail to the Trail of Time is loaded with these tiny yellow to orange fungi in 2011. I've been watching them for well over a month and they seem to change little, other than getting more orange with time. On September 29 when I take these photos I examine several of the tiny (< 3 mm) 'shrooms by lifting them off the log with my pocket knife. I am surprised to find that they have a tiny little pale stalk underneath! They look as if they are growing directly out of the log from their underside, but this is definitely not so. A few show the edge of the cap turning up and forming something of a cup, but most are curved down like a typical mushroom. When I run my fingers over the mass they are dry but pliant and not in the least jelly-like. By 2014 the log is completely overgrown with moss and the little lemon discs are nowhere to be seen. There are some dead branches on the lower end of the East Glacier Trail with little tiny buttons. They seem to appear on wood that is still hard and not very rotted so this might be an early stage decomposer of dead wood. Most references I have show the color as more yellow than orange, but all that I've seen here are more orange than yellow.

Class Pezizomycetes O.E. Eriksson & K. Winka, 1997

Order Pezizales J. Schröter, in Engler & Prantl, eds., 1894

Family Helvellaceae Fries 1822

Helvella Linnæus 1753

Latin HELL-veh-luh, American hell-VELL-uh Latin *helvella*, a small pot-herb, but became associated with morels.

Helvella elastica Bulliard (1875), elfin saddle, brown elfin saddle, elastic saddle, smooth stem elfin saddle, flexible Helvella

I spotted what is apparently a widespread fungus for the first time on September 5, 2014 on the Trail of Time. Perhaps I've just never stopped to look at this rather odd 'shroom before, but this day it compelled a closer look as I thought it was some sort of stinkhorn. Six sporulating bodies arise from the *Pleurozium schreberi*, big redstem moss and *Hylocomium splendens*, step moss with their smooth—but not slimy—and sort of jelly-like broadly wrinkled tan caps atop an almost pure white stalk. Apparently a saprobe, it is found on forest debris or on very rotten wood.

Helvella solitaria P. Karsten 1871

sall-ih-tare-ee-ah　　Latin *solitarius*, alone, lonely.

Annette and I find this most curious fungus in the shaded moss by the coho pond and I recognize that it is something related to donkey ears, but have no idea what it is. The 2 cm stalk is gray-white and ridged with the ridges extending about 3 mm onto the cap. All the caps here are folded up in half with the upper and lower surfaces looking almost exactly alike with a dark purplish gray cast. Phillips is the prime reference and provides a sure identification. Little is known about this odd fungus.

Family Humariaceae Velenovský, 1934

Aleuria Funkel 1870

ahl-lure-ee-ah　　Greek αλεύρι *alevri*, powdered with wheat flour.

Aleuria aurantia (Persoon) Fuckel 1870, orange peel fungus

awe-ran,tee-ah   Italian *arancia*, orange.

Fall is normally the time to expect fungi so on May 23, 2010 they really are not on my radar screen of things to expect on the East Glacier Trail This small (usually well <10 cm) jelly cup is hard to miss with its bright orange color and unique cup shape and offers a great place to stop and take a close look at an odd fungus. When young, the outside of the cup usually has a whitish bloom on it, lacking in all of these. Often called a jelly fungus because of its texture that is reminiscent of very old Jell-O, the walls are actually rather brittle and will break easily like old sugar candy. It is really one of the large cup fungi since the spore producing above-ground form is in the shape of a cup. In much of its range it is found on bare ground but here, where there is little of that, it has adapted to areas of thin moss, here well under 1 cm. Apparently not mycorrhizal, it leads to the question where does it get its nutrients in bare soil? The photograph shows plenty of organic matter available for decay here.

Scutellinia (Cooke) Lambotte 1887

skoo-teh-LIN-ee-ah   Latin *scutum*, shield + *inia*, diminutive.

Scutellinia umbrorum (Fries) Lambotte 1887, red eyelash cup, Molly eye-winker, scarlet elf cap, eyelash pixie cup

um-broar-um   Latin *umbra*, shadow

Taxonomy: The orthographic variant *umbrarum* occurs regularly in the literature.

One day the beaver pond where Glacier Spur Road crosses Steep Creek is nothing but mud as the Forest Service has broken down the dam. Within a few days the mud flats are home to a myriad of species liberated from their normal drowned state so I wander around to explore. I find literally hundreds of ground-hugging orange-red disks ranging from the size of a pencil eraser to a dime, all with a fringe of little hairs along the entire outer edge of the disk. Other than being a fungus, I've no idea what they are and have never seen anything like them before. They are so unique it's an easy ID. Phillips makes the telling note that they appear "in large, dense groups on very damp soil" matching this exactly and the common name is delightful in its perfect description. This tiny fungus has a very wide distribution including New Zealand!

Scutellinia scutellata is very closely related and is apparently reliably separated from *S. umbrorum* based upon its substrate preference where it is usually found growing from wood instead of very moist ground. The most definitive distinction is made by microscopically examining the spore sizes which I have not done.

Family Pezizaceae Dumortier 1829**, cup fungi**

Peziza Dillenius ex Fries 1822

peh-ZEYE-zah The etymology is obscure. Schalkwijk-Barendsen says it comes from "Greek for living on the land". Webster's Revised Unabridged Dictionary has it as a New Latin corruption of *L. pezica*, a sessile mushroom, from a Greek word for foot. The http://www.myetymology.com entry has it derived from the Greek πέζις pezis, foot. This is curious as none have any feet!

Arora writes "Identification of Pezizas is difficult, even with a microscope" (p.818) and Index Fungorum has 3119 records. I will take this as advice to go no further.

Peziza species unidentified, jelly cup

Walking the Trail of Time in August of 2014 I spotted this single cup fungus, one I'd never notices before. I immediately thought it might be an orange peel fungus past its prime, but on close examination it is quite different. With its thick walls and definite fleshy-tan color it is quite distinct. It has a very stiff consistency, like jelly left open for some time. From this, perhaps common name could be "jelly cup".

Family Pyronemataceae Corda 1842

Otidea Eckblad 1968

oh-TID-ee-ah Greek for resembling an ear.

Otidea onotica (Persoon) Fuckel 1870, donkey's ears

awn-awe-tii-cah Greek ὀνίδιον a little ass or donkey.

What a fantastic mushroom! When I first spotted it on the East Glacier Trail just above the "Appalachian Waterfall" I knew it was some sort of "eared" fungus. It took some work to identify it until I got my copy of S-B as it is in none of my others. The epithet comes from the Greek, "of the donkey", and it is an appropriate name. Here growing in a thick moss carpet, the mycelium is fully hidden and I did not disturb it to see what it is growing on.

A cup fungus, in this genus the "cup" is split down one side to be open. In the case of this individual, it is one large cup indeed—this donkey ear is 1 dm tall! The photos I find on the web are far more flesh-colored that this one, which makes me wonder if this is an older specimen. Nothing about it seems old and it feels rather fresh and supple. Mushroom Expert says "*Otidea onotica* is supposed to be one of the 'rabbit-ear species' rather than one of the 'chopped-off, split goblet' species. More reliable characters include its brownish yellow colors, the rosy tinge on the inner surface, its clustered growth, and microscopic characters" [http://www.mushroomexpert.com/otidea_onotica.html]. This seems closer to the deep russet brown of the interior of this individual.

I've looked for this every hike since, and it is nowhere to be seen. Evidently it is a short-lived fungus or it has been picked and no other fruiting bodies have erupted to take its place. It is one of the most unusual fungi I've ever seen and was a genuine joy to behold. I'm glad I stopped to get this photograph.

Class Sordariomycetes O.E. Eriksson & K. Winka, 1997

Order Hypocreales Lindau 1897

Family Hypocreaceae De Notaris 1844

Hypomyces (Fries) Tullos & C. Tullos (1860)

Ancient Greek ὑπο- *hupo-*, combining form of ὑπό *hupó*, under + Ancient Greek μύκης *múkēs*, mushroom, fungus; for their habit of being under the cap

Hypomyces luteovirens (Fries) Tullos & C. Tullos (1860), yellow-green Russula mold

lew-tee-o-vie-rens Latin *luteus*, yellow + *virēns*, green

Taxonomy: The synonym *Hypomyces tulasneanus* Plowright 1882 has been misapplied to this species as it occurs only on boletes.

Notes: August is a great time to walk the Bus Approach Trail for 'shrooms. As soon as we turn the corner, they appear. A bit of a mystery unfolds before me as I observe what's happening. I've not solved it all yet, but things are becoming clearer. This *Russula integra* patch shows up every year, but in 2015 I spot a vivid color ahead of me on an upside down 'shroom: yellow! As I examine it I realize I've no idea what I'm looking at. Since it is almost completely covering the gills and only on them, I wonder if it is a cortina which would make this a *Cortinarius*. Or, is it something growing on the 'shroom? In the past, this same patch has been "attacked" by another mold-like fungus with a vast (nearly a square foot) mass of white mycelium. None this time, just this mysterious yellow.

I've joined the Facebook group *Mushrooms and other Fungi of Alaska* run by Judy Hall Jacobsen, author of the 2015 book of the same name, and both have become a valuable resource and posting my "mystery" photo yielded a positive identification, confirmed by reviewing many of my references. It seems folks call this a "lobster mushroom", but that apparently really only applies to *Hypomyces lactifluorum* which transforms the mushroom it grows on to look and feel something like the shell of a cracked, cooked lobster. I don't care for the common name given here as it simply transliterates the Latin name, but as I've found nothing better, I include it.

Hypomyces are parasites of fungi and apparently are very specific about which one. Ours only attacks *Russula* and apparently some *Lactarius*. The yellow-green color and habit of attacking only the gills and not significantly deforming the host is very distinct for this species.

Order Xylariales Nannfeldt, 1932

Family Xylariaceae Louis Rene Tulasne & Charles Tulasne, 1861

Xylaria Hill ex Schrank (1789)

zye-LAIR-ee-ah Greek ξύλο *xylo*, wood.

This is a strange genus of fungi, one I first encountered in the Great Smoky Mountains of Tennessee with a very filamentous form that my mycologist friend Ed Lickey identified for me as *Xylaria tentaculata*, a poorly understood and not well described species.

Xylaria hypoxylon (Linnæus) Greville 1824, candlestick fungus, candlesnuff fungus, carbon antlers, staghorn fungus

high-POX-ih-lawn Greek υπό *hypo*, below + ξύλο *xylo*, wood; referring to its hyphae growing into (below) the wood.

As soon as I spotted these fungi (left photo) growing out of a moss-covered log on the trail to A.J. Falls on July 3, 2011, I knew they must be in the genus *Xylaria*, and when back home, a quick Google search on the genus leads to this positive identification, confirmed in Phillips. The black stalk with white forking top are quite striking and easily spotted, though small, rising above the moss. The white part of the fungus is a mass of *conidia*, the spores of this fungus. They are produced asexually by mitosis of haploid cells. Usually produced on stalks called *conidiphores*, in this primitive fungus they arise directly from the thallus of the fungus and whiten the surface. The more robust conidiphores on the right I found not far below A.J. Falls along the East Glacier Trail on August 10, 2012 illustrate the "carbon antlers" or "staghorn" common names.

Xylaria polymorpha (Persoon) Greville, 1824, dead man's fingers

poly-morph-ah Greek πολύ *poly*, many + μορφή *morfi*, form; hence "many forms".

I did not recognize this as anything but a fungus on the West Glacier Trail on May 2, 2011, but on reviewing my photos after seeing *Xylaria hypoxylon*, it became obvious that this was another *Xylaria*, but without the white conidia. There are only a few species in the genus, and it is just a simple matter of reviewing them to find a match to this species. What separates it from the others in the genus is its inflated growth, but as the exact pattern of inflation can vary greatly, it is "polymorphic" or many-formed. Here it's fertile growth forms extend out from a Sitka spruce (*Picea sitchensis*).

Ascomycota-Lichens

This account follows the idea that lichens are "fungi that have discovered agriculture" (P&M p. 84). Most of what we see in a lichen is the fungus, but living within the fungus are either green algae or cyanobacteria, or both. This leads to the silly—but helpful—quip that "Alice Algae and Freddy Fungus got a liken' for each other!"

Current taxonomic practice is to identify and name the lichen by its fungal component. A small number of lichens form within Basidiomycota which are sometimes called *basidiolichens* to distinguish them from the more abundant *ascolichens* that form with fungi from the Ascomycota (the only lichens I've knowingly encountered). There is evidence that the process of lichenization has occurred several times in evolutionary history and each produces its own lineage. Since they are so easily identified as a lichen, I've placed them here as an artificial grouping with no indication of their phylogeny, and the orders and families within them are arranged alphabetically.

Identification of lichens to species can be very difficult to impossible using macroscopic observation, my method. Many can only be confidently identified using 400 or more power examination as well as the use of several chemicals to test reactions, neither of which I do. My identifications should be accurate to the genus level. Many of the lichen I've observed are unique enough that—I think—can be correctly identified to species. My method for identification is to use the two Geiser et al. lists as a basis of what lichens I can reasonably expect to be here, then compare the photographs from many sources (especially Sharnoff) to these names with my photographs. This method leads me on many wrong turns, so beware!

References:

Alstrup, V. & M.S. Cole. 1998. *Lichenicolous fungi of British Columbia*. The Bryologist 101 (2), 221-229

Brodo, I.M., S.D. Sharnoff, & S. Sharnoff. 2001. *Lichens of North America*. Yale University Press.

Derr, C.C. & R.H. Armstrong. 2010. *Lichens around Mendenhall Glacier*. Nature Alaska Images, Juneau.

Esslinger, T.L. 2010. *A cumulative checklist for the lichen-forming, lichenicolous and allied fungi of the continental United States and Canada*. North Dakota State University: http://www.ndsu.edu/pubweb/~esslinge/chcklst/chcklst7.htm Version 16, June 18, 2010.

Geiser, L.H., K.L. Dillman, C.C. Derr & M.C. Stensvold. 1994. *Lichens of Southeastern Alaska, an inventory*. USDA Forest Service Tongass National Forest / Stikine Area, Petersburg, Alaska.

_____. 1998. *Lichens and Allied Fungi of Southeast Alaska*, in Lichenographia Thomsoniana: North American Lichenology in Honor of John. W. Thomson, Eds: M.G. Glenn, R. C. Harris, R. Dirig & M. S. Cole. Mycotaxon, Ltd. Ithaca, NY.

Goward, T., B. McCune & D. Meidinger. 1994. *The Lichens of British Columbia, illustrated keys.* Special Report Series 8, Part 1, Foliose and Squamulose Species. Research Program, Ministry of Forests, Victoria, B.C.

Goward, T., B. 1999. *The Lichens of British Columbia, Illustrated Keys, Special Report Series 9, Part 2, Fruticose Species*. Research Program, Ministry of Forests, Victoria, B.C.

Index Fungorum, http://www.indexfungorum.org/Index.htm

McCune, B. 2006. *Key to the Lichen genera of the Pacific Northwest*. Dept. Botany & Plant Pathology, Oregon State University, Corvallis.

McCune, B. & L. Geiser. 2009. *Macrolichens of the Pacific Northwest*, 2nd ed. Oregon State University Press, Corvallis.

O'Clair, R.M., R.H. Armstrong & R. Carstensen. 1992. *The nature of Southeast Alaska, a guide to plants, animals and habitats*. Alaska Northwest Books, Anchorage.

Pojar, J. & A. MacKinnon. 1994. *Plants of the Pacific Northwest coast, Washington, Oregon, British Columbia & Alaska*. Lone Pine Press, Vancouver, BC (abbreviated P&M).

Sharnoff, S. *Lichens Home Page*. http://www.sharnoffphotos.com/lichens/lichens_home_index.html

University of Alaska-Fairbanks Lichen Lab. undated. *Lichen morphology and terminology*.

USDA, USFS. 2006. *Lichens of the National Forests of Alaska*. Alaska Region Air, Botany and Ecology Program.

USDA, USFS. 2009. National Lichens & Air Quality Database and Clearinghouse http://gis.nacse.org/lichenair/index.php

Class Arthoniomycetes O.E. Eriksson & Winka 1997

A monotypic class of mostly tropical and subtropical lichenized fungi.

Order Arthoniales Henssen ex D. Hawksworth & O.E. Eriksson (1986)

Contains four families of mostly lichenized fungi.

Family Chrysothricaceae Zahlbruckner 1905

The illegitimate orthographic variant Chrysotrichaceae shows up often in the literature.

Chrysothrix Montagne 1852 *nom. cons.*

[A *nomen conservandum* is "(1) A name ... ruled as legitimate and with precedence over other specified names even though it may have been illegitimate when published or lack priority ... (2) A name for which its type, orthography, or gender has been fixed by the conservation process." From International Code of Botanical Nomenclature (Vienna Code), 2006.]

Greek χρυσός *chrusos*, gold + Late Greek θρίξ *thrix*, hair.

This crustose lichen is not known to produce apothecia in North American material. The thallus is composed entirely of powdery soredia.

Chrysothrix candelaris (Linnæus) J.R. Laundon 1981, mustard powder lichen, gold dust lichen

Etymology uncertain. Possibly from Latin *candeō,* "I am white, bright, shining", which the lichen often is.

The Sitka spruce (*Picea sitchensis*) on Point Louisa that face westward, open to the water, have small to vast areas of bright yellow on their bark. The lichen varies in thickness from so thin it is almost translucent to mealy aggregations that have something of a cauliflower look to it. While soredia are usually powdery and easily removed with the slightest touch, this lichen sticks tightly to the bark. Here it is most common on the smaller trees. Perhaps their smoother bark provides a better environment. Brodo notes "on shaded bark of all kinds and occasionally on rock..." Geiser notes that this lichen has always been found facing the water, and that is the only place I find it in the Juneau area. Everywhere I've found it, it directly faces west on the first row of spruce trees in the forest and most often on fully exposed trees.

Class Lecanoromycetes O.E. Eriksson & K. Winka, 1997

Order Agyriales Clements & Shear, 1931

Family Trapeliaceae M. Choisy ex Hertel 1970

Placopsis (Nylander) Lindsay 1866

Greek πλατύς, πλατυ *platy*, flat + ὄψις *opsis* face, appearance hence "looks like".

Placopsis gelida (Linnæus) Lindsay 1866, bull's-eye lichen

JELL-lih-duh Latin *gelum*, frost.

Very well-named, it is hard *not* to see this lichen. As a crustose lichen, it expands concentrically which gives it the different colors that can very much look like a bull's eye, or, as the genus name indicates, a face. The newer growth has a pale gray-green color that, when individuals grow together and form a large mass, can very much look like a fresh coating of frost. I find it in every habitat and on every trail I wander where there are boulders that are out from under the forest canopy. It is especially common on the recently deglaciated scoured bedrock around the Mendenhall Glacier Visitor Center as well as all over the larger rocks above storm tide line at Point Louisa. . While I find no specific reference, it apparently has a cosmopolitan distribution, from Wales to New Zealand to Alaska.

Order Lecanorales

Family Cladoniaceae Zenker, 1827

Cladonia P. Browne 1756, cup lichen

kla (as it cat)-DOE-nee-ah reek κλάδος *klados*, branch (from their many-branched growth pattern).

This is a genus of moss-like lichens. The podetia (stems) are hollow making it easy to distinguish them from other similar fruticose lichens. Recent molecular and morphologic study demonstrate that the abundantly branched group of reindeer lichen often segregated as *Cladina* is included within *Cladonia*.

Stenroos, S, J. Hyvönen, L. Myllys, A. Thell, & T. Ahti. 2002. *Phylogeny of the Genus* Cladonia *s.lat. (Cladoniaceae, Ascomycetes) Inferred from Molecular, Morphological, and Chemical Data*. Cladistics 18: 237–278.

Cladonia borealis S. Stenroos 1989, boreal cup lichen, boreal pixie-cup

bore-ee-al-iss Latin *borealis*, northern.

Here the only part of the lichen visible is the podetia with the apothecia showing on top as a nearly complete ring that don't rise on stalks above the cup but merely line it. This is not as red as the more common lipstick lichens thus easily separated from them at eye level. My identification is tentative but matches the key and photograph from Brodo reasonably well. The reddish center of the cup differs from every *Cladonia* photograph I've examined (hundreds) so this is a unique lichen, as least from my experience. Growing out of a tuft of several unidentified species of moss, the mass is on a log that is just starting to rot. The lichen is pretty cool looking even if I don't know exactly what it is!

Cladonia chlorophaea (Flörke ex Sommerfelt) Sprengel 1827, mealy pixie-cup lichen

klor-oh-fee-ah Greek χλωρός chloros, green + Phaea, the name of the sow of Crommyon slain by Theseus.

Taxonomy: part of a complex of forms, some of which have been elevated to species level, here considered *sensu lato*, in the broad sense, and not distinguished further, the name thus tentative. "Pixie cup" applies to the whole host of species in this complex.

Notes: I commonly find this in open areas on sand and gravel that has an organic crust over it such as the outwash plain of the Moraine Ecology Trail This photo was taken on the Trail of Time where it is growing with moss on a rotting log.

This little lichen almost commands attention as it appears as though a miniature band with many trumpets is playing on the forest floor. As this photo shows, the cups—podetia—are often ringed with brown which are actually apothecia, the fruiting body of the fungus. The soredia are, as in many lichens, granular and powdery and on the clusters of scales—squamules—(here green and on the rotting log).

Cladonia fimbriata (Linnæus) Fries, 1831, trumpet lichen, pixie trumpets

fim-bree-ah-tah   Latin *fimbritus*, from *fimbriae*, fringe.

For some time I've been noticing the many trumpet lichens on the Moraine Ecology Trail and that they seem taller, thinner and grayer than the pixie cups (*Cladonia borealis* and *C. chlorophaea*) that seems to look the denser woods. This really does have the look of golf tees. These *podetia* serve as a platform to raise the fungus spore-bearing structure of the lichen, the *apothecia* (not present in this photo), to a place where they are more easily spread. In all our "trumpet" lichens the podetia are covered with *soredia* (vegetative propagule with both fungal and algal cells lacking a cortex) which on this species is very powdery. The cups are much narrower tan pixie cups.

Note the foliose structures at the base of the podetia. In juvenile stages of the lichen, these leafy scales may be the only form and are essentially unidentifiable as *Cladonia* scales. This illustrates that one of the more traditional classifications of lichens into foliose, fruticose and crustose is based not on phylogeny or relationships, but simply the general form. This lichen is both foliose *and* fruticose!

Cladonia furcata (Hudson) Schrader 1794, many-forked cladonia

fur-KAY-tah   Late Latin *furctus*, forked.

Stalks of lichens are common on the outwash plain and on the vegetated moraines. They rarely form a "forest" of stalks like *Cladonia maxima* and are nearly always rising above a carpet of moss, often big red-stem (*Pleurozium schreberi*) as in this photo. Most of them are gray-green, scarcely branched but usually with short, rapidly narrowing branches near the tip. The always have granular blobs along the vertical portions of the podetia that narrow with each branching. The apothecia form on them and rise above the mossy understory and have a chance to blow or wash away with the vagaries of the weather or whatever small animal that comes by. Some lack branches and blobs and are entirely smooth.

Some have flared tips with tiny spikes rising from the flare. They appear more often at the outside of the drip line of larger trees or in the wider openings between them.

Cladonia maxima (Asahina) Ahti 1978, giant cladonia, towering pixie lichen

max-ih-mah Latin *maximum*, greatest.

I can't find a common name for this rather common upright brown lichen of the outwash plain, and I'm not totally certain of this identification. Every photo I find of the Sharnoff's [http://www.sharnoffphotos.com/lichensB/cladonia_maxima.html] is white to off-white while the photo and text of "Lichens around Mendenhall Glacier" (Derr & Armstrong 2010) match this photo perfectly. This species gets its name as Brodo says it can reach 6 inches, one tall stalk for a *Cladonia*. It is always in the open sun but always growing with other lichens and a rather thick biological soil crust unlike the whiteworm lichen.

Cladonia mitis Sandstede, 1918, green reindeer lichen

my-tiss Latin *mitis*, gentle, soft.

Taxonomy: syn = *Cladina mitis* (Sandstede) W.L. Culberson, 1951. There are seven species of *Cladina* on the 1998 Geiser et al. list for SEAK, all included in Brodo with keys, illustrations, and descriptions. Using Pojar & MacKinnon one would probably identify this as *C. portentosa* ssp. *pacifica*, the maritime reindeer lichen. Geiser makes note that it is "on sand and gravel in open areas with continentally influenced climates. In glacial outwash of the Mendenhall Glacier terminal moraine". This species has a pale color that is more green than blue. Both Brodo and P&M use branching in threes as a distinction with the branching in fours of *C.p.p*. I find determining the number of branching difficult to determine. I examined this clump both in the field and in this photograph and find it either dichotomous (in twos) or random!

Notes: The common ball lichen of the outwash plain can actually form a small carpet on the biological soil crust and is quite lovely both at eye level or even more so with a hand lens. Like the lungworts, this is an important indicator of air quality and has the ability to "fix" nitrogen from atmospheric N_2 into nitrate, NO_3 helping create soil.

Cladonia scales, unidentified

If you see small blue-green leafy scales randomly attached and scattered on the bark of spruce and hemlock, they are likely to be juvenile growths of some *Cladonia* lichen. While very common, I've made no attempt to delve into the intricacies of their identification as it requires some chemistry and a compound microscope, things I don't carry on my hikes.

Pilophorus Theodor Fries 1857, nail lichen, matchstick lichen

pie-LAW-for-us   Greek πηδάλιο *pidalio*, rudder + φορέας *phoros*, carrier or bearer.

Taxonomy: Formerly considered to be in the Stereocaulaceae, ribosomal DNA studies show it more closely allied with the Cladoniaceae

Stenroos, S.K., P.T. DePriest. 1998. *SSU rDNA phylogeny of cladoniiform lichens*. American Journal of Botany 85: 1548–59.

This genus is considered a crustose lichen in that the main thallus is indeed a crust, the *thallus horizontalis*. It is this part of the lichen that expands and encrusts its surroundings while expanding. The pseudopodetia serve as structures to raise the apothecia above the surface in an apparent effort to allow greater spread of the spores.

Pilophorus acicularis (Acharius) Theodor Fries (1857), nail lichen, devil's matchstick

ah-sick-you-lair-is   Latin *acicularis*, needle-like

Both this and the next species share the same common name, and even a cursory examination will show they are closely related. The thin pseudopodetia (literally false stalk) are capped by a ball-like apothecia (fruiting bodies). A chair-sized boulder near the Trail of Time on the East Glacier Trail near the Mendenhall Glacier Visitor Center is almost entirely covered with this lichen. This location is almost completely shaded, a quite different environment than the next species. When moist, the pseudopodetia feel soft to the sweep of a hand. When dry, they are stiff and hard. This species seems much greener than the next and is far more likely to have branched and taller (~2 to 3 cm) pseudopodetia.

Pilophorus clavatus Theodor Fries, nail lichen, devil's matchstick, tapered matchstick

clah-VAY-tus Latin *clāva*, club.

This lichen really looks like either common name and is distinguished by the elongate apothecia (fruiting bodies) that are described by the epithet (which means club-like) as opposed to round or ball-like on the very similar *P. acicularis*, above. At rock level, it looks like a crustose lichen tightly adhering to the rock.

It is abundant on the sunny boulders above the Dan Moeller cabin on Douglas Island (where this photo was taken on July 12, 2009). P&M note it is "over rock in cool, moist forests, often near waterfalls" an environment quite different than this. While there is a cool forest nearby, it is in the open sun in a very pioneering environment. Sharnoff notes it is"often a pioneer on road cuts and other newly exposed surfaces, this lichen contributes to soil fertility by supplying fixed nitrogen" matching my experience here. Does it include a cyanobacteria for the nitrogen fixing ability? I don't know.

Family Icmadophilaceae Triebel, 1993

Icmadophila Trevisan 1852

ick-mah-DAW-fill-uh Greek υγρασία *ygrasia*, moisture + φιλία *philia*, love hence "lover of moisture".

Icmadophila ericetorum (Linnæus) Zahlbruckner 1895, peppermint drop lichen, candy lichen, spraypaint, fairy barf, fairy puke

air-ick-EH-tor-um   Latin *erica*, the old name for heathers + *-etum*, community; probably due to the acidic nature of heath and fairy barf habitats.

How could one not fall in love with a lichen with these names! Widely scattered, this species is most easily spotted on cut and otherwise rotting logs like this one on the Auke Nu Trail. An encrusting lichen, its green to gray-green thallus can spread greatly over expanses of its preferred wood substrate. It often grows over mosses and other lichens. When completely encrusting moss stems, it makes the lichen look more like a *Cladonia* than an encrusting lichen. When older and well-developed, the thallus can become visibly granular. The sessile to very short-stalked pink apothecia are the showy part of this lichen looking like pink frisbees on the edge of this cut log. From my observations of the logs I've found this one, I think it is a fast-growing lichen. The cut edge of this log still shows the cut marks of the saw so must be fairly fresh, perhaps just a few years at most and the thallus has succeeded in covering the entire face with at least a thin layer of its cells. If this is indeed a young individual, it produces sex cells at an early age as well since the apothecia are so prominent. The lichen is aggressive, perhaps a result of its fast growth, as it seems to easily overtake and cover the various mosses also growing on the log. From this log it appears it simply grows over and so covers the moss preventing it from photosynthesizing so it dies.

Thamnolia Acharis ex Schaerer 1850

tham-KNOW-lee-ah   Greek θάμνος *thamno*, bush or shrub.

Thamnolia vermicularis (Swartz) Schaerer, 1850, whiteworm lichen, sand spaghetti

Latin *vermi-,* worm, worms.

Out on the glacial outwash plain soil is non-existent, at least in any normal sense of the word. Right at this spot there was at least 50 feet of ice less than a hundred years ago and all one sees are pioneering species. This photo includes a number of them, only one I can name to species, the whiteworm, aptly named as it's nearly always prostrate on the ground. With its long thallus, it easily out grows the competing biological soil crusts and the many mosses and probably uses them as water storage units for dry periods and storehouses of nutrients. The lichen is used to make Daxinganling tea in China and has been used as a herbal medication and has been found to affect the immune system.

Omarsdottir S, J. Freysdottir, & E.S. Olafsdottir. 2007. *Immunomodulating polysaccharides from the lichen* Thamnolia vermicularis *var.* subuliformis. Phytomedicine 14 (2-3): 179-84.

Family Parmeliaceae Zenker, 1827

Alectoria Acharius 1809

al-eck-TORE-ee-ah Ancient Greek ἀλεκτρυών, alectryon, rooster.

Alectoria sarmentosa (Acharius) Acharius 1810, witch's hair or old man's beard lichen, tl'éx, (lichen that hangs from trees is s'éiýwani)

sar-men-tow-sah From sarment, the runner of a plant

Taxonomy: Some will separate the two beard lichens and distinguish them with separate names where *Alectoria* is "witch's hair" and *Dolichousnea* is "old man's beard". I've listened to many speak of these two and find absolutely no consistency with the usage of the common name and find them both being called by the "other" name. Few that I talk to can tell the difference between the two, let alone describe what is different between them. For this reason I refuse to limit the common name to one or the other and use both witch's hair and old man's beard for both.

Notes: While common and found almost everywhere in Juneau, this lichen is downright showy on Douglas Highway at Fish Creek Road where the Sitka spruce (*Picea sitchensis*) are absolutely festooned with its long—up to about 2 m—hanging strands. On the Rainforest Trail back loop (when going counter clockwise), it is abundant on all the shrubs, especially fools huckleberry. *Lichens of North America* notes that "In the winter when other forage is buried under snow, white-tailed deer in the Northwest eat witch's hair that has blown down from the treetops during storms." On every trip up the Mount Roberts Tram I hear the conductor say that (paraphrasing) "the moss hanging from the trees is a lichen that only grows in unpolluted air". It is a species included in the U.S. Forest Service's lichens and air quality database where they give this information:

> Nitrogen deposition: Oligotroph [an organism that can live in an environment that offers very low levels of nutrients] with a low to moderate N requirement, peak detection frequency occurs at 2.4 kg N per ha per yr (McCune and Geiser 2009)Sulfur dioxide: Sensitive: 5-15 ppb (Peterson et al. 1992); present at 12.6-19.2/ absent from 19.2-28.9 ppb (LeBlanc et al. 1974); see also Kuusinen et al. (1990).Ozone/PAN: Sensitive: < 20 ppb (Peterson et al. 1992); (Ryan 1990).

Bryoria Brodo & D. Hawksworth, 1977

bry-oar-ee-ah Greek βρύο *bryo*, moss

Bryoria capillaris (Acharius) Brodo & D. Hawksworth 1977, gray horsehair lichen

cap-pill-air-us Latin *capillus*, hair.

This epiphytic hanging lichen is abundant in the Mendenhall Glacier outwash plain where forests have colonized the flats. It is often mistaken for old man's beard but has quite a distinct look. It has a very brittle feel and stiffly waves in the breeze unlike the soft undulations of old man's beard. The color varies substantially, but here usually has a golden yellow green hue. It seems to prefer the lower and smaller branches of trees and often is found in shade, but it is particularly common on the sides of the Steep Creek beaver ponds.

Bryoria fuscescens (Gyelnik) Brodo & D. Hawksworth 1977, speckled horsehair lichen

fuss-cuss Latin *fuscus*, brown.

The most striking feature of this lichen are the whitish soralia (a cluster of soredia) that look like galls or lumps or tumors on the strands. Ours seem to be a dark olive color, and like gray horsehair, is brittle and stiff. It most often hangs off branches, but in the scrub growth of the outwash plain I find it growing on the bark of small Sitka spruce (*Picea sitchensis*).

Dolichousnea (Y. Ohmura) Articus 2004

doe-lick-o-uz-knee-uh, (more commonly the o is not pronounced) Greek δόλικός *dolikhos*, long + Arabic *usna*, moss.

Dolichousnea longissima (Acharius) Articus 2004, Methuselah's beard, beard lichen, old man's beard, lichen that hangs from trees is s'éiýwani

lawn-jih-sih-mah Latin, *longi-*, long + *-issima*, very, thus very long.

Taxonomy: *Usnea longissima* Acharius remains in common use and is the accepted name on Esslinger's North American checklist as well as on the Integrated Taxonomic Information System, but Index Fungorum accepts the new name. There remains uncertainty around the acceptance of Articus' elevation of *Dolichousnea* as a genus "based on the ITS-LSU nrDNA and part of the ß-tubulin region" which "strongly supported the monophyly of *Neuropogon*" making *Dolichousnea* a monophyletic sister group. Wirtz et al. respond with "We recommend a conservative approach regarding nomenclatural changes from phylogenetic studies especially at the generic level when few taxa are studied."

Articus, K. 2004. *Neuropogon and the phylogeny of* Usnea s.l. *(Parmeliaceae, lichenized Ascomycetes)*. Taxon 53(4): 925-934.
Wirtz, N., Printzen, C., Sancho, L.G. & Lumbsch, H.T. 2006. *The phylogeny and classification of* Neuropogon *and* Usnea *(Parmeliaceae, Ascomycota) revisited*. Taxon 55 (2): 367-376.

Notes: I find this species to be less common than *Alectoria* but just as widespread in most of our area. On the North Douglas Road once out of the forest it is the common beard lichen hanging from the rock cliffs and makes a spectacular show. It takes a bit of practice to be able to differentiate between the two beard lichens as most of us simply see the hanging strands of yellow-green "hair". This species construction is quite different with a single long to very long—"easily the longest lichen in the world" (Sharnoff)— measured to 6 m in British Columbia central cord with short (~2-5 cm) more or less perpendicular side branches. The cords are often entangled in a mass that strongly resemble *Alectoria*, so take a careful look at the underlying structure. When the cord is pulled apart, the outer cortex breaks and exposes a black elastic central core. Sharnoff notes "It is extremely sensitive to air pollution and has vanished from most of Europe. Even in the Pacific Northwest, where one occasionally sees good stands of it, it has strict habitat requirements, is slow to grow or to spread, and it should never be collected."

Hypogymnia (Nylander) Nylander 1896, tube lichens

hip-po-jim-knee-uh Greek από, *apo* thus hypo-, hyp-, under + γυμνός *gymnos*, naked from its lack of holdfasts or rhizines.

There are several species of these hollow lichens that require very close observation to identify to species. All have gray uppers and black lowers and grow on trees. The various patterns of lobing are key to identification and I pretend no expertise on these!

Hypogymnia enteromorpha (Acharius) Nylander 1900, beaded bone, budding tube lichen, gut lichen


en-tear-oh-morf-uh Greek εντός *entos*, inside + μορφός *morphos*, shape, thus intestine-shaped.

The tube lichens are fun to look at and fun to lightly pinch with fingers to feel their hollow lobes. While this one shows almost pure gray-green, the underside is pitch black. Some where the black creeps up the edges to be visible from the top really remind me of a little kid's Halloween skeleton costume where the "bones" are painted on black pajamas. It's easy to see how this came to be known as a "bone" lichen. It has tiny pores or openings into the tube, some of which can be seen in this photo. This species has rather large tube with constrictions in between which give it the name "beaded" bone. It is abundant on the outwash plain and grows on most every open branch of both alder and spruce.

There is precious little literature on these abundant and obvious lichens other than taxonomic treatments and lots of popular snapshot photos. Separating the species of the genus requires very careful observation.

Hypogymnia physodes (Linnæus) Nylander 1896, hooded bone or hooded tube lichen


fi-so-dees Greek φυσχια *physcia*, full of wind; bellows, referring to the inflated lobe ends.

I use the rather flattened aspect of this as my first key to recognition. While it looks flat, it still is a tube. With this species, the pitch black underside is never visible from the top and I have to lift one of the lobes up to examine it for its lack of rhizines. In other areas, the references indicate is forms masses that resmeble rosettes, but here they don't but often form arcs, like this one. In areas exposed to more light, the lobes seem to become larger and look more flattened. Those in darker, usually the underside of the branch, look more like tubes, illustrated in this photo. The name "hooded" comes from the ends of the lobes, but to my eyes this takes quite a stretch to look much like a hood. It superficially resembles ragbag lichens at a distance, but they lack tubes.

Platismatia W.L. Culberson & C.F. Culberson 1968

pla (as it cat)-tiz-ma (as in cat)-ee-ah Greek for plate-like.

Platismatia glauca (Linnæus) W.L. Culberson & C.F. Culberson 1968. , ragbag, ragged lichen

glaw-kah Derived from the Latin *glaucus*, bluish gray.

Nearly every tree that has an open or at least partially open lower trunk with some bare branches will be adorned with this well-named lichen. The edges of the thalli are divided, often very finely so as to look frilled, and resembling a ripped up rag. These edges are covered with both soredia and *isidia* (vegetative propagule with both fungal and algal cells covered with a cortex). The underside of the thalli have at least two of three colors: black, brown and white. The upper side is pale gray to light green-gray and quite smooth. Common throughout the Pacific Northwest, but especially so in moist forest like ours.

Family Ramalinaceae C. Agardh 1821

Ramalina Acharius 1809

ram-ah-line-uh Classical Latin *ramale*, brushwood, twigs, sticks.

Ramalina farinacea (Linnæus) Acharius 1810, dotted ramalina, the dotted line, farinose cartilage lichen.

Derived from the Latin word *farina*, flour, meal; referring to the mealy soredia.

These are the gray green clumps growing out of the yellow *Chrysothrix candelaris*. Note that most of the larger, basal strands are strongly flattened yet some are almost terete (rounded). There are numerous elliptical soralia along the margins that contain very mealy soredia.

Gieser notes it is "on trunks and branches of *Picea sitchensis* and deciduous shrubs (*Alnus*, *Malus*) along marine beaches; rarely along rivers or on rock". Brodo's range map has it strongly restricted to coastal areas. This is the only place I have noticed this lichen.

Ramalina menziesii Taylor 1847, lace lichen, Menzies' cartilage lichen

men-zees-ee-eye Honorific for Scottish physician and naturalist with the Vancouver Expedition of 1790-1795, Archibald Menzies (1754-1842).

Taxonomy: *R. reticulata* (Nohden) Krempelhuber is the name I learned this lichen with. It turns out that this name is actually associated with a totally different lichen and has the synonym of *R. reticulata* (Hoffmann) Krempelhuber (1869) where the type specimen is actually *Lobaria pulmonaria* (Linnæus) Hoffmann 1796. This required the name to be changed to *R. menziesii*. CalPhotos uses the strange combination *R. reticulata menziesii* that has not been published anywhere else that I can determine.

Notes: I first learned this species in the oak woodlands of the southern central coast mountains of California where it is usually called "Spanish moss". It hangs abundantly from the oaks just as bromeliad *Tillandsia usneoides* does in the southeastern United States (a plant I would not see for many years later) with both being mis-named as "moss". On September 13, 2011 I was sharing the Shrine of St. Therese with a friend from Georgia and recalled reading that this is a location for this species in Geiser et al.'s *Lichens and allied fungi of Southeast Alaska* where they write

> The epiphytic macrolichen flora of tiny forested marine islands, or isolated peninsulas, can be spectacularly different or diverse compared to the surrounding forested shorelines. For example, at the Shrine of St. Therese I. near Juneau and Gut I. at the mouth of the Stikine R., a dramatic cover of *Usnea* spp and *Ramalina menziesii* replaces normally abundant *Alectoria sarmentosa*.

I mentioned to my friend that I had not seen this lichen here in previous visits, so I began looking more in earnest than before and found two Sitka spruce (*Picea sitchensis*) with pendants of this lichen. I do not find that this species replaces *Alectoria sarmentosa*. The most common draping lichen here is *Dolichusnea strigosa*, followed by *Alectoria sarmentosa* with *Ramalina* being a distant third. I'm able to spot this lichen as its form is quite different from either of the other with a thallus that has many wide—some 5 mm—and flat sections. I don't find any with the holes through the wide portions that give it the name "lace lichen", a feature common in the California oak woodlands.

Family Sphaerophoraceae Fries 1831

Sphaerophorus Persoon 1794

sphere-AWE-for-us Greek σφαίρα *sfaira*, sphere or ball + Latin *phor-*, bearer, to bear, carrying.

Sphaerophorus tuckermanii Räsänen 1933, common Christmas-tree lichen

tuck-er-man-ee-eye Honorific for lichenologist Edward Tuckerman (1817-1886).

Taxonomy: In P&M it is *S. globosus* (Hudson) Vain. and PLANTS it is *S. g.* var. *gracilis* (Müller Argoviensis) Zahlbruckner, but on Sharnoff's website [http://www.sharnoffphotos.com/lichensG/sphaerophorus_tuckermanii.html] he notes the name change indicated from this article:

Wedin, M., F. Högnabba, & T. Goward. 2009 *A new species of* Sphaerophorus*, and a key to the family Sphaerophoraceae in western North America*. The Bryologist 112 (2): 368-374.

Notes: A common lichen of conifer bark that really looks like a wildly branched coral from the ocean. Here it is growing on a mature mountain hemlock (*Tsuga mertensiana*) in the "gnarly woods" on Mount Roberts in the first part of the Alpine Loop Trail. This must be young growth as there are no black terminal apothecia that look like little balls. The entire lichen is rather brittle.

Family Stereocaulaceae Chevall 1826

Stereocaulon (Schreber) Schrader 1794

stair-ee-oh-call-on Greek στέρεο stereo, solid, firm, hard; three-dimensional + Latin *caul-*, stem or stalk.

Stereocaulon coniophyllum I.M. Lamb 1961, foam lichen, powdered foam lichen, snow lichen


Latin cawn-ee-OFF-ill-um, American cone-eye-oh-FILL-um Greek σκόνη skoni thus coni-, dust + φύλλο *fyllo*, leaf.

Abundant to nearly omnipresent in the recently deglaciated sandy areas of the Mendenhall Glacier outwash plain, it forms nearly a continuous ground cover where shrubs have yet to colonize. Brodo (p. 664) notes it grows "on rocks or rarely soil" yet I've not encountered it on open rock. The outwash plain is unsorted sands and gravel, moraines and even a kame. The lichen colonizes some of gentle sandy slopes and gravelly flats in great masses. The lichen strongly resembles a forest of tiny corals and the myriad of soredia (something most foam lichen lack) covering its branches give it a very granular look. The photo on the right includes a number of pinkish brown mushroom-shaped apothecia. Brodo notes that cephalodia, resembling a "sack of potatoes" are abundant, but I've not found them on the lichens I've examined here

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Incertae Sedis - uncertain lichen Family, Anamorphic Lecanorales

Leprocaulon Nylander 1878

lep-row-cawl-on Latin *lepra*: flake, scale, scales, scaly, scabby + Latin *caul-*, stem or stalk.

Leprocaulon subalbicans (I.M. Lamb) I.M. Lamb & A.M. Ward 1974 , dust lichen, mealy lichen


Latin *sub-*, under, below, beneath + Latin *alb-*, the color white.

The mossy cliff faces along the Mendenhall Valley side of the East Glacier Trail are full of this lichen. In places they almost form a continuous cover. Even on a rainy day I can place a fingertip on the white part and pick up "dust" on it. This lichen is barely more than a few spheres or globules of lichen stacked two or three on top of one another— giving it the "mealy" name—connected by a very fine cottony threads growing in a mass. The genus name means "scaly stem". It is these structures that separate this genus from the common dust lichen genus, *Lepraria*. Lichens of both genera apparently reproduce asexually by simply sloughing off these tiny balls that grow by mitosis that contain both the fungus and the *Trebouxia* algae (the most common in lichens) that grow into a new mass. The unconnected white spots beyond the main mass of this lichen probably represent globules that broke off from the main mass and landed nearby and took hold on the moss and are growing into a new lichen.

Order Ostropales Nannfeldt 1932

Family Graphidaceae Dumortier 1822

Graphis Adanson 1763

graff-iss Greek γράφω *grafo*, to scratch; to write.

Graphis scripta (Linnæus) Acharius 1809, pencil mark lichen or pencil script

scrip-tah Latin *scrib-*, write, record.

A common lichen on red alder (*Alnus rubra* Bongard) where the crustose part of the lichen is very white and very tightly embedded on the bark and the fruiting bodies form wiggly lines that, on red alder at least, require the use of a 10x hand lends to see. It is commonly stated that this lichen only grows in areas of clean air, but I find no direct reference for this.

Family Thelotremataceae (Nylander) Stizenberger, 1862

Thelotrema Acharius 1803

Latin thel-AWE-treh-mah, American thell-oh-TREE-mah Greek θηλή *thili*, teat, teats, nipple, nipples + διατρυπώ *diatrypo*, perforate.

Thelotrema lepadinum (Acharius) Acharius 1803, bark barnacle

leh-paw-DIE-num Latin *lepra*, flake, scale, scales, scaly, scabby.

The natural color of the bark of red alder (*Alnus rubra* Bongard) is rarely seen in the temperate rainforest as the green-brown is almost always completely covered with epiphytic organisms. One of the most common is the bark barnacle lichen, a crustose form that grows very tightly on the bark and actually appears to be the bark when viewed at normal walking distance. It's only when one pokes their nose close to the tree that it becomes obvious there is an organism living on the bark that gives the tree its white color.

Order Peltigerales W. Watson, 1929

Family Collemataceae Zenker 1827

Leptogium (Acharius) Gray 1821

lep-TOE-gee-um Greek λεπτός *leptos*, thin.

Leptogium hirsutum Sierk 1964, jellyskin lichen

hear-suit-um Latin *hirsute*, hair, shaggy, bristly, rough.

Family Lobariaceae Chevall, 1826

Lobaria (Schreber) Hoffmann 1796

low-bear-ee-uh Greek λοβός *lobos*, lobe

Lobaria hallii (Tuckerman) Zahlbruckner 1925, gray lungwort

hall-ee-eye Honorific for botanist Hermannus Christiaan van Hall (1801-874).

Of the leafy arboreal lichens, this one is perhaps the easiest to identify as it isn't green. Some of the leafy ground lichens turn gray when desiccated, but the gray lungwort is gray all the time. It is very common on alders and young spruce on the glacial outwash plain and less common on the Moraine Ecology Trail. This tells me it is more of a pioneer species that requires more light than the forest provides. Since it is gray and not bright green, it must have far less chlorophyll than most lungworts and thus require more ambient light to thrive. It often grows at eye level so it is easy to examine. Some have coarse edges as the photo on the left shows, but some have almost frilly edges (but they are very stiff) like the photo on the right. These can be mistaken for desiccated *Lobaria oregona*.

Lobaria linita (Acharius) Rabenhorst 1845, cabbage lungwort

LINN-ih-tah Latin *lin*-, line, thread, string, cord, net.

It took me a while to recognize we have two species of arboreal leafy lichens that get bright chartreuse green when fully hydrated, and that the more common of the two is this species, which like the lettuce lung above, lacks soredia and isidia. This organism is literally covered with apothecia, disk-shaped or cup-shaped ascocarp [the fruiting body (sporocarp) of an ascomycete fungus] which includes cells of the algal and/or cyanobacteria photobiont partner. What is curious to me is that some of the apothecia seem to wander from one lobe to another and even to another "leaf"! This species is more confined to the lower trunks of conifers than the previous.

Lobaria oregana (Tuckerman) Müller Argoviensis 1889, lettuce lichen

oar-eh-gah-nah   Oregon, where originally described.

I'm finding the leafy lichens to be difficult. This is probably a result of my taking the time to really observe what I'm seeing and am sensing the subtle differences between species, at least I hope so. This pale yellow-green and granular lungwort is by far the least common here. One of the careful observations is that this species bears no *soredia* (powdery masses composed of fungal hyphae wrapped around cyanobacteria or green algae, here both) or *isidia* (raised wart-like parts of the thallus or body of the lichen of fungal and algal cells) when comparing it to the other common species. The edges of the leafy parts give this species a frilly appearance. Upon close examination these frills are actually *lobules*, small, stiff and tooth-like ends of the thallus that can break off containing both algal and fungal tissue for asexual reproduction

Lobaria pulmonaria (Linnæus) Hoffmann 1796, lungwort, s'éixwani

pull-mow-NAIR-ee-uh   Latin *pulmo*, lung.

Omnipresent in open woods with lots of moss, lungwort seems limited to growing on live trees, especially spruce as on the bus parking lot entrance to the Moraine Ecology Trail. During our dry periods this summer, the color faded to a distinct green-gray and looked very different than this photograph taken on the Trail of Time in the moss woods just past the Steep Creek bridge during wet weather.

This photograph shows sexual reproductive structures called *apothecia* which contain *asci* (the "cup" of cup fungi, ascomycetes) on the darker lobes left center. They look round and reddish bronze in color. The fungus requires about 25 years of life before these structures are borne! Apothecia release fungal spores without the algal component and thus will *not* produce a lichen.

Younger forms reproduce vegetatively and produce two different structures: *soredia* are tiny powdery balls that grow from the thallus between the ridges "a cluster of algal cells wrapped in fungal filaments"; *isidia* are wart-like structures that grow along the rides and lobe margins and "are enclosed within a layer of protective cortex tissue. An isidium is ... like a miniature lichen". [P&M p. 89 and quotations are from http://www.ucmp.berkeley.edu/fungi/lichens/lichens.html].

Lungwort contains two phycobionts. Dense clusters of cyanobacteria in the genus *Nostoc* called *cephalodia* form in the thallus of the fungus and have the ability to fix nitrogen that apparently is not released into the soil until the lichen dies. *Nostoc* are particularly sensitive to atmospheric conditions for that reason this lichen is generally considered an indicator of clean air. The green algae *Dictyochloropsis reticulata* is the second and is not limited to *Lobaria* as it also exists in free form as a soil algae. [http://en.wikipedia.org/wiki/Lobaria_pulmonaria]

Family Peltigeraceae Dumortier, 1822 **pelt lichens**

Peltigera Willdenow 1787

pell-TIH-jer-uh		Greek ασπίδα *aspida* thus *pelt*-, shield.

Peltigera aphthosa (Linnæus) Willdenow, 1787, green dog lichen, leafy lichen, felt lichen, common freckle pelt (?).

aff-tho-sa		etymology undetermined

When I realized a couple of years ago that we have many different *Peltigera* species here, I've begun looking more closely at them when I hike. This patch caught my eye because: the green is quite a different color than the common *P. britannica*; the upturned edges show far more white and lacking in rhizines than other pelt lichens I've seen; the distal end of the upper surface pales significantly to an ashy gray; and, the surface is almost devoid of cephalodia and those that do appear seem fully embedded in the thallus of the lichen. These features seem most consistent with *P. aphthosa*, but I am very uncertain about this identification. Mc Cune & Geiser in their description of the species make this note: "specimens with tightly appressed cephalodia are assigned to *P. apthosa*, while those with cephalodia that are slightly raised and free ad the edge should be named *P. britannica*." This is a match here.

Peltigera britannica (Gyelnik) Holtan-Hartwig & Tønsberg 1983, freckle pelt

bri-ta-nih-cah		Of Britain, where originally described.

Confined to the ground in moss, humus and decaying wood, this lichen is very common, particularly in the more open areas of the West Glacier Trail and under willows on the Moraine Ecology Trail. It not easily found on the East Glacier Trail and I've never seen it on the Perseverance Trail or on the Rainforest Trail.

During our dry periods it took on a completely new look (as in the photograph right from the Herbert Glacier Trail) like faded dollar bills sticking up out of the ground. In "normal" (wet) weather, it is quite green (as in the photograph on the left) and the cephalodia are very apparent.

As with lungwort, freckle pelt has a green algae as one of its phycobionts throughout the thallus, but has the second, a cyanobacteria, in the "freckles" on the thallus in loosely attached cephalodia that provide nitrogen to the lichen. These are apparently are easily dislodged and become the major method of vegetative reproduction of this lichen. .

Sharnoff includes a photo of a chimeroid form where the cyanobacteria is the dominant partner and is dark gray, the same color as the cephalodia in the upper photo. [http://www.lichen.com/bigpix/chimera.html]. I have not encountered this form of this abundant lichen.

Peltigera collina (Acharius) Röhling 1813, tree pelt lichen

Latin CALL-in-uh, American cole-LIE-nah

Latin *-cole, -cola, -coles, -colid, -coline, -colous,* to inhabit, to live in, on, or among; to dwell; living among, dwelling in.

Abundant on many of the small alders and spruce at the shoreline of Mendenhall Lake on the Moraine Ecology Trail, this lichen is noted for the leafy and loose form of its epiphytic thalli. Its lobes can be just about any shape from rounded to elongate. The color of the upper surface is usually (when hydrated) well-tinted with a bluish color behind the tans and maroons. When desiccated it is mostly grayish.

This epiphytic lichen strongly resembles *Peltigera neopolydactyla* that is found on mosses, rotten logs, and rich soils on the ground.

The edges of the thalli are *sorediate*. These granular structures are composed of both fungal and photobiont cells that will reproduce the lichen as we see it here.

The *photobiont* (capable of photosynthesis) in this species is a cyanobacteria that is capable of fixing atmospheric nitrogen into nitrate as well and is responsible for the bluish cast to the upper surface of the thalli.

This lower mass of thalli, from July 14, 2012,is amazing for the sheer number of *apothecia* on it. In the pelt lichens they always are on the upper surface of the thallus and strongly resemble fingernails, here with a lovely ochre-mauve color to them. These cup-like fungal reproductive structure that releases only fungal spores which will grow only into the fungus form unless they happen to find the right photobiont cells where they land.

Peltigera neopolydactyla (Gyelnik) Gyelnik 1932, frog pelt, felt lichen

knee-oh-poly-DAK-tih-luh Greek νέος *neos*, new + πολύς *polus,* many + δάκτυλος *daktulos*, finger.

"Frog pelt" is right up there with my top favorite names! How descriptive it is as one can immediately imagine what a skinned and tanned frog hide would look like, and that's exactly what this lichen does. Broad and lobed, wrinkled but flat, grayish purple on top and white-gray below, it's easy to see a frog's pelt here. This name apparently comes from the "Nagaganaw [lit. "Frog's dress"] or "Frog's blanket" [translation]" [http://web.uvic.ca/~stucraw/part2NX.html]. Brodo (p. 16) calls is a far less imaginative "carpet pelt" and shows it as a clearly boreal species.

Here it seems confined to areas with abundant *Tsuga* species, but usually grows in thick moss on the ground and only very occasionally on the hemlock tree base itself. It is abundant on the East Glacier Trail, common on the West Glacier Trail and Perseverance Trail and occasional on the Rainforest Trail.

The bright orange apothecia are borne on raised edges of the thallus in little structures that look like thin match heads when small, or finger nails when large. As with the *Lobaria* and other *Peltigera*, one phytobiont is a species of the cyanobacteria *Nostoc*.

Peltigera praetextata (Flörke ex Sommerfelt) Zopf, dog lichen, felt lichen, scaly pelt lichen, born-again lichen

pree-tex-TAY-tah Latin *prae-*, before + *text-* to weave, woven; to structure, to make, from the name for the Roman toga.

Pseudocyphellaria Vainio, 1890, specklebelly lichens

sue-do-sigh-fell-AIR-ee-uh referring to the abundant pseudocyphellae on the underside. uh-NAHM-uh-luh

Pseudocyphellaria anomala Brodo & Ahti, 1987, dimpled specklebelly lichen, netted specklebelly lichen

Latin *anomalus,* irregular, anomalous, deviating from the general rule; referring to the irregular arrangement of the soredia.

Taxonomy: Curiously, Brodo and Ahti renamed this lichen with the same name as the original. *P. a.* G.K. Merrill ex A.H. Magnusson, 1939, was determined to be a *nomen invalidum*, an invalid name, as originally published since it lacked a Latin diagnosis. Brodo and Ahti provided that in *Mycotaxon* 28(1): 95 (1987) requiring a new name. To make the nomenclature simpler, they kept the same name but appended only their new authority with full acknowledgment "that this procedure does not do justice to the originators of the name".

It is almost identical to *P. anthrapsis* which lacks the soredia that make this lichen so easy to spot.

Notes: Abundant at eye level on almost every tree [but mostly young and open Sitka spruce (*Picea sitchensis*)] on the outwash plain of the Mendenhall Glacier, this leafy lichen has a very different look than the others which makes it easy to identify, even without turning it over and looking for the pseudocyphellae. The thalli are large, 20 to 40 cm broad with lobes 1 to 3 cm across and completely loose around the edges. The thallus is usually a shade of brown that ranges from chocolate to reddish but can be somewhat blue when the cyanobacteria photobiont is abundant and the lichen fully hydrated. The raised ridges of what appear to be connected white or grayish soredia are conspicuous. Pseudocyphellae are small holes in the cortex that allows the inside of the lichen body, medulary hyphae, to be seen or grow out of the underside of the lichen.

Family Nephromataceae Wetmore ex J.C. David & D. Hawksworth 1991

Nephroma Acharius 1809

neh-froe-mah Greek νεφρός *nephros*, kidney.

Nephroma parile (Acharius) Acharius, 1810, kidney lichen.

par-eel Latin *parilis*, like, equal. Reference to this lichen undetermined.

This pale mauve foliose lichen strongly resembles *Pseducyphellaria* on a casual look as its surface is densely covered with soredia. This is the primary character that separates this species from other *Nephroma*. The soredia on the edges don't form an elaborate and obvious somewhat wooly white border like *N. resupinatum* and have a definite bluish cast. The color is usually some shade of red or reddish brown.

Here I find it on branches of the small trees on the outwash plain, both , Sitka alder (*Alnus viridis*) and Sitka spruce (*Picea sitchensis*). It also grows on rocks. Today I'm out looking for lichens and paying more attention than when leading a group and my eye catches the different color of this lichen which thus requires a closer look and a photograph.

This lichen has an amazing world distribution in that it is common in the spruce-fir areas of the boreal region but it is also found in the mountains of the Sonoran Desert of Arizona and Baja California!

The photobiont is the cyanobacterium *Nostoc*.

Nephroma resupinatum (Linnæus) Acharius 1810, pimpled kidney lichen

ree-soo-pih-nay-tum Latin *resupinatus*, upside down; referring to the apothecia.

This large—2 dm across—mass of thalli on a thinly moss-covered Sitka alder is showy in its fully hydrated state. The underside (hence the specific epithet) of many of the lobes tips have the showy apothecia, here a peachy tan color. The rest of the underside is brown with whitish raised spots (papillae) which is diagnostic for this species. The upper side is a deep blue-gray hydrated. The edges are brown, particularly the tips of the lobes. The photobiont is a *Nostoc* cyanobacteria. Of all the photographs I compared mine to, the only ones coming close to these colors are from Stephen Sharnoff that he took in Southeast Alaska. All the others are of the lichen in a nearly desiccated state.

Order Pertusariales M. Choisy, 1949 ex D. Hawksworth & O.E. Eriksson, 1986

Family Pertusariaceae Körber ex Körber 1855

Ochrolechia A. Massalongo 1852

oh-crow-LEK-ee-uh Greek ώχρα ochra, the color yellow; pale, wan, or sallow.

Ochrolechia laevigata (Räsänen) Verseghy 1962, crabseye lichen

lee-vih-gay-tah   Latin *levi-* light in weight + *igate*, to make, to drive thus having a smooth surface, as if polished.

Of the encrusting tree bark lichens, this may be the easiest to identify. Most of the encrusting thalli look the same: gray to white and smooth, almost as if painted on the tree. The thallus of this species is much thinner than other encrusting lichens upon close examination. Here the cup-like apothecia are scattered about like someone stuck chewed bubble gum on the trunk. It is most common on *Alnus rubra*, red alder and one of the lichens that gives mature trees their white "bark".

Order Verrucariales Mattick, in Engler, 1954 ex D. Hawksworth & O.E. Eriksson, 1986

Family Verrucariaceae Zenker 1827

Hydropunctaria C. Keller, Gueidan & Thüs 2009

high-dro-punk-TARE-ee-uh   From Ancient Greek ὑδρο-, *hudro-*, from ὕδωρ, *húdōr*, water + from Modern Latin *punctuatus*, from Latin *punctum*, point; meaning dotted or marked with dots. Presumably named for the dotted look on the rocks growing near water. *Punctaria* is a genus of algae so it is possible the name comes from the algal component.

Hydropunctaria maura (Wahlenberg) Keller, Gueidan & Thüs 2009, sea tar, black seaside lichen

maw-rah   Ancient Greek for dark or obscure

Taxonomy: Formerly known as *Verrucaria maura* Wahlenberg 1803, "molecular phylogenetic analyses and morphological studies have shown that it is necessary to revise the present morphology-based generic delineation of the lichen family Verrucariaceae in order to account for evolutionary relatedness between species". Three new genera have been created to deal with this new information. "Two marine (*V. maura*, *V. adriatica*) and two freshwater (*V. scabra*, *V. rheitrophila*) species of *Verrucaria* form a well-supported monophyletic group. They are here included in the new genus *Hydropunctaria*."

Gueidan, C, S. Savic, H. Thüs, C. Roux, C. Keller, L. Tibell, M. Prieto, S. Heiðmarsson, O. Breuss, A. Orange, L. Fröberg, A.A. Wynns, P. Navarro-Rosinés, B. Krzewicka, J. Pykälä, M. Grube, & F. Lutzoni. 2009. *Generic classification of the verrucariaceae (ascomycota) based on molecular and morphological evidence: recent progress and remaining challenges*. Taxon, 58(1), 184-208.

Notes: The name "sea tar" is especially appropriate after the Exxon Valdez when tar coated the rocks and made them look like this natural "tar" In this case it's a crustose lichen that adheres extremely tightly to the rocks in the splash zone above normal high tides of the ocean shore. Here it must be able to withstand the physical action of waves against the rocks and the high salinity of the water. The lichen thallus actually grows into the rock (*endolithic*) about 2 mm! It obviously thrives as it often forms a black linear band at the splash line along our coasts. I call this "the black bathtub ring". In areas of near vertical cliffs it is especially apparent, but here at Point Louisa with its gravel beaches still forms a line at the splash line.

On close examination (middle photo), most of the lichen appears as a fairly smooth coating of very hard paint on the rock that can be a dull flat black or even quite shiny. On larger rocks or in extensive growth areas, this *exciple* (the outer, upper layer) develops small to extensive areas of raised or small black *involucrellae* (a shield-like mound of hyphae around the ascocarp) that often look wrinkled. The photo on the right shows a boulder of tonalite freshly split that illustrates how extensive the lichen covering becomes on exposed rock surfaces.

This is a cosmopolitan species that is "ubiquitous on most temperate to boreal coasts of Eurasia, North America, Japan and Antarctica; also in Macquarie I. and New Zealand" [Checklist of the Lichens of Australia and its Island Territories, http://www.anbg.gov.au/abrs/lichenlist/VERRUCARIACEAE/Verrucaria_maura.html]

Phylum Basidiomycota H.C. Bold, 1957 ex R.T. Moore, 1980 *"higher fungi"*

Subphylum Agaricomycotina Doweld (2001)

Class Tremellomycetes Hibbett, Matheny & Manfr. Binder (2007)

Incertae sedis

Order Tremellales Fries 1821

Family Tremellaceae Fries 1821

Tremella Persoon 1794

Latin TREH-me-luh, American treh-MEL-uh. Latin *tremulus*, trembling, from the jelly-like consistency.

Taxonomy: The name *Tremella* comes from Linnæus' 1753 *Species Plantarum* where he placed it with the algae because of its jelly-like character. Persoon revised *Tremella* in 1794 and 1801 and placed its 100+ species (~500 taxa have been named) within the fungi. Limited molecular evidence indicates it may by polyphyletic and in need of future revision.

Tremella foliacea Persoon, 1799, leafy brain, jelly leaf, brown witch's butter.

foe-lee-aye-see-uh Late Latin *folium*, leaf; for the leafy look of the lobes.

I spot this strange gelatinous fungus in amongst the moss on a weepy slope and simply call it a "jelly fungus". It doesn't take a great deal of effort to identify it, although my specimen is surely very young and small as it can apparently grow to near softball size! It also seems to vary in color markedly with mine being olive brown. It turns out this is a rather widespread fungus in North America that I've now found in many other places far south of Alaska. I found it in some old firewood at my Georgia house in February, 2014. I just learned it in Alaska!

I'm quite familiar with what is commonly called "witch's butter", *Tremella mesenterica*, as I've encountered it many times in my wanderings in the United States. This species is far more gelatinous, and upon sticking my finger on it, feels like it is overwhelmingly made up of just plain water. The leafy or ear-like lobes are all joined to a common base that grows out of the substrate, here only moss.

Order Dacrymycetales Hennings 1897

A monotypic order containing only the single family.

Family Dacrymycetaceae J. Schröter 1888

Dacrymyces Nees 1816

Greek δάχτυλ *dactyl*, a finger + Greek μύκητας *mykitas*, fungus.

Dacrymyces palmatus (Schweinitz) Bresàdola 1904, jelly fungus, witch's butter

Latin *palma*, the open hand; palm, width of the hand.

I've been guilty of not observing the jelly fungi here close enough! It turns out there are quite a number of bright orange jellies out there and they really are different from one another. The "witch's butter" I'm used to are *Tremella mesenterica* and *Tremella aurantia* which are not very closely related and in fact are in a completely different order! There are two fairly common jellies here, both of which have a peg-like structure when growing singly as the lower photo illustrates. The broad palm-like fan at the tip gives it the specific name. When they mass together they really resemble the contortions of a brain. Unlike the *Tremella* which parasitize *Stereum* fungi in wood and show up through the bark, these feed upon wood and grow on logs where the bark has been removed. Here they are on a Sitka spruce (*Picea sitchensis*) log cut to open the trail on the face of the cut.

Class Agaricomycetes Dowell 2001

Order Agaricales Underwood, 1899*, gilled mushrooms*

Phylogenetic order of families follows the work of these 25 (!) researchers:

Matheny, P.B. et al. 2006. *Major clades of Agaricales: a multilocus phylogenetic overview*. Mycologia, 98(6), pp. 982–995.

Family Strophariaceae Singer & A.H. Smith 1946

Gymnopilus P. Karsten (1879)

Latin jim-NAW-pih-lus, American jim-no-PIE-lus

Greek γυμνός, *gymnos*, naked + πῖλος, *pilos*, hat hence naked pileus or cap

Gymnopilus sapineus (Fries) Murrill 1912, spruce gymnopilus, common and boring gymnopilus, scaly rustgill

suh-pih,nee-us Latin *sapineus*, 'of fir or pine' referring to the host tree

I've been calling the "laughing mushroom" when I see it growing in clumps at the base of dead trees and stumps. This comes from a misidentification with a species in the same genus that occurs further south than here. The skirt halfway up the stalk marks the point where the darker bottom meets a lighter top. The cap is "UFO"-shaped with a lighter wide disk and darker central raised portion that lacks a crown or peak. It is abundant on the East Glacier Trail

Pholiota (Fries) P. Kummer 1871

Latin foe-LEE-oh-tah, American foe-lee-OH-tuh Greek φολίς *pholis*, scaly.

Pholiota destruens (Brondeau) Gillet (1876), poplar pholitoa, destructive pholiota

deh-STREW-ens Latin *destruere*, demolish, pull, tear down.

Both of these "common" names are not common, and try as I might, I come up with no "common" name for this genus. This cluster of very young white mushrooms is growing out of a black cottonwood (*Populus trichocarpa*) on the Amalga Trail on September 26, 2011. Their very white color grabbed my attention, and it's only on a much closer look do I find the "scales" developing on the cap that give its generic name. I was able to identify this wood-rotting fungus from references in *Silvics of North America* on fungal decay. Other than the bright white cluster of mushrooms that caught my eye, what was most interesting on closer examination are the very large (especially with one of the mushrooms) and somewhat flattened vertical stalks that grow out of the tree. The "scales" on the cap today are mere tan discolorations. This is a large (20 cm across on the largest here) fungus that, along with its white color, makes it pretty obvious on the trail. This cottonwood is alive, and apparently fairly well, based upon the leaf cover of its canopy. If my references are correct, that will not last long as this is a rapid decayer of live wood.

Family Cortinariaceae R. Heim ex Pouzar (1983)

Cortinarius (Persoon) Gray 1821, webcaps

core-tih-NAIR-ee-us Latin *cortina*, cauldron, kettle; now referring to the cobwebby partial veil.

This, the largest genus of fungi with perhaps more than a thousand species normally requires close observation of many details for an accurate identification. They are all united by the presence of a *cortina*, a cobwebby partial veil between the cap and the stem that covers and presumably protects the developing gills and sporangia they contain. The cortina usually disintegrates shortly after the cap expands but often has residual shreds that capture the falling spores and become stained by them.

Gibson, I. 2011. *Notes on* Cortinarius *in the Pacific Northwest*. Pacific Northwest Key Council. http://www.svims.ca/council/Cortin.htm

Cortinarius alboviolaceus (Persoon) Fries 1838, silvery-violet cortinarius, pearly webcap (?)

While walking the long ramp of the Trail of Time with Linda Nicklin on August 16, 2014, I a mushroom caught my eye that requires more than a casual look. From eye level, it is rather nondescript except for the very long stipe and very compact pileus that give it an out-of-proportion look which is what made me look at it. When I tease one out of the *Pleurozium schreberi*, big redstem moss and turn it over, the fuzzy cortina gives its genus away. Working on the species has proven a challenge and this is but a tentative name. The pale tan cap only has the faintest tinge of lilac that could be called mauve, but it's very subtle and brown is the dominant color. The gills are decidedly a lilac-mauve as are the strands of the cortina and striping on the otherwise white stalk. A search of many resources leads me to this identification, and the two common names are certainly apt for my specimen.

Gibson notes: "STIPE 5-12 cm x 0.5-1.0 cm, with base up to 2 cm wide; violet in upper part, with whitish silky fibrils overlying pale violet surface in lower part; dry, silky" but "in forest humus, associated mainly with hardwoods". Cottonwood and alder abound on this slope.

Cortinarius traganus (Fries) Fries 1838, lilac conifer cortinarius, gassy webcap, lilac webcap, pungent cort, purple cort, purple webcap, violet webcap

TRA (as in cat)-gah-nus Greek τράγος tragos, goat; referring to it's goat-like odor.

Taxonomy: The species *sensu lato* is cosmopolitan in temperate forests. When North American material is considered separate from Eurasian, the name is *Cortinarius pyriodorus* Kauffman 1932. The epithet comes means "with the odor of pears", quite distinct than from goats!

Notes: The switchback area of the East Glacier Trail erupts with this lilac mushroom in late August each year. The color is unique for our area with nothing even coming close so this 'shroom are hard to miss and is easily identified. The balls last several days before the veil opens and the cap expands. While in the universal veil, when cut longitudinally the *cortina* is apparent as a very cobwebby material between the cap and the stipe that shrouds the gills. When the cap opens, this veil remains in small pieces on the stipe. The interior—including the gills—of the mushroom is a rusty red-brown color that separates this from the purple milkcap (*Lactarius indigo*). As the mushroom matures, the stipe and cortina remains become stained by the brown spores making the lilac color less showy. It is supposed to have the odor of "over-ripe pear" but when I cut the bulbs I have yet to experience this smell. Apparently our North American fungi have a better odor than the European that are "goaty"! Arora makes the note that this species is common under conifers; here it is directly under Sitka spruce (*Picea sitchensis*).

Cortinarius collinitus (Persoon) Fries (1838), belted slimy cort, orange webcap, slimy webcap

call-in-EYE-tus derived from Latin for smeared or greased, referring to the slimy cap

<u>Taxonomy</u>: Originally named *Agaricus mucosus* Bulliard 1792, this fungus is part of a group that is poorly known and has been called by very many names. If considered broadly (*sensu latu*), it may well be *Cortinarius mucosus* (Bulliard) Cooke (1867) or that ours is the species and the more European material is *Cortinarius collinitus* var. *mucosus* (Bulliard) Fries 1838. Since *Cortinarius collinitus* is the oldest name, it has priority and provides the currently accepted name. What is currently circumscribed as a single species probably contains many species that have yet to be described.

<u>Notes</u>: When walking in our wet rainforest woods, if one sees a very wet mushroom cap that looks like it just came out of the Krispy Kreme donut shop, there are two places to look in your mushroom books: here, and for *Armillaria nabsnona*. If you have very fresh material, like the domed cap with the water drop, look underneath and if you see a veil or covering over at least part of the gills, you have a *Cortinarius* with its cortina. When fresh, the stipe (stem) has a purplish or violet tinge to it that becomes brown with age, sometimes a very young age. As the cap expands and flattens, it seems to always have an umbo (a rounded knob or protuberance that resembles a nipple) that is plainly visible in the photograph on the right. Don't make the mistake of only looking at the tan, slimy cap.

Since this widespread fungus is common under conifers in the boreal forest, it probably forms a mycorrhizal relationship with at least one of the trees common in our area. Since it has not been studied, we can only guess which one at this time.

Most *Cortinarius* are at least mildly to deadly poisonous (*Cortinarius gentilis*) and it seems best to leave this one in the woods as its edibility is unknown.

Family Psathyrellaceae Vilgalys, Moncalvo & Redhead (2001)

<u>Taxonomy</u>: Most references place the inky caps in the Coprinaceae. With the phylogeny of the type species, *Coprinus comatus*, being found well embeded in the Agaricaceae, it had to be moved there. The name Coprinacae then becomes a synonym for the Agaricaceae which has priority. All but three species in *Coprinus* had to re renamed as they are unrelated. A new family name, Psathyrellaceae, formerly the subfamily Psathyrelloideae in the Coprinaceae, is elevated to family status to encompass the former coprinoids. The type genus, *Psathyrella*, is polyphyletic and more restructuring is certain.

Redhead, S. A., R. Vilgalys, J.-M. Moncalvo, J. Johnson & J S. Hopple, Jr. 2001 Coprinus *Pers. and the disposition of* Coprinus *species sensu lato*. Taxon 50: 203-241.

Coprinellus P. Karsten 1879

Latin caw-PRIH-neh-lus, American cop-rih-nell-us Diminutive of *Coprinus*.

Coprinellus micaceus (Bulliard) Vilgalys 2001, glistening inky cap, mica cap

my-KAY-see-us   Latin *mica*, a crumb + *micare*, to glitter, thus resembling mica.

Inky caps simply appear overnight and before they became "inky" I find them very difficult to identify. This one gets its name because of small, shiny mica-like (hence the specific epithet) granules that adorn the cap. MushroomExpert.com notes that these often wash away with rain, and we have a lot of rain here which explains why I've never seen them. What seems most notable about these are the lines that look like pleats on the cap that end in a dentate pattern ad the base of the cap. The gills begin white, then pale brown or tan but turn absolutely black when ripe and "inky". I reach my finger under the cap and show the dark fluid to my guests, but it washes right off on the wet moss that is always nearby. When finished sporulating, the cap virtually disintegrates into a black, watery mass atop a stalk that gets weaker and finally collapses to the ground. Every time I find these, they are always in a group of at least six mushrooms. These wood rotters were less common in 2010 than in 2009.

Family Hydnangiaceae Gäumann & C.W. Dodge 1928

Laccaria Berkeley & Broome 1883

lah-CARE-ee-ah   Persian *lac*, paint or varnish, thus referring to the shining cap.

Laccaria are cosmopolitan—found on every continent but Antarctica—yet has only about 70 worldwide species. While easily recognizable as a genus, its members are remarkably difficult to name to species. Michael Kuo gives this warning: "you must, in some cases, have fresh, young specimens available in order to judge the color" and that "microscopic analysis is required in order to sift through a few species clusters".

These 'shrooms here are usually somewhat flesh-colored, but in other places can be red to purple or even blue. The caps and gills are rather waxy and never slimy. Many species are reported to form ectomycorrhizal associations.

Kuo, M. *The Genus Laccaria.* http://www.mushroomexpert.com/laccaria.html

Mueller, G.M. *The Mushroom Genus Laccaria in North America.* http://archive.fieldmuseum.org/research_collections/botany/botany_sites/fungi/index.html

Mueller, G. M. 1992. *Systematics of Laccaria (Agaricales) in the Continental United States and Canada, With Discussions on Extralimital Taxa and Descriptions of Extant Types*. Fieldiana: Botany, n.s., 30: 1-158

Laccaria laccata (Scopoli) Cooke 1884, the deceiver (?)

Latin *laccatus,* varnished or shining.

Instantly recognizable as a distinct mushroom, I call this the "redwood tree fungus" as the stalk looks like the trunk of an old and large redwood and is it's most unique feature and seem diagnostic for most of those I see on the glacial outwash plain. The stripes are usually a deeper brown than the cap and with a slight purple undertone yet resemble the brown-cinnamon color of redwood trees. They appear raised slightly from the main stem that is mostly white. The upper ends of the stripes appear to rise and curl slightly away from the stem. Mueller's description says the stipe is "often finely striate, concolorous with pileus".

The color of the forms I see are not as vibrant as many of my sources indicate, usually an orange-brown for fresh 'shrooms that fade to a varnished deep honey-brown with age. Many here look to my eyes as a fleshy-pink. The rapidly thinning and wavy edge of the cap of older specimens is quickly spotted while walking.

It is common along the bus entrance to the Moraine Ecology Trail and the trail itself as well as similar places on the Trail of Time. I always find it in moss, usually in a more open area that is near forest. I find a few in the mossy areas of the East Glacier Trail, but here the caps seem to weather by splitting apart. This may be a clue to this species ectomycorrhizal relationship with *Tsuga heterophylla* [1] (yet this is not a common tree in the outwash plain) and role as a pioneer species [2]. Since I find it in the youngest vegetation, a pioneer role in succession seems reasonable.

[1] Trappe, J. M. 1962. *Fungus associates of ectotrophic mycorrhizae*. Botanical Review (Lancaster), 28: 538-606.

[2] Watling, R. 1977. *Relationships between the development of higher plants and fungal communities.* Second International Mycological Congress. University of South Florida, Tampa. p. 718 (Abstract).

This may well be one of the apparently many morphs of "the deceiver" that give this 'shroom its name. It is abundant in moss in the outwash plain where all have an orange-tan stalk without the "redwood bark" and a cap a bit more orange than tan. The gills are large in proportion to its small (~ 3-5 cm across the cap and 7-1- cm tall) stature and are widely spaced. Instead of dividing to get smaller, the smaller ones attach from the outer part of the cap and fill in the space inward between the gills that go the whole way.

Family Agaricaceae Chevall 1826

Coprinus Persoon 1797

Latin KAH-prih-nus, American co-PRY-nus Greek κοπριά, *kopria*, dung.

Coprinus comatus (O.F. Müller) Persoon 1797, shaggy mane

CAH-mah-tuss Old Latin, *coma*, hair.

Taxonomy: DNA studies find that *Coprinus* is deeply embedded within the Agaricaceae and has been moved here from the Coprinaceae. See notes on the Psathyrellaceae for details.

Notes: The only place I find these until September of 2014 are in the median of Egan Drive ("The Road") on the causeway section where the road is built up from dredged material from the channel They pop up at various times from August through September, usually not far, <3 feet, from the edge of the pavement, and only rarely in the grassy swale in the center. I've not worked up the courage to stop and make my way there for a photograph! In 2011 they erupt three times from August until mid-September. The early eruptions are completely rotted when the last ones (far fewer in number) arise. The next three years the eruptions were far smaller. I heard that folks have been gathering bushel baskets of them on Douglas Island in 2014 and on September 20 Annette spots this group in a gravel patch off Fish Creek Road, a place I can safely take their photograph.

Leucoagaricus Locquin ex Singer 1948

lew-ko-ug-gair-ih-cuss Greek λευκός *leucos*, white + from Ancient Greek ἀγαρικόν, *agarikón* to New Latin *agaricus*, the name for larch fungus.

This genus contains some 90 species of very agaric-looking mushrooms, all of which have a very prominent and usually thick veil that remains as an annulus (skirt) on the pileus (stalk).

Leucoagaricus leucothites (Vittadini) Wasser 1977, smooth lepiota, white dapperling, smooth parasol


lew-ko-thigh-tees Greek λευκός *leucos*, white + unknown word of probably Greek origin

Synonyms:
Agaricus leucothites Vittadini 1835,
Lepiota naucina (Fries) P. Kummer 1871
Leucoagaricus naucinus (Fries) Singer 1951

Notes: These 5 'shrooms erupted under the large Sitka spruce (*Picea sitchensis*) in front of our garage in September of 2014. The look very much like the commercially available mushrooms, *Agaricus bisporus* which lacks the annulus. When they first erupted, I had no idea what they were as the pileus (cap) in bud was somewhat cylindrical with a domed to but rather lumpy or uneven. When the stipes began to lengthen, I spotted the skirt and immediately thought it was one of the confusing Amanitas, but it doesn't have the lower universal veil and the annulus and stipe are both too robust for any Amanita I'm familiar with or looked at in my field guides. This strong resemblance to the destroying angel is the basis of my decision not to eat wild mushrooms, even though some consider this one especially good. Kuo notes it is often found near conifers.

Phaeolepiota Maire ex Konrad & Maublanc 1928

Latin fee-oh-leh-PEE-oh-tah, American fee-oh-leh-pee-OH-tah Greek φαιός, *faios*, dusky + Greek λεπις, *lepis*, scale.

Phaeolepiota aurea (Mattuschka) Maire 1928, gold cap, Alaska gold


Latin aw-REE-ah, American OAR-ee-ah Late Latin *aureus*, gold coin; of gold, golden; gilded.

Walking through the deep spruce forest on the *Kax̱digoowu Heen Dei* (clear water creek) Trail along the Mendenhall River are these massive gilled mushrooms standing 3 dm tall and with lovely gold colored caps a bit larger than that! The caps are smooth and dry, the gills end right at the stipe which bears the remains of the universal veil a third its height and has a rather granular surface visible in the photograph. These are mostly past their prime and several have been destroyed by people kicking them apart, but this one is still in pretty good shape. Never have I encountered such a massive toadstool shaped mushroom and it means memory and photos head to the books to identify this beauty. Because it is past its prime, the veil and cap don't match most of the illustrations of young specimens where the universal veil is still covering the entire fruiting body. S-B gives me a clue to this species but my clincher comes from the Medicinal Mushrooms website where their photo nicely matches mine [http://healing-mushrooms.net/archives/phaeolepiota-aurea.html]

Family Mycenaceae Overeem (1926)

Taxonomy: Most references include this family in the Tricholomataceae which was created as a convenient place for gilled mushrooms that were not an *Amanita, Hygrophorus, Hygrocybe Lactarius, Limacella, Lepiota* or *Russula* for later study. While this family was named in 1926, it was not fully recognized until 2002.

Moncalvo J.M. et al. 2002. *One hundred and seventeen clades of euagarics.* Molecular Phylogenetics and Evolution 23 (3): 357–400.

Mycena (Persoon) Roussel 1806

my SEE-nah   Ancient Greek μύκης *mykis*, mushroom.

A genus of small traditionally shaped mushrooms with over 500 species world-wide, most of which are very difficult to name to species.

Mycena acicula (Schäffer) P. Kummer (1871), orange bonnet, coral spring Mycena, candy corn mushroom

ah-SICK-you-lah   Latin *acicula*, small needle; relevance to this species obscure.

This is the only *Mycena* I can confidently name to species when I see it. Most are rather dull in color and don't stand out from the moss as much as this bright little mushroom. Of the brightly colored species, only two have white stems, this and *Mycena adonis* whose cap is pinkish, rather than orange. The stipe of this species is *pruinose*, covered with a white powder, often just thinly as the photo on the left shows. The brightly colored group is genetically separate from the others and may be transferred to new genus! [California Fungi http://www.mykoweb.com/CAF/species/Mycena_acicula.html] Each time I find this tiny (<5 cm tall, 1.5 cm across) mushroom—over only about a two-week span—it enchants me with its diminutive beauty and lovely color. The orange cap with crinkly yellow margin is obvious growing out of the big red-stem and *Hylocomium splendens*, step moss. The stems are hollow and the gills white. I'm trying to create a new common name with the "candy corn" as every time I see the tiny 'shroom I think of the candy that it strongly resembles and is about the same size.

Not known to form a mycorrhizal relationship with any species, this fungus is a *saprobe* (an organism that gets its nutrition from the dead remains of other organisms) that uses an enzyme to decompose the lignin of wood fibers in the organic layer at the molecular level.

Family Marasmiaceae Roze ex Kühner 1980

Pleurocybella Singer 1947

A monotypic genus, containing only this species.

Latin plur-ah-KIH-bella, American plur-oh-sigh-bella Greek πλευρό, *pleura*, rib, side + σίβυλλα, *sibylla*, prophetess (a small head attached on one side).

Pleurocybella porrigens (Persoon) Singer 1942, angel wings

pour-ih-jens *Porrigens* means extending forward, projecting horizontally, stretched out and up.

An old 3 foot diameter stump of a Sitka spruce (*Picea sitchensis*) has about a dozen angel wings on it along the flat portion of the West Glacier Trail. Quite beautiful, but I did not stop for a photo as I had both dogs on a leash in my left hand and Sophia Stage-Harvey on my right! The shelf-like habit with gills sweeping all the way to the point of attachment on the stump seem diagnostic. A spruce stump right at the beginning of the Rainforest Trail often has conks of it in mid- to late summer.

Family Physalacriaceae Corner (1970)

Taxonomy: When mycologis Edred John Henry Corner created this family with the single genus *Physalacria* in 1970 expanding it to include the very common genera *Armillaria*, *Flammulina* and *Xerula* was far beyond his concept. With modern DNA analysis tools, the family has expanded from one to 25 genera!

Moncalvo J.M., R. Vilgalys, S.A. Redhead, J.E. Johnson, T.Y. James, M.C. Aime, V. Hofstetter, S.J. Verduin, E. Larsson, T.J. Baroni , R.G. Thorn, S. Jacobsson, H. Clémençon and O.K. Miller. 2002. *One hundred and seventeen clades of euagarics*. Molecular Phylogenetics and Evolution 23 (3): 357–400. doi:10.1016/S1055-7903(02)00027-1.

Armillaria (Fries) Staude 1857, honey fungus

ahr-muh-lair-ee-uh New Latin *Armillaria* name for the genus, derived from the Latin *armill* or *armillary* a bracelet, referring to the braceletlike frill on such mushrooms; see + *-aria*, feminine of *-arius -ary*.

Armillaria nabsnona T.J. Volk & Burdsall 1996, northwest honey fungus, alder honey fungus

nabs-no-nuh Named for NABS IX: nabs, acronym for North American biological species + *nona*, ninth

Taxonomy: When I first learned this fungus in the late 1960's it's name was *Armillaria mellea* (Vahl:Fries) Kummer 1871 and considered a very wide-ranging and variable species. Herink (1973) and many others considered it a species complex and began what turned out to be a long and difficult process to untangle. Anderson and Ullrich (1979) recognized the North American material as distinct from European and coined the term North American biological species or NABS and used Roman numerals to identify the ten cryptic species they described. Burdsall & Volk, 1993 created a key to the complex using macromorphological characters. Our species, NABX IX, was formally named in 1996.

Notes: If one sees a cinnamon to tan mushroom growing in large clumps on rotting wood, it's likely this abundant species. Be sure to compare it with *Gymnopilus sapineus*. If you are sure it as *Armillaria*, Volk notes "*Armillaria nabsnona* can be identified most easily by its geographical distribution, primarily the west coast of North America, and host range, primarily on hardwoods in riparian areas, especially frequent on *Alnus* species.

Pileus: The cap is nearly always at least a little bit sticky do downright mucilaginous. Even a cursory view of a clump yields many with an umbonate pileus (cap) that can look much like a baby bottle with a small nipple, yet some are simply a very broad cone. The edge of the pileus is often finely crisped (cut into short, stiff, wavy folds or crinkled) to cut, with the cuts getting larger as the mushroom ages. The cap can have fine granules on top or be completely smooth.

Stipe (stalk): Note the two first photos above where there is an annulus (ring) around the stipe. When young, this ring tends to turn upward, but progressively turns down and completely disappears with aging. Note the feathery to granular scales that point downward representing the remains of the veil. They often appear to be peeling back in parallel stips. These are visible only on very fresh material.

Family Amanitaceae R. Heim ex Pouzar, 1983

Amanita R. Heim ex Pouzar 1983

am-an-eye-tah Perhaps named after Amanon, a mountain in Cilicia.

Some workers have moved Amanitaceae into the Pluteaceae. Matheny et al (2006) noted the "Pluteoid clade appears to include four agaric or gasteromycete families: the Pluteaceae, Amanitaceae, Pleurotaceae and Limno-perdonaceae, plus several orphan gilled genera. This grouping is poorly supported, and not all constituents are consistently resolved together". Since Amanitaceae is such an easily recognized group, a substantial number of workers retain the family, and expert on the family, R.E. Tollos, publishes the journal Amanitaceae, I retain it as a stand alone family.

Amanita muscaria (Linnæus) Lamarck 1783, fly agaric, fly amanita

Latin mus-CAH-ree-ah, American mus-CARE-ee-ah Latin, from *muscus*, having to do with flies.

> *Vocatur fungus muscarum, eo quod in lacte pulverizatus interficit muscas* ("It is called the mushroom of flies, because crushed in milk it kills flies") Albertus Magnus in *De vegetabilibus* circa 1256.

Taxonomy: Various names have been given to lower taxa due to the immense range of characters for this species. Classification here follows Tulloss [http://www.amanitaceae.org]. Recent molecular work seems to indicate there are cryptic species within the wide understanding of the species that, when resolved, will be segregated out as separate species. Geml finds three clades that match a Eurasian, subalpine Eurasian and North American range with all three found in Alaska suggesting this may be the center of speciation. More clades have been identified in the southeastern United States and on Santa Cruz Island in California. *Amanita breckonii* was segregated out in 1982. While there may be regional clades, the fungal forms here seem to me more closely related to one another, if for no other reason than I see them growing together, sprouting at the same time, presumably from the same substrate, as this photo of both normal-sized yellow caps and giant-sized tan-brown caps illustrates.

Geml, J, G.A. Laursen, K. O'Neill, H.C. Nusbaum, & D.L. Taylor. 2006. *Beringian origins and cryptic speciation events in the fly agaric* (Amanita muscaria). Molecular Ecology 15 (1): 225–39.

Geml J; R.E. Tulloss, G.A. .Laursen, et al. 2008. *Evidence for strong inter- and intracontinental phylogeographic structure in* Amanita muscaria*, a wind-dispersed ectomycorrhizal basidiomycete*. Molecular Phylogenetics and Evolution 48 (2): 694–701.

Lindgren, J. 1998. *Trial key to the species of* Amanita *in the Pacific Northwest*. Pacific Northwest Key Council. http://www.svims.ca/council/Amanit.htm.

Tulloss, R.E. 2008. *Appendix A5: Draft Keys to Species of* Amanita *Occurring in California, Idaho, Oregon, and Washington, U.S.A. and in Neighboring Regions of Canada and Mexico*. http://www.amanitaceae.org/content/uploaded/pdf/pnwcakey.pdf.

subsp. ***flavivolvata*** Singer 1957

Latin flah-vih-VOLE-vah-tah, American fla (as in cat)-vih-vole-VAY-tah   Latin, *flavus*, yellow + Latin *volva*, the covering of the mushroom; referring to the universal veil.

Cap red to yellow; not fading to pink or orange. Warts cream to yellow. Universal veil yellow. Tulloss considers this the "typical" American form from southern Alaska to the rest of the continent.

var. ***formosa*** (Persoon) Bertillon 1866 *sensu* Thiers

four-mo-sah   Latin *formosus*,beautiful, finely formed, handsome.

Cap yellowish, tan or sordid yellow. Warts yellowish or tan and often on the stem.

Notes: On September 13, 2009 while walking the Powerline Trail, I come across a patch of eight bright red fly agarics in the grass on the shoulder of the trail This is the color I've come to expect for this species from my experiences in the lower 48. I watched a single specimen over three trips on the East Glacier Trail erupt in a crevice between two 3 foot boulders just before the kettle. How I spotted it the first time—August 22, 2009—I'm not sure as I must have been looking down at just the right angle. It was only the size of a small apple, but the cap was scarlet and covered with worts. On August 26th, it had more than quadrupled in size and was the size of a dinner plate! The cap turned a bit more orange and had been misshapen a bit by growing between the rocks. By September 8 it turned to mush and was utterly unrecognizable.

On September 8, 2009, a patch of seven vanilla custard colored mushrooms are in the moss just above and across the trail from the now long-rotted red one. I pick one to show the warts, veil and bulb. In 2010 mushrooms erupted earlier along the East Glacier Trail and were decidedly more yellow with only a very few being red. A patch erupted under the stairs by the rock cliff on East Glacier Trail in 2010 that went from globose buds to flat-topped parasol to completely rotted in only one week! 2011 is a near perfect repeat of 2010 on East Glacier.

With the much lighter caps in 2010 (see bottom photo) there was some discussion with Dan Hopson if some of them could be the similar species *A. pantherina*. My examination of our plants matches *A. muscaria* more closely. All examined sources illustrate *A. pantherina* with a much browner cap without a hint of red and a stalk with three or more concentric rings near the base that resemble a rolled sock that these lack. *A. pantherina* is in a far greater state of taxonomic confusion with regard to North American material.

On September 17, 2011 I spotted a mass of giant fly agaric while driving down from Eaglecrest about two miles from the Douglas Highway junction. They were so massive that I had to turn around and park to go examine the monsters. Most of the caps are a pale yellow but some of them are quite tan, all growing in the same area of thick hemlock duff just above the shoulder of the road. The largest cap takes five lengths of my 60 mm long pocket knife to cover (see photo), making it 300 mm in diameter! The stem is as wide as my knife and twice as tall. These are larger measurements than I can find anywhere for the species. The concentric rings of volval material at the base of the stem are plainly visible and these are perhaps the most diagnostic feature of this species.

Toxicity: S-B notes the name comes from the practice when "East Europeans stun houseflies [*Musca domestica*, the source of the specific epithet] by putting pieces of fly amanita in a saucer of milk, which draws them." [S-B p 227]. MykoWeb notes "Toxic when raw. Contains ibotenic acid and muscimol ... Many persons have eaten this fungus, without ill effect, after parboiling the sliced mushroom and discarding the liquid." [http://www.mykoweb.com/CAF/species/Amanita_muscaria.html]

> Ibotenic acid evokes entheogenic effects in human beings at doses in range of 50-100 mg. Peak intoxication is reached approximately 2-3 hours after oral ingestion, consisting of one or all of the following; visual distortions/hallucinations, loss of equilibrium, muscle twitching, and altered sensory perception. These effects generally last for 6-8 hours, varying with dose.[http://en.wikipedia.org/wiki/Ibotenic_acid]

There are some amazing stories out there on how this mushroom has been used, including 3,000 years as a hallucinogenic drug. Some Siberian peoples even drank the urine of people who ate fly agaric "to obtain a pleasurable intoxication" There are recipes on the web that claim to remove the water soluble toxins and make the mushroom not just edible but thoroughly palatable. Since the toxins are water soluble, cooking and changing waters apparently removes them enough to be edible. None of this for me!

Spoerke, D.G. & B.H. Rumack. 1994. *Handbook of Mushroom Poisoning: Diagnosis and Treatment*. Bristlecone Enterprises, Lakewood, Colorado.

They apparently are not toxic to all as on September 17, 2011, I find a red-capped form on the dike at Fish Creek on Douglas Island with plenty of evidence of being eaten by something as the stem has a 15 mm wide hole and a tunnel from it well up into the cap. There is a slightly large hole in the cap with a section of the gills immediately underneath eaten away. The photo illustrates the way the universal veil covers then entire "mushroom" when it is in its bulb form underground. The "warts" are the remnants on the cap, the gills are covered and protected by it as the cap pulls away and it sheaths the stem all the way to the base.

Family Lycoperdaceae Chevall, 1826

Taxonomy: I'm amazed to learn that puffballs have been found to be in the Agaricales and some even put them in the Agaricaceae! No sign of gills anywhere so how could this be? Their relationship to the agarics has been found to be strong through rDNA studes and the former order Lycoperdales has been abandoned. The status of the family Lycoperdaceae is currently in question as some subsume it into the Agaricaceae (Hibbet and Moncalvo) while others (Larsson and Jeppson) maintain it as a distinct family within the Agaricales. Since puffballs are so visually distinct, I'm chosing to retain them in their own family but have moved them into Agaricales.

Hibbett D.S. et al. 2007. *A higher-level phylogenetic classification of the Fungi*. Mycological Research 111 (Pt5): 509–547. doi:10.1016/j.mycres.2007.03.004.
Larsson E. & M. Jeppson. 2008. *Phylogenetic relationships among species and genera of Lycoperdaceae based on ITS and LSU sequence data from north European taxa*. Mycological Research 112 (Pt1): 4–22. doi:10.1016/j.mycres.2007.10.018
Moncalvo J-M, et al. 2002. *One hundred and seventeen clades of euagarics*. Molecular Phylogenetics and Evolution 23 (3): 357–400. doi:10.1016/S1055-7903(02)00027-1.

Lycoperdon Tournefort ex Linnæus 1753

Latin lie-KO-per-dun, American lie-co-PER-don   Greek λύκος *likos*, wolf + πέρδομαι *perdomai*, to break wind (fart).

Taxonomy: DNA and morphologic evidence reviewed by Kruger and Kreisel led them to suspect that *Lycoperdon* was paraphyletic and that *L. pyriforme* was outside the clade and moved it into *Morganella* Zeller 1948. Larsson and Jeppson further studied the genus with a larger sample group and retained it in *Lycoperdon*.

Krüger D. & H. Kreisel. 2003. *Proposing* Morganella *subgen*. Apioperdon *subgen. nov. for the puffball* Lycoperdon pyriforme. Mycotaxon 86: 169–77.

Lycoperdon pyriforme Schaeffer 1774, pear puffball, wolf-fart puffball

peer-ih-form-ee Pyriforme, pear shaped.

Taxonomy: synonym *Morganella pyriformis* (Schaeffer) Kreisel & D.Krüger (2003).

Notes: A tight cluster of puffballs along the West Glacier Trail in 2009 beckons a closer look. The tawny color with an orange-brown nipple at the top of the pear-shaped 2 to 3 inch fresh ‘shrooms makes me pick one and slice it in half with my knife and see no sign of gills, but a uniform mass growing in moss on a very rotted Sitka spruce (*Picea sitchensis*) stick. Instantly I recognize it from my wanderings in Georgia and am pleased to find it so far away. I find it occasionally, at least once each season, scattered among the places I wander. I more often find it on the Rainforest Trail than anywhere else. It is fun to find mature cases and "puff" (or fart if you will) the spores out of the little opening at the top of the ball.

Order Boletales E.-J. Gilbert, 1931*, pore fungi*

Family Boletaceae Chevall, 1826

Boletus Linnæus 1753

bow-LEE-tuss Ancient Greek βωλιτης *bōlētus,* mushroom.

Boletus edulis Bulliard 1782, king bolete, the king

ED-you-liss Latin *edulis*, edible.

I learned this one in August 9, 2009 at Eagle Beach for the church picnic. Once spotted, this unique mushroom is easily spotted so I looked for it again and found several on the trail we hiked through the Methodist camp inland from the coastal strand. They pop up sporadically all over the place, but none have been as large as this one, nearly 2 dm across the cap. Most are in the 10 cm size. The cap color is extremely variable and I use the rather massive stalk as the first key to identification while walking along, then look underneath to see the pores. If looking for one good enough to eat, look for a cap that looks like a freshly baked hamburger bun top. The stalk is almost always much wider at ground level that at the cap and somewhat barrel-shaped. I always find it in mossy areas, but usually with some sand beneath. A quick survey indicates that this species will form a mycorrhizal relationship with a wide variety of species making me wonder which one it chooses here on the bank of Eagle River where trees are nearly absent.

Leccinum

Latin LECK-in-um, American less-in-um Italian *leccio*, the name for an oak with coarse bark.

Leccinum insigne Smith, Thiers & Watling,1966, scaber stalk

in-sig-nee Latin *insigne*, mark or badge.

Taxonomy: Older references merge many species into *Leccinum auranticum* and Smith & Thiers carve out two varieties and five forms from this single species, a place I shall not go.

Notes: This bolete is abundant on the Moraine Ecology Trail, both in moss-covered sand and in nearly bare sand and nearly always in full sun and near black cottonwood (*Populus trichocarpa*) Along the dike approach trail to the Trail of Time it hugs the trail under the scrubby cottonwood, alder and spruce. It must form a mycorrhizal relationship with one or more.

Considered by many a prime edible, the North American Mycological Association's *Toxicology Committee Report for 2007 Recent Mushroom Poisonings in North America* includes this species as the culprit in several poisonings. [http://www.namyco.org/toxicology/tox_report_2007.html]

Order Russulales Kreisel ex P.M. Kirk et al., in P.M. Kirk et al., 2001***, brittle gill mushrooms***

This "order" should be considered at the same level as the Subclass Agaricomycetidae as it forms a well-defined monophyletic clade between it and the Polyporales.

Family Russulaceae Lotsy 1907

This is a difficult family of over 1,000 species where relationships are not well known and recent DNA work is only beginning to help clarify them. Its two major genera here can be recognized by breaking the stem where it snaps like an apple or a piece of chalk.

Lactarius Persoon 1797, the milkcaps

lack-TARE-ee-us Latin *lactationem*, a suckling, referring to the "milk" that exudes from cut gills.

As the common name indicates, this genus of some 400 species is characterized by caps that exude "milk" . It can drip like rain, or only slowly secrete a small amounts. Note the color of the milk upon cutting the gills and any change in color on exposure to air. In most the cap is distinctly rolled inward in young, fresh specimens, and usually somewhat hairy. Michael Kuo tells us that "identification of species in *Lactarius* ranges from very easy to very difficult" [http://www.mushroomexpert.com/lactarius.html].

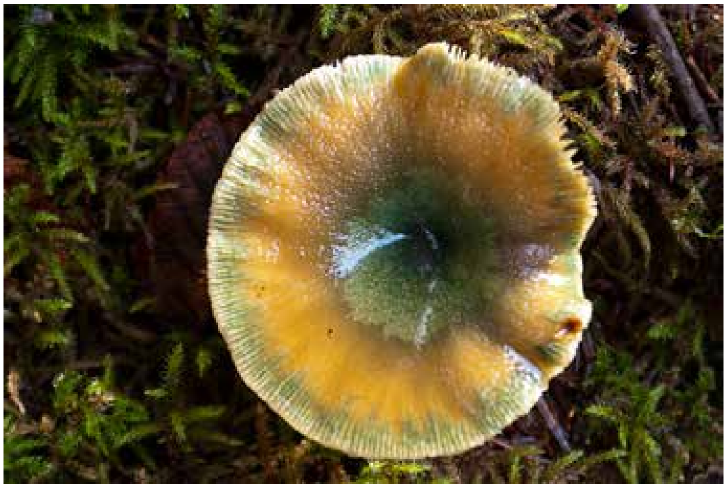
Leuthy, C.S. 1997. *Key to species of* Lactarius *in the Pacific Northwest*. Puget Sound Mycological Society. http://www.svims.ca/council/Lactar.htm

I have been attempting to put names on all the milk mushrooms in the area and it has proven very difficult for me. Some of the characters used in my many references don't seem to be consistent with what I'm seeing here. There seem to be five consistently recognizable forms in the area that can be recognized with the key I've developed here. The names applied to each are tentative!

Cap apricot-orange to tawny, hairy throughout, often with concentric rings of lighter and darker bands, >10 cm across
  Bruises purple, creamy latex changes to purple..............*L. repraesentaneus*
  Bruises brown or not at all, never purple
    Creamy latex changes to pale yellow.................................*L. scrobiculatus*
    Latex remains creamy in color..*L. torminosus*
Cap multi-colored with green or mostly white

Cap whitish, smooth to viscid top, hair only on the inrolled edge, <10 cm across, latex changes to pale yellow .... *L. resimus*
Cap yellow to brown, suffused with patches of green.......L. deliciosus

Lactarius deliciosus (Linnæus) Gray 1821, saffron milk cap, red pine mushroom, delicious milkcap



Latin deh-lih-KIGH-oh-sus, American deh-lih-she-OO-sus Latin, delicious, delicate.

With it's orange milk turning green and multicolored cap with green patches that increase in size with age, this milkcap is easy to identify. It is common in moss in spruce woods.

Lactarius repraesentaneus Britzelmayr 1885, northern milkcap

re-preh-zen-TAY-nee-us Latin, well-represented.

Miller (2006) notes "we have seen this in quantity near Juneau, Alaska under Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*)" but I rarely find purple-staining milkcaps and have cut hundreds of them! What characterizes this species is its very large size, usually at least 1 dm across the cap and sometimes as much as 3 dm and often cap is covered with the duff of the forest floor on the cap as it "bulldozes" its way out of the ground pushing everything away or sticking to the sticky cap.

Lactarius resimus Fries 1838, yellow-staining bearded milkcap

REH-zih-mus   Latin, with elevated margin.

This is a small, <10 cm, viscid white-topped milkcap with a woolly edge to the inrolled cap. The creamy milk stains the flesh a pale yellow, Common in the outwash plain. This has become one of my favorites as it is fun to pick one, cut the cap and watch the latex "milk" go from creamy white to lemon yellow right before our eyes.

I've spent quite a bit of time trying to learn the various milkcaps here and have found that not all of the "read the book". When freshly erupted, this species has a mostly white cap with a slight tan wash in places. The cap forms a fairly flat broad, shallow bowl. It is entirely smooth and covered with a thin but very sticky liquid. The inrolled edge of the cap is very hairy with white hairs. The gills are evenly spaced and shallow at only about 4 mm deep. The stipe is shallowly pitted with oval depressions that discolor a pale tan that resemble water blisters. I find it always growing in a carpet of moss and nearby the abundant , Sitka alder (*Alnus viridis*), which I suspect it forms a mycorrhizal relationship with. From eye level, the pale cream to white cap is the first key to recognizing this species, second being the rather small size, usually under 6 cm in diameter. The quickly turning latex is sure and the lemon yellow color is quite pleasing to the eye.

Lactarius scrobiculatus (Fries) Fries 1838, pitted milkcap, bagel mushroom

scrow-bih-cue-lay-tuss   Latin, spotted, with small erosions.

This is the abundant form throughout and can be >20 cm. The cap varies markedly in color but usually has concentric rings and a shingled look to the hairs. The stem has holes (scrobilactae) that look like water blisters. Miller (2006) says the milk turns "sulphur-yellow" while these are a lovely yellow short of sulphur.

Lactarius torminosus (Fries) Gray 1821, woolly milkcap

tore-mih-no-suss   Latin, full of sharpness.

The cap is obviously woolly and the milk remains creamy for 15+ minutes. The stem has some holes, but not as many as the pitted. Top two photos.

Russula Persoon 1796, the brittle gills

RUSS-you-lah   Latin *russus*, red.

Before proceeding, it will do the 'shroomer well to consider the words of Michael Kuo on this genus of some 750 species:

> The genus *Russula* includes some very beautiful and interesting species, and a lot of hard-to-distinguish species. Because russulas are typically fairly large, and because they are often brightly colored, amateur mushroomers are frequently interested in identifying them. About 20 or 30 species can be identified fairly easily--but there are perhaps 750 species worldwide.
>
> Confounding the identification problems for North American *Russula* collectors is the dearth of available technical literature. I know several mycologists who maintain that Kauffman's 1918 treatment of *Russula* species in the Great Lakes area is still the most comprehensive and useful overall treatment of the genus on this continent! See the bibliography below if you are interested in attempting to compile a notebook of North American *Russula* literature by sorting through field guide descriptions and technical treatments of subgenera and sections.
>
> Before you do, however, let me try to talk you out of it. Advanced *Russula* identification is a nightmare far beyond the usual frustrating realm of advanced mushroomology. In fact, I will go ahead and say it (though I am likely to receive some e-flak for my efforts): *Russula* identification is a joke. The "species" are defined on frequently ridiculous, variable characters; the literature goes to great lengths to cover this fact up with pseudoscientific jargon and long-winded descriptions; the use of a microscope often compounds, rather than alleviates, the frustrating milieu of variability and subjectivity; and we are at a point in time when DNA studies are likely to throw out most of the babies with the PCR-primed bathwater. [http://www.mushroomexpert.com/russula.html]

With this fully in mind, I include only these five species that, at least to me, seem fairly straight-forward in identification.

The genus is fairly straightforward and pretty easy to identify while the species represent a miasma of confusion. When freshly picked, Russula are, indeed, very brittle. Both the cap and especially the stalk break easily, with the stalk breaking like a pice of chalk. They snap cleanly without strings or hangers-on. This is probably the single best character to base genus identification upon.

Russula aeruginea Fries 1863, green russula, green brittlegill, green apple mushroom

air-ooo-jin-EE-ah   Latin for verdigris or coppergreen rust.

The smooth and usually slimy to wet (viscid) apple-green cap seems diagnostic for this species. The green pales from the edge inward as it ages and the stem is mostly white. Occasional, especially in the older forest on the Moraine Ecology Trail, the middle portion of the East Glacier Trail and along the flat portion of the West Glacier Trail. This photo is from a dense spruce forest near the brink of Ebner Falls on the Perseverance Trail.

It forms a mycorrhizal relationship with, and I always find it near, Sitka spruce (*Picea sitchensis*). It helps the tree absorb nutrients from the very thin soil as well as help it fend off parasites like nematodes in return for a share of carbon.

Taylor, A.F.S. & I.J. Alexander. 1989. *Ectomycorrhizal synthesis with an isolate of* Russula aeruginea. Mycological Research 92 (1): 103-107.

Russula emetica (Schaeffer) Persoon, 1796, the sickener, "pretty puker"



eh-MEH-tick-a Greek εμετικός *emetikos*, causing vomiting.

The cap of these, when fresh, is bright red and hemispherical. As it expands it fades to a lighter red and develops a small depression. Most are <10 cm tall and broad. The gills and stalk are pure white. Well into maturity many show the bite marks of red squirrel.

This smallish *Russula* was common on East Glacier Trail and Moraine Ecology Trail in 2009 and noticeably less common in 2010. While sharing this on the trail, I talk about its names, both common and scientific. I find "the sickener" not quite appealing and have never heard anyone but me use it. I ask if anyone knows what an emetic is and follow that the "vomit mushroom" might be a more appropriate common name. A young boy said "how 'bout the *puke* mushroom?" To which a woman responded, "why it's the *pretty puker*!" That will now be its name for me.

Russula integra (Linnæus) Fries 1838


Taxonomy: This name is applied to a broadly circumscribed group that surely contains cryptic species that with further study will be described.

Notes: My identification is based largely upon my conversation with Casey Harris in the Facebook group *Mushrooms and other Fungi of Alaska*. Judy Hall Jacobsen uses the rather pejorative lumping call of David Arora, "its a JAR" (just another Russula). This fits right in with LBB's (little brown birds) and DYC's (damn yellow composites) but when seeking an identification leaves one wanting. That this is a *Russula* is obvious by the very brittle cap and gills and a stalk that breaks like a pice of chalk. Naming to species is difficult and I thank Casey for his work.

These show up every August on the Bus Lot Approach Trail almost as soon as the corner is turned, usually in a group of three to five, but with scattered individuals around as well. They are nearly always parasitized by other fungi, one of which I've identified as *Hypomyces luteovirens*.

Russula cascadensis Shaffer 1964, Cascade russula

cas-cay-dee-en-sis Described from the Cascade Mountain Range.

I'm surprised to find I have no photo of this rather large—some 2 dm across the cap—mushroom. It develops this large size underground and begins to open the cap before emerging so it usually pushes up quite a bit of duff from the forest floor that sticks to and covers much of the cap. When I first saw this species I was sure it was a *Lactarius*—it strongly resembles some of the large forms in the Great Smoky Mountains—but it exudes no milk. Common in all spruce woods, especially so along the dike approach trail to, and along the lower portion of the Trail of Time.

Russula queletii Fries 1872, fruity brittlegill, gooseberry russula

keh-let-ee-eye   Honorific for mycologist Lucien Quélet (1832–1899.

The <10 cm cap is viscid brownish-purple when fresh, dry brown and cracked when flattening with age when it is more obvious with the white boldly shining through. This one is in a group that needs extensive work to clarify relationships.

Russula rhodopus Zvára 1927

ROW-doe-puss   Ancient Greek ῥόδον rhodon, rose + Latin *pus*, pus (as in rotten)

Telling the red-capped russula's apart is a challenge, but this one has a red stem that matches the cap. The gills, as with the other red ones, are pure white and brittle. The outer 4 mm edge of the cap is ridged and paler than the rest. The cap darkens to the center. This 7 cm wide and tall specimen is growing in the moss carpet and easily lifted out. The mycelium are very dark.

Order Polyporales Gäumann, 1926***, non-gilled mushrooms***

This "order" should be considered at the same level as the Subclass Agaricomycetidae as it forms a well-defined monophyletic clade after the Russulales. It and the Thelophorales form a natural branch and are closely related.

Family Clavariaceae Chevall, 1826

Unidentified species

While rapidly descending the switchbacks on the East Glacier Trail I spotted this tiny—3 cm tall—coral fungus out of the corner of my eye and had to turn around and return to it as it is a totally new fungus to me. It looks very much like a golf tee someone stuck in the moss. The pure, waxy white color is what caught my eye, but on close examination the stalk has small spots of dark brown scattered on it that don't flick off with my fingernail indicating that they are part of the body of the fungus. This is the only stem and is the only time I've encountered it.

While I call it a coral fungus to my group, I tell them I really don't have any idea what it is. Back home with my books, I don't find anything definitive in any of my references but conclude it's in the Clavariaceae since it appears singly and suspect it is in the genus *Clavaria*, perhaps *C. vermicularis*, white spindles but my references indicate this species is usually cespitose (clumped).

Family Ganodermataceae Donk, 1948

Ganoderma (Persoon) Patouillard 1887

Latin gah-NAW-der-mah, American gan-oh-der-mah Greek γανος, ganos brightness, sheen + δερμα derma skin hence "shining skin".

<u>Taxonomy</u>: This genus has traditionally been divided into two subgroups based upon the cap surface being shiny or dull. While phylogenetic studies have found these groups polyphyletic, it is still a good beginning point for field identification since it is easy to observe on fresh, young specimens.

Ganoderma tsugae Murrill 1902, cedar lacquer fungus

t'sue-gay From *Tsuga*, the genus on which it regularly occurs.

This common rotter of live and dead trees has a worldwide distribution. I learned it at Humboldt State growing in and on western hemlock (*Tsuga heterophylla*) and have found it everywhere I've travelled in the U.S. and is very common in the Appalachian Mountains on eastern hemlock (*T. canadensis*). It is not specific to hemlock and can be found on a wide range of conifers. Many photographs show the fungus with something of a stalk attaching it to the tree, but here I nearly always find it as a standard bracket or shelf fungus without a well- or weakly-formed stalk. It is abundant on all trails where there are large hemlock trees, especially on the Rainforest Trail, and usually is found on the lower portions (<20 feet) of the bole and easily spotted at eye level. In September of 2010 it seems to have put on some serious new growth with pure white pore surfaces and bright orange-pink margin shining brightly in the dark woods. This specimen's top isn't very "varnished" and I'm not sure why.

Unlike most shelf fungi, this is an annual (but can be long-lived) and doesn't add new growth to the existing bracket each growing season. The smaller is a very young bud of a conk growing out of the bark. I'm not quite sure what the water drops mean. It didn't rain this morning, its now sunny and warm where they should have dried up. Is it some kind of exudate from the thallus of the fungi? The fluid is very thin, just like water, and has no taste. Perhaps a phenomenon like guttation?

Family Polyporaceae Fries ex Corda, 1839

Laetiporus Murrill 1904

Latin lee-TIH-pore-us, American lay-tih-PORE-us   Latin *laetus*, fat, rich, fertile + Latin *porus*, pores; referring to the many pores full of spores.

Taxonomy: I learned this in my forest pathology class at Humboldt State as one of the very many *Polyporus*, where L.O. Overholts seminal 1953 work *The Polyporaceae of the United States, Alaska and Canada* placed nearly all the polypores into this single genus, very *sensu lato*. It became understood as a polyphyletic "garbage can" for many unrelated species characterized by an amazing number of pores. Current DNA studies produce confusing results and the family is now regularly rearranged with *Polyporus sensu stricto* now a rather small genus. *Laetiporus* is a distinct, easily field recognized taxon. It stood as a monotypic genus with only *Laetiporus sulfureus* until its revision in 2001 which split it into six rather distinct species with excellent geographic and/or host characters.

Burdsall, H.H. & M.T. Banik. 2001. *The genus* Laetiporus *in North America*. Harvard Papers in Botany 6 (1): 43-55.

Laetiporus conifericola Burdsall & Banik 2001, chicken-of-the-woods, sulphur shelf

Latin caw-nih-fur-IH-cole-ah, American cuh-nih-fur-ih-COLE-ah   Commonly found on conifers.

It grows abundantly in the old growth forest of the Rainforest Trail on Douglas Island in huge masses. Some single conks are nearly two feet wide! The conks always seem to grow in shelf-like groups. The upper side is brilliant pumpkin orange and the lower, pore, side is bright yellow. The texture when fresh is tender and almost feels like suede, but it stiffens to become more fibrous or woody a few days after eruption. I've only seen one, far smaller, mass on the East Glacier Trail in the flat area below the overlook before the kettle.

On the Point Lena Trail, just above the deep cleft in the rock (that really looks man-made) is this dead spruce with an amazing column of dried-up chicken-of-the-woods. Long past any temptation to eat, they sure grab my attention and a few of the dried edges look as if someone has broken them off for a bite. While I'm used to seeing them in large groups, this is the tallest I've ever encountered.

Guide Richard Stokes tells me he carefully cut some from the Rainforest Trail, took it home and sautéed it and ate a small portion finding it "mildly pleasant". Guide Jami Likins tells me she eats it regularly and enjoys it. All my books seem to agree that its edibility is "questionable" and that it has been reported to cause some "digestive disturbances".

Michael W. Beug, Chair, North American Mycological Association Toxicology Committee, notes he is "used to getting reports of upset from the western look-alike, *Laetiporus conifericola* Burdsall & Banik. However, even with *Laetiporus conifericola*, I would not expect every person in the group to have become ill. I would expect at most one or two sensitive individuals to have suffered gastrointestinal distress, not the whole group."

Beug, M.W. 2009. *Mushroom poisoning, the role of careless identifications*. BEN no. 416, October 20, 2009, http://www.ou.edu/cas/botany-micro/ben/ben416.html.

"One woman of a group of five ate what was probably *Laetiporus sulphureus*, suffered severe GI symptoms, dermatitis, and died in 19 hours while no one else in the group was even sick".

Beug, M.W., M. Shaw & K.W. Cochran. 2006. *Thirty-Plus years of mushroom poisoning: summary of the approximately 2,000 reports in the NAMA case registry*. McIlvainea 16 (2): 47-68.

Order Gomphales Jülich 1981

Family Gomphaceae Donk 1961

Ramaria Fries ex Bonorden, 1851

rah-MARE-ee-ah   Latin *rāmus*, branch.

Ramaria conjunctipes (Coker) Corner 1950 var. ***tsugensis*** Marr & D.E. Stuntz 1974, hemlock coral fungus

con-junk-tih-pees   Latin *coniunctus*, adjoining, contiguous, linked; closely connected, related, attached; process, state of being joined together; connection + Latin *pes*, foot; referring to the single basal stalk. Of or pertaining to hemlocks; referring to its habit of growing with western hemlock.

While biking the Herbert Glacier Trail on September 26, 2011, I spot this coral fungus that looks quite different from the next species that I'm used to seeing. This species has a unique flesh or salmon color that stands out on the forest floor. The "fingers" are mostly dichotomous, especially at the tips. Some tips end with long (4 -6 mm) blunt ends, some just rounded nubs. None of the tips is sharp, pointed, horn-like or crown-like. Reaching below the moss line, I feel a single basal stalk. The forest here is typical old-growth, about 80% hemlock and 20% spruce so there are plenty of hemlock roots for the fungus to associate with.

Ramaria velocimutans Marr & D.E. Stuntz 1974, coral fungus

veh-law-sih-moo-tans   Latin *velox*, swift + Latin *mutationem,* a changing; thus rapidly mutating

<u>Taxonomy</u>: S-B notes this genus is "difficult to identify without a microscope" [p. 63] and only includes two species. Miller & Miller include more, but not this one, so it falls to Phillips to find this.

Large masses—about a half square meter each—of this fungus erupt midsummer on the West Glacier Trail. Growing from what is apparently a single stalk from the ground, this fungus branches mostly dichotomously with each branch getting smaller, finally ending in tiny, 1-2 mm tips. The pale color is uncommon in *Ramaria*. This coral fungus proves to be widespread and occasional on our trails during a two week period in July.

There was an initial eruption of fairly large masses, followed by smaller and smaller masses until the fungus simply disappeared.

Ramaria aurea (Schaeffer) Quélet 1888, coral fungus

AWE-ree-us Latin *aureus*, golden, gold coin.

Of the two showy coral fungi, this bright orange one is the more common, especially on the East Glacier Trail. One can count on several cauliflower like masses just past the boulders just beyond the bridge that provides such a lovely view of a small pond that empties slowly over a moss-covered boulder. I'm always asked if fungi are edible and must rely upon what my books say, in this case, yes. I don't eat them.

Ramaria are easily separated from *Clavaria* as each clump arises from a single massive stem at ground level. To go father with total confidence, one must take the specimen to a compound microscope and have some chemicals handy. These aren't the sort of things I carry on a hike, so I'm at the mercy of what species my several books include, none of which is comprehensive for the genus.

Unknown coral-like fungus

While hiking down the switchbacks on the East Glacier Trail at a steady clip I spot an unusually shaped white fungus that my first glance simply says is one of the little clavarias. But something in my brain says there's something unusual about them and after passing them by a meter I turn around and take a closer look which presents me with something I've never seen. They remind me of the odd fungi that seem to always be at the end of the mushroom books like *Helvella* and this could possibly be a young form of that. My photograph is blown out by the macro use of the built in flash on my Canon G10 so little structure is visible on the fungus. The stipe and cap are uniform in texture and color and the cap is irregularly lobed and has no sign of gills, pores or teeth.

Order Thelephorales Corner ex Oberwinkler 1976

Family Bankeraceae Donk 1961

Hydnellum

Latin HID-nell-um, American hid-NELL-um Greek ὕδνον *(h)udnon*, from the Ancient word for truffle thus *hydnum*, spongy plant or fungus + Latin

-*ellum*, little, referring to a small hydnum.

Hydnellum peckii Banker 1912, bleeding hydnellum, red juice tooth, strawberries & cream, bleeding tooth fungus

peck-ee-eye   Honorific for mycologist Charles Horton Peck (1833-1917)

Synonyms:
Hydnellum diabolus Banker 1913
Hydnum diabolus (Banker) Trotter 1925
Hydnum peckii (Banker) Saccardo 1925
Hydnellum rhizopes Coker 1939
Calodon diabolus (Banker) Snell 1956
Calodon peckii (Banker) Snell & E.A. Dick 1956

Notes: This is one bizarre mushroom. I've seen the photograph in David Arora's book so I know what the fungus is when I see it, but I'm not prepared for my first encounter with it in the wild: shocking! A patch of several white blobs of what surely looks like cream with raspberry red drops of liquid oozing out are on spruce roots at the slope of the kettle pond on the East Glacier Trail, right where I stand to interpret the glacial feature all season. On August 31, 2009 there are weird mushrooms here.

What in the world are the red droplets? The species is only covered lightly in Arora (1991) and Miller and Miller (2006) so I visited more than a dozen web sites and *none* of them identify what the red juice is or what function it may have for the developing fruiting body. All simply describe the form without explanation.

The mass erupting from the root is pure white to rosy-pink (is the pink due to staining from the red drops?) and rather amorphous in shape, rather like marshmallows melting together under low heat. Unlike marshmallows, the mass is stiff and doesn't let my finger push down into it far so there is a thick mass below the "cream". The top photograph patch of four bodies are near three others without the red drops. The others are less that half this size and presumably are younger and thus have not developed the red drops.

Arora (1991) notes "the red droplets on fresh, actively growing individuals are the most spectacular feature. Dyers prize this and other species of *Hydnellum* for the blues and greens they impart to yarn, especially when an alkaline dye bath is used" [p. 206]. When I touch the tip of my forefinger to the exudate it spreads quickly, but when I smell or taste it sense absolutely nothing, which is how Miller & Miller (2006)separate it from the "sweetish pungent" *H. diabolus*. It does stain my finger a bright yellow-orange, but it washes off easily with soap when back home. So what is it? Apparently it has some anticoagulant properties from a chemical "named atromentin, similar in activity to the well-known anticoagulant heparin" [http://healing-mushrooms.net/archives/hydnellum-peckii.html]

On September 6, 2009 it is still looking weird, but only the bottom body in this photograph is in prime condition, the others are beginning to wither and turn brownish white without the red ooze. On September 15 (bottom photo) all the red ooze is gone, the white parts have solidified, and it looks like a common shelf or bracket fungus. All the weirdness is gone! On September 28 it doesn't even look similar to its first appearance. Had I not been watching its metamorphosis, I would have never known what this conk was as all the books have photos of the weird phase (Arora does include the mature form in a photograph but most of the conks are covered with leaves and not readily discerned). When the bracket stage forms the "teeth" are plainly visible underneath that produce the spores for reproduction indicating that this is the mature form of the fungus. That just makes the erupting stage that much more a mystery.

In 2010 none erupted on the kettle pond roots but several small cream balls formed just north of it in and along the trail as well as several other places on the East Glacier Trail such as next to the stairs that lead to the cabled cliff face. All were less than half the size of these and mostly smaller than a quarter in diameter with proportionally smaller drops of the red fluid. This makes me question my guess last year that the smaller mass at the kettle hadn't reached enough maturity to form the drops as it was much larger than any of the 2010 crop.

On August 1, 2011, one large and two smaller masses (all smaller than 2009) appeared on the Sitka spruce (*Picea sitchensis*) roots at the kettle pond. In 2012 (center photo) a single mass just barely smaller than 2009 appears on the same spruce roots. Here a bright red fingertip give scale to the photo.

Ectomycorrizal growth forms have been found on several species of trees including Norway spruce, jack pine leading me to presume that they will probably be found on Sitka spruce (*Picea sitchensis*) here.

Agerer, R. 1993. *Ectomycorrzae of* Hyndellum peckii *on Norway spruce and their chalmydospores*. Mycologia 85 (1): 74-83.

Some photographs I've found show teeth on the underside of the white mass, but I've not found them on any of the masses I've examined here, only on the traditional bracket form of the fungus.

Sarcodon Quélette ex P. Karsten (1881)

sahr-co-don Greek σαρκώδης *sarkodis*, fleshy + δόντι *donti*, tooth.

Sarcodon imbricatus (Linnæus) P. Karsten 1881, scaly hedgehog, hawk wing

Latin im-BRIH-kah-tus, American im-brih-KAY-tus Latin *imbricatus*, to overlap in a regular pattern, like shingles; tiled; imbricated.

Another simply amazing mushroom in a family noted for bizarre forms. My first encounter—how have I missed this before?—with this species was on a late afternoon photo hike on East Glacier Trail on August 11, 2010 when I came upon the top cluster right alongside the trail on one of the flat sections above the bare tonalite boulders. Poking out their dish-sized caps through the dwarf dogwood made a lovely scene that required a 15 second exposure to capture.

The color of the cap ranges greatly from a tawny russet to a deep dark brown that is almost black from the imbricate scales. I darkens with age and when finished, almost melts into a black slimy goo that covers whatever was on the ground under it.

The massive size is what first strikes the eye, indeed it would see it couldn't be missed, yet this is my first observation of the species. Most references indicate the cap will reach 20 cm across, which fits with the top two photographs as my pen is 14.2 cm long. However on August 30 I spot a far more massive specimen just past the bridge that leads to the cabled cliff. Just to illustrate its great size, I place my 25 cm long can of bear spray next to it for scale where the cap is a full third larger, making it about 42 cm across at it's widest point, 12 cm more than the longest reference I fin in Miller & Miller (2006) where they add "the largest specimens we have collected have been found in Alaska". This large specimen seems more durable than the smaller ones as I'm able to show it to folks on the trail into mid-September.

As the teeth mature, they seem to cause the lip of the cap to rise, presumably to allow the spores to more readily escape and blow away. The lower teeth are always longer than the upper and as the cap matures, the upper teeth do increase in length. This produces a pronounced funnel look to older specimens.

As is often the case, I'm asked about edibility, a topic my references vary wildly about. Arora (1991) says it is "excellent if sauteed for at least 20 minutes; otherwise it is apt to be bitter", S-B says "this one is edible, but some forms are bitter tasting" Miller & Miller (2006) says "taste is somewhat bitter" and Phillips says "edible but poor". It truly doesn't look inviting to my eye so I'm not going to try it with these endorsements!

This widely distributed fungus is found in many forests which may indicate that it forms ectomycorrizal relationships with a broad range of tree species, but apparently only confirmed in Norway spruce and western hemlock (*Tsuga heterophylla*).

Order Hymenochaetales Oberwinkler 1977

Family Repetobasidiaceae Jülich 1982

Alloclavaria Dentinger & D.J. McLaughlin 2007

al-oh-clah-VARE-ee-ah Latin *allo*, the other + Latin *clava*, a club.

Alloclavaria purpurea (Fries) Dentinger & D.J. McLaughlin 2007, purple fairy club; purple squid mushroom, purple coral, dead man's fingers


Latin purr-PURR-ee-ah, American purr-purr-EE-ah; Latin for purple.

Taxonomy: Most references use the name *Clavaria purpurea* Schaeffer 1774 but recent molecular work on the Clavariaceae revealed this fungus isn't really closely related to anything at all so it was not only placed in a new genus, but new family and new order!

Dentinger B.T. & McLaughlin, D.J. 2006. *Reconstructing the Clavariaceae using nuclear large subunit rDNA sequences and a new genus segregated from* Clavaria. Mycologia 98 (5): 746–62.

Some may rebel at my inclusion of the common name "dead man's fingers" as being more appropriate for *Xylaria polymorpha*, but I find that in practical use the name is commonly used here for this more common species.

Notes: While the first two common names are at least cute, the last one has the most appeal for this rather bizarre fungus and nearly everyone here calls them dead man's fingers. When this single-stalked coral fungus erupts, it does it with abandon, usually dozens of stalks in an area a meter square. On September 6, 2009, I come across a large patch on the rock step before the lake view cable on East Glacier Trail with witch must be 100 stems! A patch with a similar number erupts right at the Bus Parking Lot entrance to the Moraine Ecology Trail. The photo above is from September 14, 2009 on the Alpine Loop Trail on Mount Roberts. The next day it is absolutely abundant on the East Glacier Trail and very hard to miss. On September 18, 2009 I count 15 "eruptions" along the West Glacier Trail. Guide Dan Hopson tells me he's been eating small portions of the fungus raw and finds it pleasant and without any ill effect. The eruptions in 2010 were far smaller in number and size of the "fingers". The largest was in the rock steps on East Glacier Trail leading to the cliff cut portion of the trail and they were demolished in short order by hikers walking over them. Their color ranges from this lovely lilac to a pretty bland gray. In 2011 the eruption is less than spectacular, but on the rock steps of East Glacier Trail they don't disappoint. One clump of "fingers" really looks like a sea anemone!

Class Exobasidiomycetes Begerow et al., 2006

Order Exobasidiales Hennings, in Engler & Prantl, eds., 1897

Family Exobasidiaceae J. Schröter, 1888

Exobasidium Woronin 1867

eks-oh-bah-SID-ee um Greek ἔξω exo, external, from the outside + Latin basidium, base, footing; referring to the external spore layer of the fungus.

Exobasidium vaccinii (Fuckel) Woronin 1867, azalea leaf gall

vack-sin-ee-eye *Vaccinii* refers to its common occurrence on members of the genus *Vaccinium*, the blueberries.

Azalea leaf gall is common on cultivated Kurume azaleas throughout the world, and especially common in humid environments. On July 3, 2011 I spot my first galls of this fungus on fool's huckleberry (*Rhododendron menziesii*) in the flats below the stairs on the East Glacier Trail. The structure of these galls has always puzzled me as they don't appear to be leaf tissue but a fungal body growing out of the leaf. Most galls (like willow leaf bean galls) are a response by the plant to a disturbance, chemical or physical, of an outside agent where the leaf tissue continues to grow but in a grotesque fashion that doesn't resemble the leaf. These structures—to my naked eye—appear quite different from the leaves they are attached to. Adding to this, when this fungus produces spores, they are created on the outer surface of the gall and give it a white color and powdery texture. Does the fungus grow so intimately within the cellular structure of the leaf that they become almost one? Does a layer of fungal cells capable of bearing spores—the hymenium—grow on the outside of the host/fungus cells if they are indeed intermingled? I need to examine this with a good microscope to answer my questions.

Class Pucciniomycetes R. Bauer et al., 2006

Order Pucciniales Clements & Shear 1931

Family Coleosporiaceae Dietel (1900)

Chrysomyxa Unger (1840)

Latin cry-SAW-mix-ah, American cry-so-MIX-ah Greek χρυσο- *chryso-*, gold + μύκητας *mykitas*, fungus.

Chrysomyxa pyrolae (De Candolle) Rostrup 1881, rust of pyrola

PEER-oh-lay *Pyrolae* refers to the host plant, *Pyrola*.

While walking on the Moraine Ecology Trail on May 26, 2011 I happened to spot some bright orange color in amongst the pink wintergreen (*Pyrola asarifolia*) leaves. I flipped one over and was stunned to find the entire underside of the leaf covered with this mass of tiny spherical and hotdog-shaped orange growth that I figured must be a rust fungus. There is no sign of any infection on the upper leaf surface as it looks perfectly normal. A quick web search gets me the identification from E.M. Freeman's 1905 book *Minnesota Plant Diseases*. From Natural Resources Canada [http://imfc.cfl.scf.rncan.gc.ca/maladie-disease-eng.asp?geID=119]I learn that its alternate host are spruce trees, which here is Sitka spruce (*Picea sitchensis*) where it occurs only on the cones. I'm going to have to keep a watch out for infected cones!

Family Cronartiaceae Dietel, 1900

Endocronartium Y. Hirats 1969

en-doe-crow-NAR-tee-um Greek εντός *entos*, inside + (?).

Endocronartium harknessii (J.P. Moore) Y. Hiratsuka 1969, western gall rust

hark-NESS-ee-eye Honoriific for H.W. Harkness (1821–1901), the "Father of California Mycology".

At mile 36 "out the road" is a muskeg perched on a terrace about 100 feet above sea level that I enjoy wandering. The dominant woody growth are stunted shore pine (*Pinus contorta* var. *contorta*) where in May and June many low stems show the orange growth of this fungus in a ball to pear-shaped gall. The yellow is the reproductive structure of the fungus called aecia, a cup shaped mass of cells that produce aeciospores, a spore with two nuclei. This rust fungus doesn't require an alternate host and can reproduce and flourish on a single tree or group of trees for up to 200 years! The aeciospores can remain viable for long periods even while airborne and can move long distances. Since beach pine isn't an economic species and the closest, Ponderosa pine (*Pinus ponderosa*) is far from here, the infections are more a curiosity than a threat. The branches with the galls often are invaded by other fungi that kill the branch which makes the tree look like it is full of clubs and are very obvious.[http://www.eppo.org/QUARANTINE/fungi/Endocronartium_harknessii/ENDCHA_ds.pdf]

Familly Melampsoraceae Dietel 1897

The family is monotypic, containing only one genus

Melampsora Castagne 1843

meh-LAMP-sore-uh Late Greek μέλας *melas*, black + Greek ψωρός *psoros*, spore, hence black-spored.

Melampsora medusae Thümen, 1878, poplar rust

meh-dew-see Greek μεδουσα *medousa*, which was derived from μεδομαι *medomai*, to plan, to contrive. In Greek myth this was the name of one of the three Gorgons, ugly women who had snakes for hair. She was so hideous that anyone who gazed upon her was turned to stone, so the hero Perseus had to look using the reflection in his shield in order to slay her. [http://www.behindthename.com/name/medusa] This story seems to me the best reason Thümen chose this epithet as any reference to jellyfish seems exceptionally remote.

The black cottonwood (*Populus trichocarpa*) in the outwash plain of the Mendenhall Glacier, especially along the Steep Creek Trail often show signs of galls. I always think of insects and have stopped to look at the galls many times and never found an insect. The upper side of the leaf has pustules or raised spots composed of smaller, yellow, pustules that look something like a cauliflower. The underside is convex, matching the raised upper surface and lacks any thickening of the leaf tissue. This should have given me enough evidence to not look for an insect but a fungus.

Most illustrations I find of it show a mass of fungal tissue on the underside of the leaf that has a rather granular look to it, something I've not encountered here. I can feel that there is something of a raised mass when I run my finger over the gall and the yellow areas look as if they are separate from the leaf tissue.

This common rust fungus attacks a wide range of species but here seems to concentrate on the cottonwood. The pustules are *uredinia* that create *uredospores* that spread the fungus asexually. The fungus has evolved to survive the winter in two very different ways. Some *teliospores* (a thick cell-walled diploid fungal spore for overwintering) remain in the leaves when they fall off the tree and overwinter in them, ready to emerge as *basidiospores* (haploid reproductive fungal spore) next summer. Some find their way into the leaf bud that forms in late summer for next year's leaf and overwinter there.

Holsten, E., P. Hennon, L. Trummer & M. Schultz. 2001. *Insects and diseases of Alaskan forests*. U.S.D.A. Forest Service, Alaska Region R10-TP-97. p.133.

unidentified fungi

Many, especially the tiny 'shrooms, require a more careful study than I have given them. They represent a taxonomic category one of my botany friends, Steve Bowling, uses for his own study. This one fits his Scarlett O'hara category for me: "After all...tomorrow is another day" and maybe I'll get to them then. That's better than his Rhett Butler category: "Frankly, my dear, I don't give a damn". There really isn't anything out there that I'm *that* uninterested in, so there better be plenty of tomorrows!

This photo left represents one of the myriad of small (<5 cm tall and broad) flesh-colored mushrooms with pale stalks that arise from more from the forest duff than through the carpet of moss. This indicates to me they might be more important wood rotters and this individual appears to be growing right out of a moss-covered branch laying on the ground.

Erupting on the buss lot access to the Moraine Ecology Trail, this little group resembles the one above and below in several respects. The stipe is thin in proportion to the very viscid cap.

This "LBM" (little brown mushroom) may be one of the ***Marasmius*** mess of tiny, tiny thread-stemmed mushrooms, but I'm not able to find a match using Michael Kuo's key to this genus so it may be something else. Many of the tiny mushrooms have a more nipple-shaped crown, but this one has a plain hemisphere. I always find this growing out of moss where there are small stems and twigs entangled in the mass leading me to thing they are important wood rotters.

I've absolutely no clue what this diminutive mushroom is poking out of the mud of the beaver pond the Forest Service keeps low by breaking the dam. These are about 2-4 cm tall.

This may be a ***Clavariadelphus***, based upon photos in Hall Jacobsen, but none there are similar along with all my other references. It almost looks like a wierd morph of *Alloclavaria purpurea*.

A spruce on the bus approach trail to the Moraine Ecology Trial suddenly appears with black soot all over a four-foot section of the bark. There are two old wounds, but there is some fairly fresh resin dripping from the base. All are covered with a fine, black material that strongly resembles fireplace soot. It is obviously a fungal mold, but searching for an identification has been futile.

Kingdom Plantae Haeckel, 1866 plants

This "kingdom" is both traditional and classical in that it dates so far back in human history to the basic division of things "plants, animals and minerals". Here I use it in a far narrower sense including those things we normally think of as plants, but excluding all the unicellular organisms, algae and fungi. There is considerable difference of opinion on these exclusions and many current circumscriptions include the red and green algae (or just the green algae) as plants since they form a monophyletic clade with a common ancestor. The names *Viridiplantae* (literally green-plants) Cavalier-Smith 1981 and *Chlorobionta* (literally colored-life) Bremer 1985 have been applied as both a kingdom and subkingdom for the "green plants" that include green algae. *Embryophyte* (literally plants with an embryo made of diploid cells that reproduce by mitosis) has been applied for land plants. More for a simple habitat dichotomy (land versus aquatic), I've excluded the algae and place them in their own group, Algae.

The classification scheme that follows is mostly traditional. There are some recent revisions that result in some names with very traditional circumscriptions being dramatically expanded. Equisetopsida is perhaps tops among them. This name traditionally applies only to the horsetails, but with recent molecular studies and the reorganization of algae, the reasoning of Chase and Reveal goes that "If the major clades of green algae are recognized as classes, then all land plants, the embryophytes [land plants], should be included in a single class...". The commonly used available name for this class would be the current class *sensu stricto* that would dramatically expand *sensu lato* to include all embryophytes! Because of the confusion this will create, other names for this broad clade have been proposed with Embryophyta gaining some traction as it has a history of being used for a larger group (land plants) rather than a smaller group (horsetails).

The class Equisetopsida *sensu* Chase & Reveal, 2009, contains the following subclasses. Some of the traditional divisions and classes (not necessarily those that I use), along with common names are shown in parentheses.

- Bryophytes (non-vascular plants)
  - Subclass Marchantiidae Engl. 1893 (div. Marchantiophyta, 3 classes - liverworts)
  - Subclass Bryidae Engl. 1892 (div. Bryophyta, class Bryopsida - moss)
  - Subclass Anthocerotidae Engl. 1893 (div. Anthocerotophyta, 2 classes - hornwort)
- Lycopodiophytes
  - Subclass Lycopodiidae Bek. 1863 (div. Lycopodiophyta, 2 classes - clubmoss, spikemoss, quillworts)
- Monilophytes (ferns)
  - Subclass Equisetidae Warm. 1883 (class Equisetopsida, s.s. - horsetails)
  - Subclass Ophioglossidae Klinge 1882 (class Psilotopsida - whisk ferns, grape-ferns, moonworts)
  - Subclass Marattiidae Klinge 1882 (class Marattiopsida - marattioid ferns)
  - subclass Polypodiidae Cronquist, Takht. & W. Zimm. 1966 (class Polypodiopsida - polypod ferns)
  - Subclass Psilotidae Reveal 1996 [merged into Ophioglossidae by Christenhusz, 2011]
- Gymnosperms[3]
  - Subclass Cycadidae Pax 1894 (div. Cycadophyta, class Cycadopsida - cycads)
  - Subclass Ginkgoidae Engl. 1897 (div. Ginkgophyta, class Ginkgoopsida, one extant genus: Ginko)
  - Subclass Gnetidae Pax 1894 (div. Gnetophyta, class Gnetopsida - gnetophytes)
  - Subclass Pinidae Cronquist, Takht. & W. Zimm. 1966 (div. Pinophyta, class Pinopsida - conifers)
- Angiosperms[4]
  - Subclass Magnoliidae Novák ex Takht. 1967 (Angiosperms - flowering plants)

Chase, M.W. & J.L. Reveal. 2009. *A phylogenetic classification of the land plants to accompany APG III*. Botanical Journal of the Linnean Society 161: 122–127.

What this demonstrates are the limitations of the Linnæan hierarchy with its fixed divisions. With current understandings of phylogeny, these fixed divisions make less and less sense. The prevailing idea today is that a lineage should be monophyletic. This means each organism is a member of a single line—a clade—of relationship with its relatives. The nodes on this don't match up well with a fixed hierarchy. Our understanding of the intricate details of phylogeny remain very coarse, and for this reason I'm choosing to follow what I consider the more conservative (read traditional) classification until the story becomes clearer. A modern phylogenetic tree for vascular plants is included for them.

Plants (in the traditional sense) are autotrophic, organisms that can create their own food through chemistry. Plants have taken this ability first developed in autotrophic bacteria and elevated it to an amazing level. It takes place in the special cell organelle, the chloroplast, that contains chlorophyll, a unique organic molecule that has a magnesium ion (Mg^{+++}) as its core structure. Six different versions of the molecule have been identified that harness different wavelengths of light for the source of energy for the chemical transformation called photosynthesis (literally putting together with light). Elegant in simplicity, it takes the raw materials of carbon dioxide and water and transforms them into a simple sugar. The equation is $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$, it has never been replicated in the laboratory!

Plants have cell walls, in addition to cell membranes, made out of long-chain polysaccharides (literally, many sugars), mainly forms of *cellulose*, $C_6H_{10}O_5$. Woody plants use *lignin* ($C_9H_{10}O_2$ in its simplest form), and *xylan* ($C_5H_8O_4$ in its simplest form made of units of the sugar xylose), in addition to cellulose to form their hardy structure. It is this structure, perhaps more than any other, that distinguishes plants from other living things.

References:
Abrams, L. *Illustrated flora of the Pacific states* (4 vol.). Stanford University Press, Stanford, California.
Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson & T.J. Rosatti, eds. 2012. *The Jepson manual: vascular plants of California*, 2nd ed. University of California Press, Berkeley.
Burns, R.M., & B.H. Honkala, tech. coords. 1990. *Silvics of North America: 1. Conifers; 2. Hardwoods.* Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.
Cody, W.J. 2000. *Flora of the Yukon Territory, 2nd ed*. National Research Council of Canada, Ottawa.
DeVelice, R.L, S.L, Boudreau, C. Wertheim, C.J. Hubbard, C. Czarnecki. 2001. *Vascular plant identification guide, Chugach National Forest,* R10-MB-421. USDA Forest Service, Chugach National Forest, Anchorage, Alaska.
Flora of North America Editorial Committee, eds. 1993+. *Flora of North America North of Mexico*. 14+ vols. New York and Oxford (abbreviated FNA).
Hall, J.K. 2010. *Native Plants of Southeast Alaska*. Windy Ridge Publishing, Haines, Alaska.
Heller, C.A. 1993. *Wild edible and poisonous plants of Alaska*. Cooperative Extension Service 300C-00028, University of Alaska Fairbanks, Fairbanks (abbreviated Heller).
Hickman, J.C., ed. 1993, *The Jepson manual: higher plants of California*. University of California Press, Berkeley.
Hultén, E. 1968. *Flora of Alaska and neighboring territories: a manual of the vascular plants*. Stanford University Press, Stanford California (abbreviated as Hultén).
Klinkenberg, B. ed. 2012. *E-flora BC: electronic atlas of the plants of British Columbia*. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia. eflora.bc.ca
MacLean, S. 2010. *Familiar plants of coastal Alaska*. Greatland Graphics, Anchorage.
Moerman, D. 2009. *Native American ethnobotany: a database of foods, drugs, dyes and fibers of Native American Peoples, derived from plants.* http://herb.umd.umich.edu/ (abbreviated NAE).
O'Clair, R.M., R.H. Armstrong & R. Carstensen. 1992. *The nature of Southeast Alaska, a guide to plants, animals and habitats*. Alaska Northwest Books, Anchorage.
Pojar, J. & A. MacKinnon. 1994. *Plants of the Pacific Northwest coast, Washington, Oregon, British Columbia & Alaska*. Lone Pine Press, Vancouver, BC (abbreviated P&M).
Pratt, V.E. 1989. *Field guide to Alaskan wildflowers a roadside guide*. Alaskakrafts, Inc., Anchorage
Stensvold, M. undated. *Ferns of the national forests in Alaska*. U.S. Forest Service, Alaska Region Botany Program.
Stevens, P. F. 2001 onwards. *Angiosperm Phylogeny Website*. Version 9, June 2008 [and more or less continuously updated since]. http://www.mobot.org/MOBOT/research/APweb/.
USDA, Forest Service. undated. Wildflowers of the National Forests in Alaska. R10-RG-107. U.S. Forest Service, Alaska Region, Anchorage.
USDA, Forest Service. 2008. *Mosses and liverworts of the National Forests in Alaska,* R10-RG-179. U.S. Forest Service, Alaska Region, Anchorage.
USDA, NRCS. 2009. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
The Kayaaní Commission. 2006. *Ethnobotany field guide to selected plants found in Sitka, Alaska*. The Kayaaní Commission of the Sitka Tribe of Alaska (abbreviated Kayaaní).
Weakley, A.S. 2012. *Flora of the Southern and Mid-Atlantic States*. University of North Carolina Herbarium. herbarium.unc.edu/flora.htm
Welsh, S.L. 1974. *Anderson's Flora of Alaska and adjacent parts of Canada.* Brigham Young University Press, Provo, Utah.

Tlingít names occur last in the list of names and come from Kayaaní, Andra Martin, http://en.wikipedia.org/wiki/User:James_Crippen/Tlingít or http://www.alaskoolorg/language/dictionaries/akn/dictionary.asp

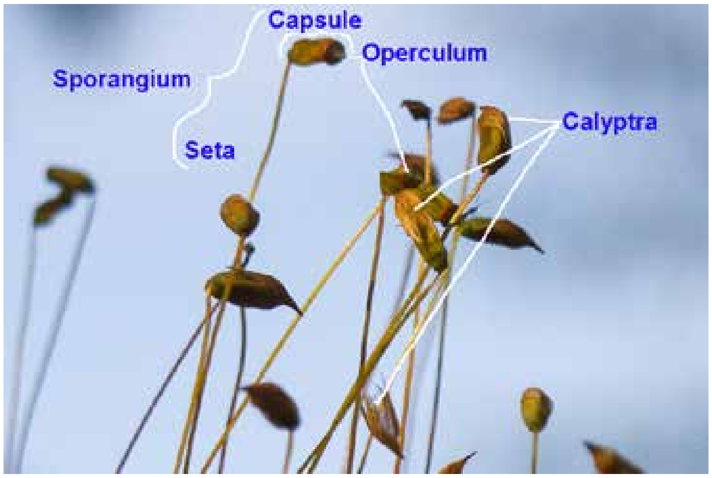
Subkingdom unnamed–non-vascular plants

This group is traditionally called the bryophytes and has been given the formal name as Bryophyta. It refers to the embryophytes (land plants) that lack vascular tissue. It is a useful grouping that includes liverworts, mosses and hornworts. It is a polyphyletic grouping and has thus been abandoned as each group has its own lineage.

All plants undergo an alternation of generations between a *gametophyte* (gamete—sex cell—making plant) and *sporophyte* (spore making plant) stage. The vast majority of what we think of as "plants" are the sporophyte generation with the gametophyte being reduced to microscopic size in specialized structures called flowers. Liverworts, mosses and hornworts reverse this and the dominant form we see is the gametophyte.

The gametophyte is *autotrophic* (makes its own food) by photosynthesis. This generation is *haploid* (with only one set of chromosomes from one parent, $1n$ or simply n) and is thus *dioecious* (sexes form separate plants). The males produce *antheridia* (male sex organ that produces biflagellate sperm) and the females *archegonia* (female sex organ that produces eggs). As a haploid organism, they are formed by simple mitosis. These sex organs are usually found in the uppermost part of the moss, often in the axils of the leaves. Since the sexes are separate the sperm uses its two flagella to swim, mosses are nearly always confined to areas that are wet, or have periods where they are wet. In the rainforest we are wet and moss have developed into the most diverse assortment of plants here.

When a motile sperm fertilizes an egg the result is a *diploid* zygote that develops in the haploid archegonium. As the zygote develops it grows into the sporophyte generation that is *heterotrophic* (cannot make its own food) and entirely dependent upon the gametophyte it is growing out of. The stalk is called the *seta* which is topped by the *capsule* where spores are created. The *calyptra* (outer covering of the capsule, often just a small portion) is the haploid remains of the archegonium. Under the calyptra is the *operculum* (the cap of the capsule). Inside the capsule spore mother cells undergo meiosis which produces male and female haploid spores. These are released from the capsule in some of the most bewildering ways using the operculum and the *peristome* (tooth-like structures around the upper opening of the capsule) to literally pluck the spores out and throw them to the winds. This entire diploid structure is called the *sporangium* (spore maker) and is the sporophyte generation.



Phylum Hepaticophyta H.C. Bold ex Stotler & Crandall-Stotler 1977 *liverworts*

My notes on liverworts represent those of a woefully uneducated naturalist. They represent, at best, only a miniscule portion of the liverwort flora of the Juneau area. These are organisms that, for the most part, are easily overlooked. Most species are well under 10 cm long that many walk by them will never notice them, let alone ask the question what they are. My eyes are attuned for the "mega-liverworts", those that I can spot from eye level when hiking. I have yet to take the step to examine those that live within the moss carpet on the forest floor or the bark or the trees. They represent an entirely new—and incredibly intricate and exciting.

Liverworts lack vascular tissue, so there are no costa (a longitudinal vascular rib) that most moss have, or veins; they have no roots but single-celled rhizoids; their leaves are often ringed with cilia (rare in mosses); the leaves are often deeply lobed or divided (rare in mosses) and arranged in threes. Most species are between 2 and 20 mm in size, so are tiny. They are often divided into two broad groups, the thalloid where the body is not clearly divided into leaf and stem which can become large, and the leafy where obvious leaves can be seen if closely observed.

Class Hepaticopsida Paris

Order Marchantiales Limpricht 1876

Family Conocephalaceae K. Müller ex Grolle 1972

Conocephalum F.H. Wiggers 1780

kawn-awe-SEFF-ah-lum   Greek κώνος *conos*, cone + κεφάλι, *kefalos*, head; referring to the sporangia.

Conocephalum salebrosum Szweykowski, Buczkowska & Odrzykosk 2005, scented liverwort, snake liverwort, snakeskin liverwort, seal's tongue by the Haida.

say-leh-bro-sum   Latin *salebrosus*, rugged, rough.

<u>Taxonomy</u>: I remember bryologist friend Paul Davison telling me that our material has recently had a name change, but only found the new name via my friend Margie Hunter's blog with information from our mutual bryologist friend Ken McFarland. *Conocephalum conicum*

(Linnæus) Underwood 1895, has been the long-accepted name for this cosmopolitan species until the late J. Szweykowski found *C. salebrosum* to be a cryptic species within the *C. conicum* complex in a 2005. Cryptic species are often morphologically almost identical to one another but are reproductively isolated thus fulfilling the definition of being a separate species. They found *C.c.* to be strictly European and *C.s.* to be more widespread, including the Americas. A field characteristic that can be helpful are the appearance of distinct parallel lines up the thallus.

Szweykowski, J., K. Buczkowska, & I.J. Odrzykoski. 2005. Conocephalum salebrosum *(Marchantiopsida, Conocephalaceae)- a new Holarctic liverwort species.* Plant Systematics & Evolution.

Notes: This must be one of the most widespread organisms on the planet as I've seen it all over the mesic United States. It is the largest thalloid (a *thallus* is a shoot of vegetative tissue not differentiated into organs) liverwort and the hexagonal feature that gives it the snakeskin appearance are air pores [http://www.botany.ubc.ca/bryophyte/conocephalum.html]. It is abundant on the weepy slopes just before the rock cuts on the East Glacier Trail and in every other similar habitat in our area. It produced sporophytes in June of 2009, rather short umbrella's developed near the center of the thallus.

The photo on the right from August 9, 2012 shows it with sporangia for only the second time in my long experience with this thalloid liverwort. I must admit to being a bit confused by what I'm seeing. The female archegonia usually have hot dog shaped appendages hanging down from a disc perched atop a stalk. There are no such structures here which made me immediately think I'm looking at male antheridia. However I find that

> Male plants have sessile, terminal cushions. Fruiting female plants bear terminal, stalked, conical receptacles with short descending lobes. [British mosses and liverworts: a field guide, British Bryologic Society http://www.bbsfieldguide.org.uk]

If these are archegonia, they must be over mature and have already shed the lobes where the eggs are created, fertilized, nurtured and spores created. Or, I simply don't know what I'm looking at!

Family Marchantiaceae Lindley, 1836

Preissia Corda, 1829

pree-zee-uh   Honorific for German-born British botanist and zoologist Johann August Ludwig Preiss (1811-1883).

Preissia quadrata (Scopoli) Nees 1838

kwa-dra-tuh   Etymology undetermined; *quadrata* are Roman square capitals.

In the nearly vertical face of rock at "the horn" I spot a small and very inconspicuous plant that I recognize as being a thalloid liverwort, but have no idea what species it is. The thalli are broadly two-lobed, almost thin near the outer edges yet very succulent. They are crowded together in this little bit of organic matter—with calcium from the limey slate—that must pass for soil here, most overlapping at least part of another.

What caught my eye are however are the male sporangia, here looking a bit like a flattened and floppy beret. The 5 mm diameter discs are sitting atop a 2 cm stiff stalk whose diameter increases with height and has some purple tinging at the base.

Making identification of this was a challenge. My easy references led immediately to *Marchantia polymorpha*, but the thalli are definitely not ribbon-like but broad and spreading. There is no central black line, or anything resembling a midrib. The tissue seems homogeneous accross the thallus. Searching web images I come up with *Lunularia cruciata* that does strongly resemble my plants, but this weedy species does not produce sporangia in North America. Pojar and MacKinnon make a brief reference to *Preissia* and *Asterella* and a search of both leads to a match with *Preissia* even though P&M note they have "stalkless male sex organs". The British Mosses and Liverworts field guide [http://www.bbsfieldguide.

org.uk/sites/default/files/pdfs/liverworts/Preissia_quadrata.pdf] shows they do and confirms my ID.

Order Metzgeriales Hampe

Family Pelliaceae Grolle, 1972

Pellia Raddi 1818

PELL-ee-ah Honorific for L. Pelli-Fabbroni, a Florentine friend of Limprict.

Pellia neesiana (Gottsche) Limpricht 1876, ring pellia

knees-ee-ann-uh Honorific for German botanist and entomologist Christian Gottfried Nees von Esenbeck (1776-1858).

On May 7, Dan Hopson and I hiked to Bishop Point and back and kept finding little Chinese noodles with chocolate balls on top in amongst the ground hugging plants as we crossed streams and drainages where there was little organic matter. I knew they were some sort of sporophyte, but did not know from what. The stems are nearly translucent, about 3 cm tall and 1 mm in diameter with a 2-3 mm diameter cap. They often formed a tiny forest of noodles that were plainly visible from eye height as we walked. I found a few during the next few weeks in similar locations on the East Glacier Trail.

Phylum Bryophyta A. Braun 1860 *mosses*

Class Bryopsida Pax 1968 True mosses, s'íx'gaa

I am extremely weak on my bryophytes and this treatment represents my "baby steps" into learning them, beginning with only the most obvious and abundant species. They are difficult to learn as most "thumb-through" books don't seem to have photographs that illustrate exactly what is at hand and the FNA technical keys require a compound microscope and chemicals, neither of which I have handy. P&M has a very good moss section and I use "Mosses and Liverworts of the National Forests in Alaska", R10-RG-179 of the Alaska Region of the U.S. Forest Service.

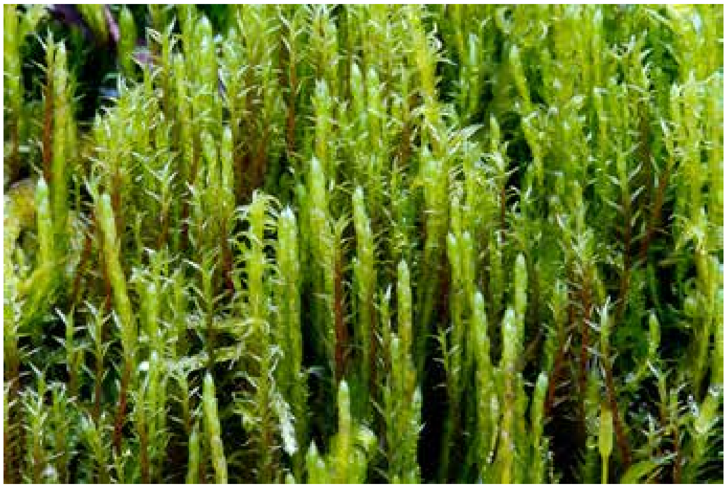
Order Bryales M. Fleisch. 1904

Family Bryaceae Schwägrichen 1830

Bryum Hedwig 1801

BRY-um Greek βρύο *bryo*, moss.

Bryum pseudotriquetrum (Hedwig) Gaertner et al., common green bryum moss



sue-doe-try-KWEH-trum   Greek ψευδώς *psevdos*, false + Latin *tri-*, three + *quetrum*, cornered.

Family Mniaceae Schwägrichen 1830

Leucolepis Lindberg 1868

Latin lew-CAWHI-leh-piss, American lew-co-LEH-piss   Greek λευκός *leucos*, white + λεπίς *lepis*, a flake; botanically lepidote, covered with small, scurfy scales; from the small whitish leaves on the vertical stem.

Leucolepis acanthoneura (Schwägrichen) Lindburg 1868, Menzie's tree moss, palm tree moss

a-can-tho-new-rah   Greek αγκάθι *agkathi*, thorn + νεύρο neuro, nerve; from the teeth on the underside of the midrib.

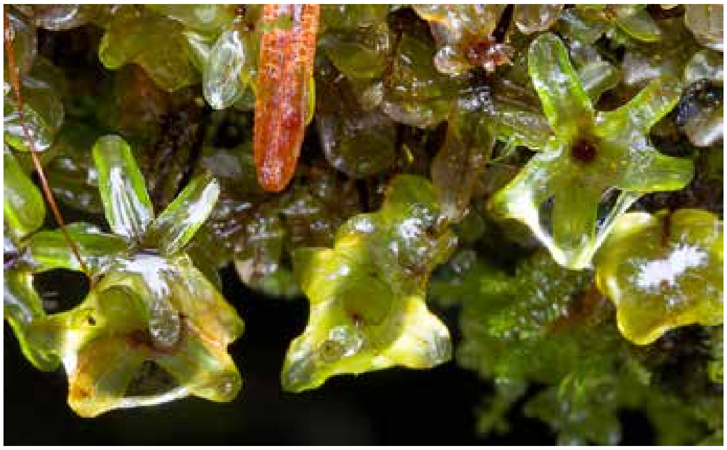
Taxonomy: The orthographic variant *acanthoneuron* appears in several accounts. It comes from the basionymn for this species, *Hypnum acanthoneuron*, but does not grammatically match the current genus name so is an invalid name.

Notes: While hiking on the Amalga Trail on September 26, 2011, I spotted a large clump of moss that caught my eye as being new, at least to me. It immediately struck me as American tree moss, *Climacium americanum*, but looked different as it is fluffier and growing more densely than I've seen this species. So off to the books when home and I find that Menzie's tree moss lacks the creeping stems, has sharp, triangular leaves, and sporangia that droop. I find no sporangia in this patch so I suspect that these are male plants. In this lovely sun-dappled spot, the moss completely covers about a meter of ground with a thick mat of green.

Rhizomnium (Mietten ex Brotherus) Koponen 1968

Latin rye-zoe-m'nye-um, American rye-zoe-mee-um   Greek ρίζα *riza*, root + old Latin word for a moss.

Rhizomnium glabrescens (Kindberg) T.J. Koponen 1968, large leafy moss, rhizomnium moss



glay-breh-sens Latin *glabescere*, become smooth, thus hairless.

Family Orthotrichaceae Arnott 1825

Amphidium

am-fih-dee-um Greek αμφίβιο *amfibio*, amphibian from the ancient word for both thus living in wet and dry places.

Amphidium lapponicum (Hedwig) Schimper 1801, bottle moss

lap-pwan-nih-come Of Lapland, where it was originally described.

A common rock-face moss growing in round, mounded clumps on the East Glacier Trail right at eye level on nearly vertical faces. I'm using Pojar & MacKinnon's photo and description for this identification. I love the pinwheel growth pattern of the whorls of leaves.

Order Hypnales W.R. Buck & Vitt

Family Brachytheciaceae Schimper1876

Isothecium

ice-oh-THEE-see-um Greek έσος *esos*, equal + Latin -*thecium*, case, capsule, sheath, container, receptacle.

Isothecium stoloniferum, Bridel 1827, cat-tail moss

stole-awn-IF-ur-um Latin *stolō*, branch, from the stem runners.

Taxonomy:

> ... an abundant and taxonomically problematic moss that occurs in Europe and on the west and east coasts of North America. It has sometimes been split into two taxa, *I. myosuroides* on the east coast of North America and in Europe, and *I. stoloniferum* on the west coast of North America. *I. stoloniferum* has four distinct morphological types ... Molecular phylogenetic analyses reveal that there is some genetic basis to the morphs of *I. stoloniferum*, and that [it is] is paraphyletic. Accessions of *I. myosuroides* form a trans-Atlantic monophyletic group. The remaining samples form two distinct groups that each include samples of two morphotypes within *I. stoloniferum*. Populations of julaceous and ordinary morphotypes form a monophyletic group. Populations of coarse and pinnate morphotypes form an unresolved polytomy at the base of the clade that includes accessions of *I. myosuroides*.

Ryall, et al. 2005. *Molecular Phylogenetic Study of Interspecific Variation in the Moss* Isothecium *(Brachytheciaceae)*. Systematic Botany 30 (2): 242–247.

Notes: This moss is everywhere except the forest floor, and just why is that? The obvious answer is that it's habit of hanging down won't really work on the ground where it would have to expend energy to run. Is this correct? I'm not certain, but it is my best guess. It does occur on some rocks and logs, but my observation is that it only does this where at least some strands can hang off the edge or at least drape over the top.

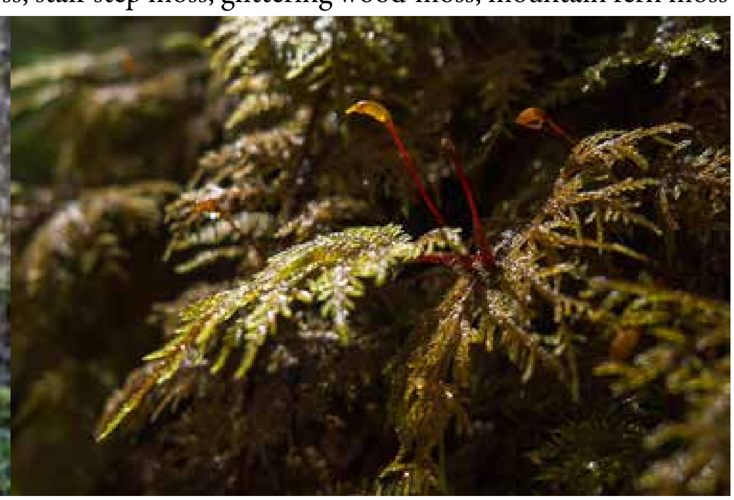
One characteristic of this species that seems to separate it from other hanging moss is the rather twisted or knotted look as it a woman with long hair hadn't brushed it in weeks.

Family Hylocomiaceae (Broth.) M. Fleisch. 1914

Hylocomium Bruch & Schimper 1852

high-low-CO-me-um Greek ξύλο *xylo* thus hylo-, wood + Latin *com*-, together, together with; hence *hylokomos*, a forest inhabitant.

Hylocomium splendens (Hedwig) Schimper 1852, step moss, stair step moss, glittering wood-moss, mountain fern moss



splen-dens Latin *splendo*, to shine.

If there is a single understory moss to learn here, this is it. Abundant does not near enough to describe how common this moss is. It is literally everywhere in the forest! It covers anything on the forest floor. It prefers humus rich soils that are circumneutral (being replaced by *Sphagnum* on acidic soil).

It is fun to reach into the mass of moss and follow one of the stems to its base and pluck it off the main stem. Simply holding this up, everyone immediately understands the common name. Each year a single plane of leaves about 3 to 5 cm in size is formed 1 to 2 cm above the previous years and strongly resembles a stair step. When kids are along, I have them count the steps to see how old the moss is, many times as old or even older than they are. That impresses everyone!

Sporophytes show up in small numbers (at least in comparison to the abundance of the gametophyte) in mid summer and grow from the side of the stem and resemble the stalk and capsule of they "typical moss".

Pleurozium Mitten 1869

plure-oh-zee-um Greek πλευρό, *pleura*, rib+ ὄζος *ozos* branch; from the branching pattern.

Pleurozium schreberi (Willdenow ex Bridel) Mitten 1869, Schreber's big red stem moss, big redstem

schreh-bur-eye Honorific for Linnæus' student Johann Christian Daniel von Schreber (1739-1810).

This is, for me at least, one of the easier mosses to learn. It is just about everywhere and always on the ground or not very far from it up the slopes of rocks, stems, trunks. While not a strong climber—rarely more than 2 dm—it is a strong competitor for ground space and is often the dominant ground cover, snuffing out all its competition by growing over it with its rather loosely interwoven stems. The common name is an apt description as it almost always has a red tinge to many of the stems. I only find this moss in the more recently deglaciated areas which leads me to think this is something of a pioneer species. I do not find it at all along the Rainforest or Herbert Glacier Trail in the old growth forest.

Family Hypnaceae Schimper 1856

Ptilium De Notaris 1867

TILL-ee-um Greek πτίλον *ptilon*, a feather.

Ptilium crista-castrensis (Hedwig) De Notaris 1867, knights plume moss

kriss-tah-kass-tren-sis Latin *crist*, crest, thus plume + *castra*, a military camp referring to the highly organized pattern of the leaves and branches.

This is one of the showy "feather mosses" of the forest floor, almost visually shouting as I walk the trails with its brilliant chartreuse green leaves. The leaves are arranged as if some compulsive gardener just had to have them facing the right direction. The plane of leaves curve to one side and most curve together, fitting almost as a set of spoons in the kitchen drawer. This character gives rise to both the common name and the epithet.

Plagiomnium T.J. Koponen 1968

Latin pla-gee-OH-nigh-um, American pla-gee-oh-NIGH-um Greek πλάγιος *plagios*, oblique thus sideways, slanting, sloping + μνιον *mnion*, Classical Greek for moss; regarding the arching stems.

Plagiomnium insigne (Mitten) T. Koponen 1968, badge moss, coastal leafy moss (?)

in-sig-nee Latin *insigne*, badge of office, mark.

Bright green lights ahead! That's what this moss looks like in the rainforest darkness. The green is brilliant and shiny. The leaves are thin, broad and uniformly colored. On close examination, each of the leaves is minutely toothed with a short spike of midvein arising from the tip and the base of sharply auriculate "ears" that match very well with the line drawing on page 457 of P&M, the basis for my identification. Wherever I see this, it forms these clumps that almost look like hemispheres or yellow tennis balls that have been cut in half and covered with a thin layer of algae.

Order Polytrichales M. Fleischman 1920

Family Polytrichaceae Schwägrichen 1830

Pogonatum P. de Beauvois 1804

Latin po-GAW-nah-tum, American, po-go-NAY-tum Greek Πωγών *pogon*, beard, referring to the hairy calyptra.

Pogonatum urnigerum (Hedwig) P. Beauvois 1805

ur-nih-jer-um Latin *urna*, a jar, vessel.

Taxonomy: *Polytrichum urnigerum* Hedwig 1801

Class Sphagnopsida Schimper 1968

Order Sphagnales M. Fleischer 1904

Family Sphagnaceae Dumortier 1829

Sphagnum Linnæus 1753

s'fag-num Greek σφάγνος *sphagnos*, a moss.

Sphagnum girgensohnii Russow 1865, white-toothed peat moss, common green sphagnum, common green peat moss


gur-gen-sone-ee-eye Honorific undetermined.

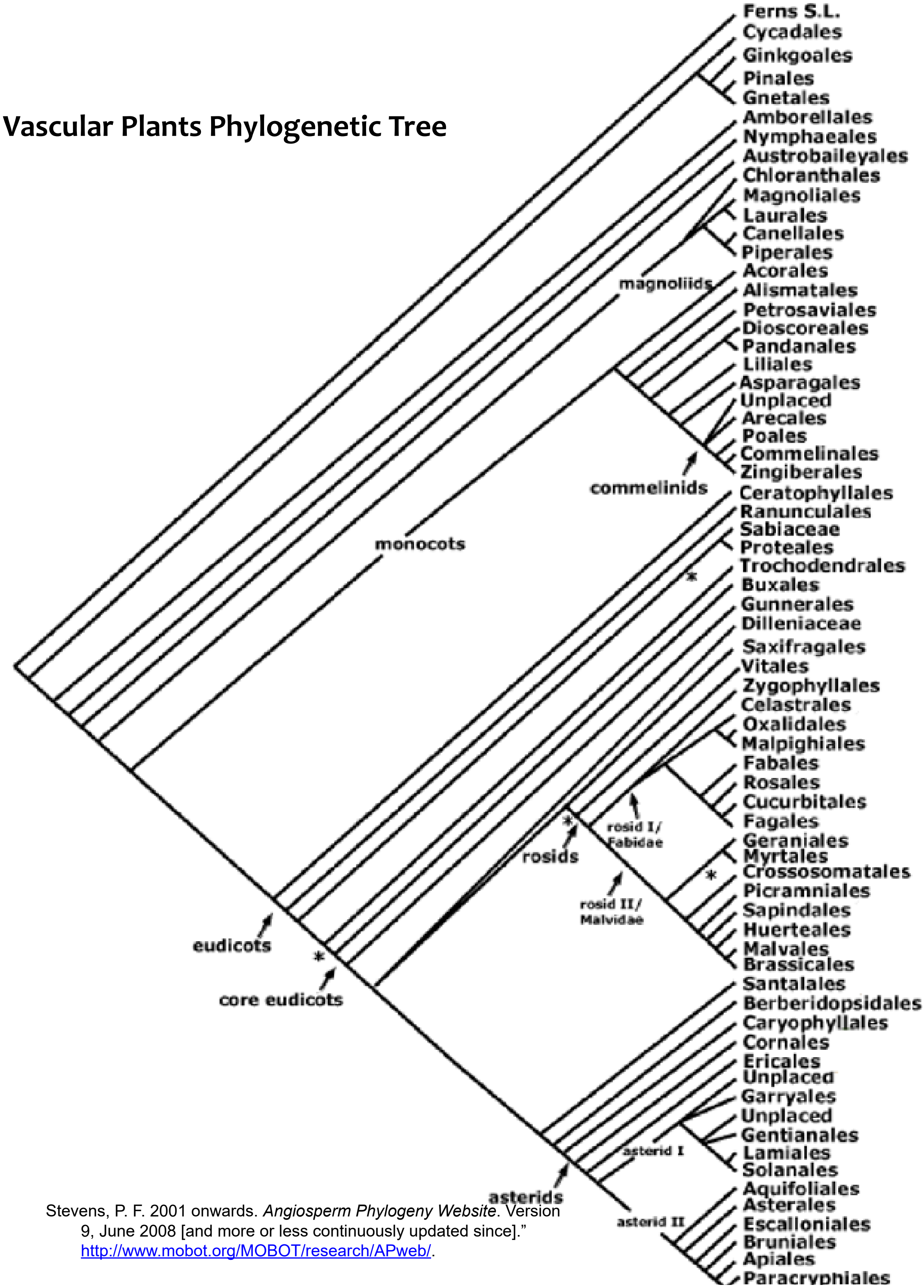
While biking up to Herbert Glacier on September 26, 2011, I spot a brightly lit patch of this sphagnum that makes me stop to examine more closely and take a photograph. Up until this point, I've simply walked by many patches of our sphagnum but never gave it any thought or examination to learn about our species. Today I take that time! What causes the eye to stop, for at least a moment, on this moss is the bright green color of the star-shaped tops with "trunks" fading to pale green and almost white "falling" off the cap. The moss stems are about 2 - 3 cm tall and wiry and stiff with loose, leafy side stems up the stalk that is capped with a star-shaped *capitulum* (a dense cluster or head).

There are four species of Sphagnum in the National Forests of Alaska that helps me narrow the 90 species treated in FNA! Only two are green and shaggy sphagnum has leaves that bend off the stem at right angles for a very different look. For serious taxonomic work, a microscope is necessary to examine the structure of mosses for sure identification.

I seem to encounter this moss in the more lit areas of the forest, often on a well-drained slope of sandy organic matter. On the bus entrance to the Moraine Ecology Trail it is common and on the slopes just above the nearly permanent puddles.

Unidentified Moss

Vascular Plants Phylogenetic Tree



Stevens, P. F. 2001 onwards. *Angiosperm Phylogeny Website*. Version 9, June 2008 [and more or less continuously updated since]." http://www.mobot.org/MOBOT/research/APweb/.

Phylum Lycopodiophyta D.H. Scott 1900 *lycophytes*

While the most obvious and visible parts of moss are the haploid gametophytes, from here on the most obvious and visible part of plants are the diploid sporophytes, a very major change in evolution.

Taxonomy: The understanding of lycophytes and ferns has undergone a major upheaval and dramatic rearrangement, abandonment and creation of newly circumscribed families. If you are used to older treatments, where you find things will be unexpected! Among the lycophytes, many traditional groupings have been found to be paraphyletic with many "garbage can" placeholders that needed splitting into more natural groups. The genus *Lycopodium sensu lato* contained clubmosses not even closely related to one another and has been, here, divided into *Lycopodium sensu strictu* and *Huperzia*, easily separated by most with a casual glance.

Christenhusz, M.J.M., X-C Zhang, & H. Schneider. 2011. *A linear sequence of extant families and genera of lycophytes and ferns*. Phytotaxa 19: 7–54.

Class Lycopodiopsida Bartling 1830

Order Lycopodiales De Candolle ex Berchtold & J. Presl 1820

Family Lycopodiaceae Palisot de Beauvois ex Mirbel 1802 **Lycopodium**

Members of this family are only distantly related to ferns and more fern-like plants. The family has been revised substantially with major acceptance of new circumscriptions with the 1993 publication of the Flora of North America. Most treatments before include most species in the single genus *Lycopodium*.

Lycopodium sensu lato (in the broad sense) has proven to be a convenient yet cumbersome dumping ground for many similar, yet quite different club mosses. It is geologically very old and very diverse. Many of the subgenera were split out many years ago (as *Huperzia* was in 1800) yet there was strong resistance to splitting up the genera and splits were not generally accepted until the publishing of Volume 2 of the Flora of North America in 1993 where the splits were recognized and accepted. It formerly included the genera *Austrolycopodium*, *Dendrolycopodium*, *Diphasiastrum*, *Diphasium*, *Lycopodia*, *Lycopodiastrum*, *Lycopodiella*, *Huperzia*, *Pseudodiphasium*, *Pseudolycopodium*, and *Spinulum* (not well accepted but becoming more so). Unlike most of the genera split out, *Lycopodium sensu strictu* (in the narrow sense) has remarkable little interspecific hybridization. I'm using it in the narrow sense here. It takes a very practiced eye to separate our clubmosses. The first thing to look for are strobili, either old or new will do.

Diphasiastrum Holub, 1975, flat-branched clubmoss, running cedar

die-fay-zee-ass-trum *Diphasium*, a generic name from the Greek δί *di*, twice + φάσις *phasis*, appearance; and Latin *-astrum*, incomplete resemblance. J.L. Holub created this name from an existing, but nearly abandoned (only a single species is recognized) name to create this genus.

The common name running cedar is apt as the leaves are reduce to almost scales that tightly overlap each other, at least at the base, very similar to most cedars.

Diphasiastrum alpinum (Linnæus) Holub 1975, alpine clubmoss


Latin AL-pin-um, American al-PIE-num From the Alps, thus alpine or high elevation.

Synonym: *Lycopodium alpinum* Linnæus 1753

Notes: The only place I've found this is on the Mount Roberts Trail more than a mile up from the Alpine Loop Trail. It is a tundra species growing low to the ground among other ground-hugging plants. Even when fully developed, the bluish-green 4-ranked leaves appear as though they are still somewhat in bud, awaiting expansion. Curiously, the leaves of the ranks come in three different shapes, but this requires a very close look and a hand lens is most helpful to see the differences. The inner leaves are shaped like trowels, the outer like lances, and the two lateral are concave. All are visible in this photograph upon careful observation.

Huperzia Bernhardi 1801, firmoss, clubmoss

whoo-pear-zee-uh   Honorific for German fern horticulturist Johann Pete.

With "an isolated position" basal to the rest of the Lycopodiaceae, Haines resurrects W.H.P. Rothmaler's 1962 Huperziaceae, an idea not well accepted and not followed here. *Huperzia* is distinct from *Lycopodium* in many ways, most notably the gemmae and unbranched gametophytes with sporangia born in the axils of ordinary leaves. Hybrids of North American *Huperzia* abound and thus can make identification to species difficult. Hybrids usually have aborted spores visible with a 10× hand lens. *H. selago* is circumboreal and should be considered carefully when making an identification. It is only one pseudowhorl of gemmae.

Haines, A.A. 2003. *The families Huperziaceae and Lycopodiaceae of New England: a taxonomic and ecological reference*. V.F. Thomas Co., Bowdoin, ME. 100

Huperzia occidentalis (Clute) Kartesz & Gandhi 1991, western clubmoss, fir clubmoss

ox-ih-den-tal-is   Latin *occidens*, sunset, west (of the west referring to the Western Hemisphere).

Taxonomy: First considered conspecific with the circumboreal but mostly European *Lycopodium selago* Linnæus, the eastern U.S. plants were carved out as *Lycopodium lucidulum* Michaux in 1803. A century later, forma *occidentale* Clute was named to describe the western plants. In 1991 it (and *L.l.*) was moved into *Huperzia* and elevated to species as the western counterpart of *H. lucidulum* where it occupies similar habitats. P&M use *Lycopodium selago* Linnæus, *sensu lato*. The name *H.o.* (Clute) Beitel 1992 used in the printed version of FNA is a later, and thus invalid, synonym.

Notes: This clubmoss is very difficult to distinguish from stiff clubmoss on a casual walk from eye level and requires a close look when not sporulating. The leaves are extremely similar as well as the habit, but not quite so running as the stiff. It's largest leaves are oblanceolate instead of narrowly ovate and stomata are abaxial instead of on both sides. It never branches and all stalks arise singly from the ground.

It is most easily recognized when gemmae (singular gemma and also call bulbils) form as several pseudowhorls at the top of the shoots that looks almost like a little cup, visible in all of these photos. Gemmae are asexual reproductive structures common in fungi and moss and far less so in more advanced plants. The tissue in gemmae fragments off the parent plant and has enough cells to grow into a new plant, identical genetically to the parent. In the case of this clubmoss, the structure takes advantage of the abundant rainfall and forms a splash cup that the force of the raindrop will break off the gemma and disperse it into the environment around.

Sexual reproduction occurs in sporangia (spore cases)that form in the axils of the leaves—instead of in cones at the top of the shoots—and are pale cream to bright yellow and easily seen with the naked eye when examined at the level of the plant as in the photo on the right. The spores are produced by meiosis and are haploid and grow into a gameteophyte that grows and remains underground where it must rely upon stored energy as it cannot photosynthesize. It produces the egg and sperm that fuse and grow into the spermatophyte, the plants we see.

Both gemmae and spore cases formed twice in 2009, first in late April and early May and again in September when these photos were taken. I don't know if this is unusual or not or if the warm, dry summer had anything to do with it.

It is common on the Trail of Time, particularly near the log CCC visitor center where the two left photographs were taken (with gemmae nearly always present), and scattered about the East Glacier Trail and in suitable habitat as well as on the Perseverance Trail well up into the Silverbow Basin. The photograph with sporangia was taken on the Moraine Ecology Trail at the edge of the forest along the lakeshore.

Lycopodium Linnæus 1753

lie-co-po-dee-um   Greek λύκος *lykos*, wolf, and πόδι *podi*, foot; the ends of the stems look like a wolf's paw.

<u>Taxonomy</u>: *Lycopodium* here is treated mostly *sensu stricto* (in the narrow sense) but I use a circumscription that includes *Spinulum*.

Lycopodium annotinum Linnæus 1753, stiff clubmoss, bristly club-moss

ah-not-in-um   Latin *annotinus*, of last year, of the preceding, previous year.

<u>Synonym</u>: *Spinulum annotinum* (Linnæus) A. Haines 2003; who separates out the three boreal and circumboreal species.

This species has a single sessile (stalkless) strobilus atop an erect stem.

This is the most common clubmoss of the area and is found in just about every habitat below the alpine. The appellation *stiff* is quite appropriate and I demonstrated this to my guests on the bus parking lot entrance to the Moraine Ecology Trail most every trip. The sporophylls (cones) are born singly and mature in April and May and it is fun popping them with my finger to spray the golden spores about and telling the story of "lycopodium powder". In early to mid-August the plants grow a new sporophyll, ready to overwinter under a substantial carpet of snow and be ready to sporulate next spring. When present, it is easy to separate this from western or fir clubmoss by the constrictions that form between each year's growth (hence the specific epithet). When not, the more running nature of the plant is obvious. The plant is extremely variable in leaf shape and size.

Lycopodium clavatum Linnæus 1753, groundpine, running clubmoss, stag's-horn clubmoss, wolf's-foot clubmoss, common clubmoss

clah-VAY-tum   Latin *clav-* thus clavate, knotty stick, club, thus one end thickened as in a club.

Taxonomy: This nearly cosmopolitan (and most widely distributed) clubmoss has been divided into taxa with 40 some names. Even with the dramatic reorganization of the Lycopods in 1993, there is little agreement on how the species should be delineated. FNA and many others do not subdivide the species into lower taxa.

Notes: This clubmoss has 2 to 5 strobili on a peduncle (a stalk) on a mostly prostrate stem with branching upright sprouts. One easy to spot characteristic of this clubmoss is the long hair at the tip of each leaf that can give the stems a silvery look. The annual constrictions are very abrupt or short and are not easily visible unlike those in *L. annotinum*. These pictures are from the Boy Scout Camp at Eagle Beach in a mossy meadow between the beach grass and the forest. This species seems to grow best in areas that are well-drained and don't stay wet. It is abundant on the steep slopes of Nugget Creek on the East Glacier Trail where its running habit is obvious.

Phylum Pteridophyta Schimper 1879 ***(Monilophyta) ferns, s'aach, and horsetails***

Class Equisetopsida C. Agardh 1825

Order Equisetales de Candolle ex von Berchtold & J. Presl 1829

Family Equisetaceae L.C. Richard ex de Candolle 1805 **horsetails**

Equisetum Linnæus 1753, horsetails, scouring rush

eh-kwiss-ee-tum Latin *equis*, horse, and *seta*, bristle.

Equisetum arvense Linnæus 1753, common horsetail, field horsetail

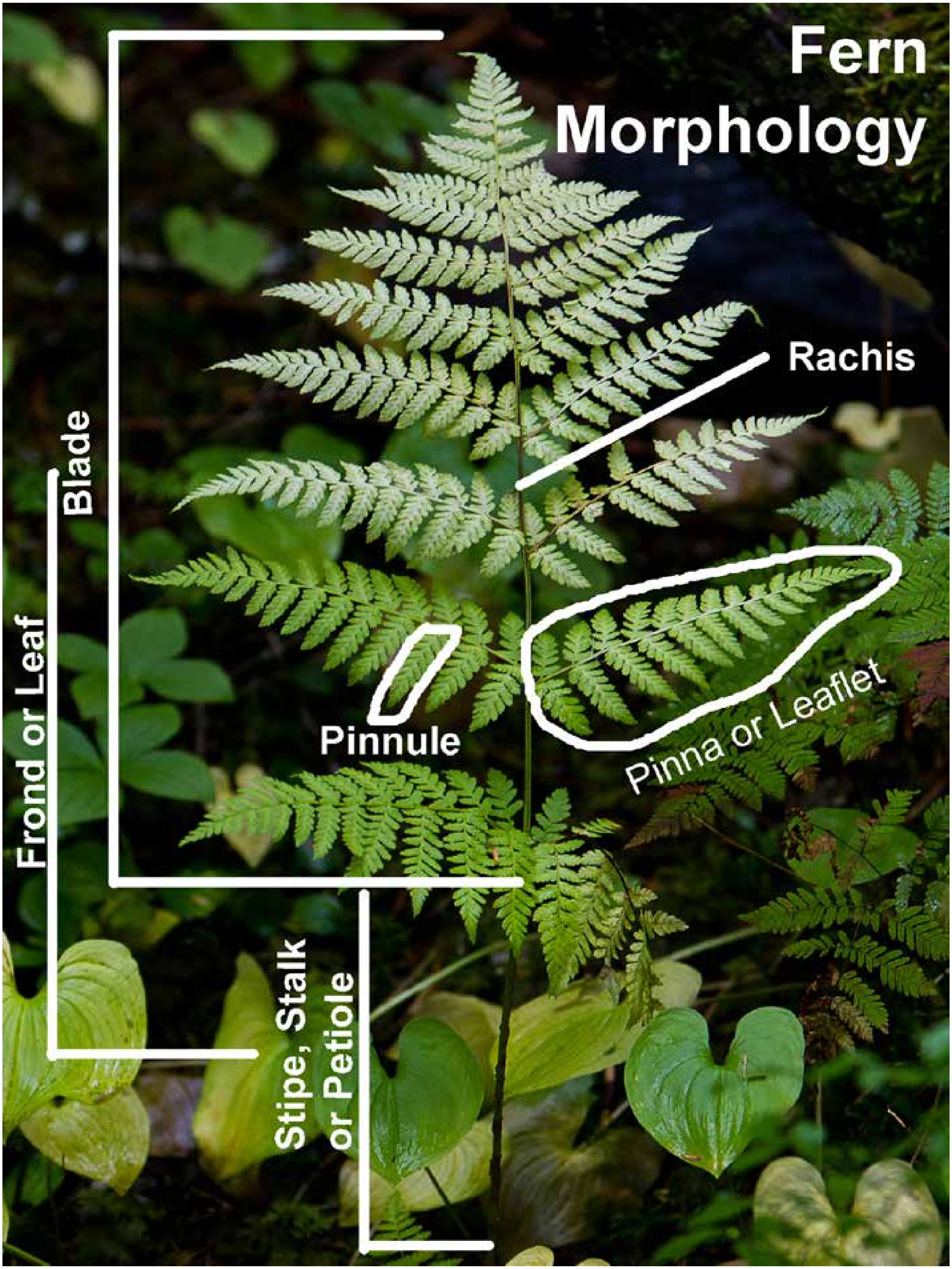

are-VEN-sis Latin *arvensis*, from the field.

Almost as soon as the snow melted away from the ground, but with many feet of it still nearby not yet melted, the fertile stems of this horsetail appeared early this spring. I'm not really sure if I've ever seen them before! Brown and light tan and rather fleshy in texture, they are quite obvious against the bare earth or dead leaves from last year. If one simply saw these and didn't watch the sterile shoots come up afterwards, it would be very easy to consider these two totally different plant species! The sporophylls atop the fertile stem almost look like a morel mushroom or a Turkish head wrap or even a brown Russian Easter egg! The sterile shoots, ~5 mm diameter, are bright green and have a dozen or more tiny. ~1 mm, branches coming out at each node, ~2.5 cm, in a tight whorl. The plant is abundant and rather weedy as it grows in lawns, plantings and just about anywhere one looks for it. While not in the forest, if there is an open depression with a little light, it will grow there quite happily.

Equisetum hyemale Linnæus var. ***affine*** (Engelmann) A.A. Eaton 1903, scouring rush, souring rush horsetail

high-mal-ee Latin *hiemalis*, of winter, blooming in the winter. uh-FIH-nee Latin *affīnis*, neighboring, allied to, kindred.

This species lacks the branching at the nodes and is simply a perennial erect shoot arising directly from the ground. Almost exclusively an aquatic plant, it is abundant in the shallow waters of nearly all the ponds in the Dredge Lakes area. Sporophylls arise from the tip of the stem in mid-summer.


Fern
Morphology
Rachis
Blade
Frond or Leaf
Pinnule
Pinna or Leaflet
Stipe, Stalk
or Petiole

Taxonomy: The understanding of ferns has undergone a major upheaval with dramatic rearrangement, abandonment and creation of new families and radical circumscription of families. If you are used to older treatments, where you find things here may be unexpected. There are some families here that could easily be divided further such as the Pteridaceae. I'm including the names of former families where our ferns have been placed to help avoid confusion. Most were once included in a very broadly circumscribed Polypodiaceae, for as FNA notes, "New World species historically were placed in the single genus *Polypodium*". What was once considered a rather singular genus is now spread among 7 to 9 orders with 41 to 70 or so families and 9,000 or so species!

Christenhusz, M.J.M., X-C Zhang, & H. Schneider. 2011. *A linear sequence of extant families and genera of lycophytes and ferns*. Phytotaxa 19: 7–54.

Order Polypodiales Link 1833

Family Dennstaedtiaceae Lotsy 1909 bracken fern

Pteridium Gleditsch ex Scopoli 1760

tear-IH-dee-um Greek πτερόν *pteridion*, little wing, from a name for a small fern.

The common name comes from the Swedish *bräken* and Danish *bregne*, both meaning fern in a general sense.

Taxonomy: The genus *Pteridium* was originally described by Johann Gottlieb Gleditsch with the single species *Pteridium aquilinum*. Now TROPICOS now lists 62 taxa within it. The genus is cosmopolitan in distribution and has many forms that appear unique in the various habitats. It was formerly placed in the Polypodiaceae.

Pteridium aquilinum (Linnæus) Kuhn 1879 var. ***pubescens*** Underwood 1900, bracken fern, Western bracken fern

a (as in cat)-kwi-lie-num Latin *aquila*, eagle.pew-BEH-sens Latin *pubescens*, pubescent, downy or short-haired.

Taxonomy: This has been treated as either one cosmopolitan species with many varieties or about ten separate species or two species. FNA (1993) recognizes 12 worldwide varieties and four in North America. The range of our variety is entirely western and the other three are eastern.

Notes: Here the plant is an uncommon understory plant where the canopy doesn't block light from the forest floor. This photo is a plant from the Lena Point Trail just in from the cobbly cove east of the point and about 20 yards from the shoreline under the cover of the edge of the forest.

David Emory, a botanist friend of mine, calls this plant the world's most widespread weed being found everywhere on earth but deserts and Antarctica, often weedy in habit.

While generally considered poisonous in the United States, this fern has a long history of consumption in many parts of the world. The rhizomes have been powdered into flour and the fiddleheads eaten raw or sautéed. The Merck Veterinary Manual includes enzootic hematuria, acute brackenism or hemorrhagic disease, bright blindness and bracken staggers in animals and note that "Japanese scientists have shown an association between consumption of bracken crozier and esophageal cancer". Bracken fern contain the toxin ptaquiloside that wasn't isolated until 1983 but proven carcinogenic in 1984. This is a fern to avoid eating.

Haruki, N., M. Ojika, K. Wakamatsu, K. Yamada, I. Hirono, & K. Matsushita. 1983. *Ptaquiloside, a novel norsesquiterpene glucoside from bracken,* Pteridium aquilinum *var.* latiusculum. Tetrahedron Letters 24 (38): 4117–4120.

Family Pteridaceae Reichenbach 1837 **maidenhair ferns**

Cryptogramma R. Brown 1823

krip-toe-gra-mah Greek κρύτως *cryptos*, hidden + γραμμε *gramme*, line; referring to the ± marginal soral bands hidden by revolute margins.

Cryptogramma sitchensis (Ruprecht) T. Moore, 1857, Alaska parsley fern



sich-en-sis Of or pertaining to Sitka, Alaska.

Taxonomy: Formerly placed in the Pteridaceae. When treated as conspecific with its European counterpart, its name is *C. crispa* (Linnæus) R. Brown ex Hooker var. *sitchensis* (Ruprecht) C. Christensen. When considered within American parsley fern its name is *C. acrostichoides* var. *sitchensis* (Ruprecht) C. Christensen. Since North American material has a chromosome number of 2n=60 and European 2n=120, this is a compelling reason to consider them separate. Since this species is 2n=120 it is a hybrid with one parent "*C. acrostichoides* and another species, possibly the eastern Asian *C. raddeana* Fomin" [FNA] and is separate from the more widespread parent.

Notes: When sporulating, this fern is unmistakable with its dimorphic (2 forms) fronds. The typical fern leaves are densely clustered, sterile and dark green, while the fertile are much lighter green to nearly light yellow, linear (actually folded over and covering the almost continuous row of sori) and much longer. At almost all times of the year, a cluster of dead fronds from last year will be visible at ground level (see left photo). It nearly always is found growing out of rock crevices or very rocky slopes and is very common on all the weepy faces of the graphitic schist on the Glacier Peninsula, Photo Point and following the exposure toward Thunder Mountain.

Adiantum Linnæus 1753

aye-dee-an-tum Greek αδιαντος *adiantos*, unwetted, since the leaves shed raindrops.

Adiantum aleuticum (Ruprecht) C.A. Paris 1991, maidenhair fern, western maidenhair, Aleutian maidenhair, shaa ya léet'ee




ah-LEW-tih-come   Of or about the Aleutians, from which it was first described.

Taxonomy: Formerly placed in the Polypodiaceae. Could be placed in the Adiantaceae. I do not find this to be different from the eastern species and include a short article on my observations published in *Chinquapin* 17(2) 2009:

Field Notes: On maidenhair ferns

Your Chinquapin editor has been working in southeast Alaska since early April and has been seeing northern (or western) maidenhair fern (*Adiantum aleuticum*) nearly every day. I've been asking myself, every time I see it, just how is this different from the maidenhair fern (*Adiantum pedatum*) from eastern of North America?

I've read just about everything I can find on this genus, including Cathy A. Paris and Michael D. Windham's *A Biosystematic Investigation of the* Adiantum pedatum *Complex in Eastern North America* where they state "no single character is diagnostic" as well as David Lellinger's *A field manual of the ferns & fern-allies of the United States & Canada*, but find this statement from the 1993 treatment in the Flora of North America interesting, if not illuminating:

"Although the western maidenhair has traditionally been interpreted as an infraspecific variant of *Adiantum pedatum*, the two taxa are reproductively isolated and differ in an array of morphologic characteristics. Therefore, they are more appropriately considered separate species (C. A. Paris and M. D. Windham 1988). Morphologic differences between *A. pedatum* and *A. aleuticum* are subtle; the two may be separated, however, using characteristics in the key."

I'm sorry folks, but I just don't see the difference! After four seasons of looking at this fern from Alaska, I simply see no differences that make it distinctive enough to call it a "good species". Even the statement "reproductively isolated" seems questionable. Just look at any distribution map of the two species you care to and there is overlap. The key from FNA is a good example of what happens when a "fine" a distinction is made between species:

"Segments at middle of penultimate divisions of blades generally less than 3.2 times as long as broad, apices with rounded, crenulate or crenate-denticulate lobes, lobes separated by shallow sinuses 0.1–2(–3.7) mm, segment stalks ca. 0.6–0.9 mm..*Adiantum pedatum*

Segments at middle of penultimate divisions usually more than 3.2 times as long as broad, apices with sharply denticulate, angular lobes, lobes separated by deep sinuses 0.6–4 mm, segment stalks to 0.6 mm...*Adiantum aleuticum"*

In their treatment of the genus, no other species in this genus are separated on such fine morphological characters.

Weakely (2008) separates them similarly, if not geographically:

"Ultimate segments at middle of penultimate divisions usually > 3.2× as long as broad, the apices with sharply denticulate, angular lobes, these lobes separated by deep sinuses 0.6-4 mm deep; segment stalks 0.2-0.9 (-1.3) mm long; [disjunct in se. PA on serpentine from a generally more northern and western distribution] .... [*A. aleuticum*]

Ultimate segments at middle of penultimate divisions usually < 3.2× as long as broad, the apices with rounded, crenulate, or crenate-denticulate lobes, these lobes separated by shallow sinuses 0.1-2.0 (-3.7) mm deep; segment stalks 0.5-1.5 (-1.7) mm long....................................*A. pedatum"*

I do not see these as different. I consider this a *mildly* variable circumboreal species. The same fern Vitus Bering and Georg Steller saw in St. Petersburg, Russia on their way to Alaska in 1741, is the same one I see in southeastern Alaska and the north Georgia mountains.

Common on rock slopes, rock walls, weeps, spray zones of waterfalls, and nearly always in shade or at least filtered sunlight. I can be found on nearly every trail walked in the Juneau area (but not on the Moraine Ecology Trail).

Family Cystopteridaceae Schmakov 2001 **brittle fern, bladder fern**

Cystopteris Bernhardi 1805

Latin kiss-TAWH-tear-is, American sis-TOP-ter-is   Greek, κιστις *kystis*, a bag + φτέρη *fteri* thus *pteris*, fern.

Cystopteris fragilis (Linnæus) Bernhardi 1806, fragile fern

fra (as an cat)-jill-is   Latin *fragilis*, brittle, frail; impermanent.

Taxonomy: Formerly placed in the Polypodiaceae and Athyriaceae. FNA (1993) notes: "*Cystopteris* is a taxonomically difficult genus at the species level. Especially troublesome is the worldwide and polymorphic species *C . fragilis sensu lato*. To maintain it as a single species with several varieties would be easiest (and least controversial). This approach, however, may not accurately reflect true evolutionary history." TROPICOS lists 51 subspecific taxa! At the present time it seems only prudent to consider the species *sensu lato*.

Notes: The only place I regularly see this common boreal fern is on the exposed weepy rock faces on the West Glacier Trail. If one looks hard in similar locations on the East Glacier Trail it can be found. It is abundant in the gorge of the Powerline Trail. It is common in the rocky crevices along the Perseverance Trail, but here not out in the exposed areas but in the protected areas, somewhat opposite of the glacier area. The straw-colored stipes and yellow-green leaves usually make this stand out from the other ferns (parsley fern) in the same habitat. The leaves taper at both ends and can be easily confused with young lady ferns until the stipe is examined.

Gymnocarpium Newman 1851

gym-no-car-pee-um   Greek γυμνός *gymnos*, naked + καρπός *karpos*, fruit, referring to the absence of indusia over the spores.

Gymnocarpium disjunctum (Ruprecht) Ching 1965, Pacific oak fern, western oak fern

dis-JUNK-tum

Latin *disiunctus*, separated, distant, disconnected; referring to its disjunct distribution.

Taxonomy: Formerly placed in the Polypodiacae and Aspidaceae. Kathleen Pryer's excellent work on the genus finally made sense of it by recognizing that the common *G. dryopteris* is "a fertile allotetraploid species that arose following hybridization between *G. appalachianum* and *G. disjunctum*". Both *G. dryopteris* and *G . disjunctum* occur in Alaska, but here on the Pacific slope, all material seems to be *G. disjunctum*.

Pryer, K. M. 1993. *Gymnocarpium*. In: Flora of North America Editorial Committee, eds. 1993+. *Flora of North America North of Mexico*. 16+ vols. New York and Oxford. 2: 258-260.

Notes: I learned this genus in Pennsylvania many years ago as it has a circumboreal distribution. It has a most distinctive appearance and is very easy to learn on sight at eye level while walking. The ternately compound pinnate pinnatifid leaves are unique in shape from all our other ferns. It almost appears to be three distinct leaves in an arrangement where the middle one is larger and longer. The pale green color contrasts with the dark and wiry stem and rachis. The leaves are held almost horizontally to the ground. There is a very certain frailness that I sense when walking by this fern that is only more deeply confirmed when fall approaches and the pinnules turn an almost ghostly shade of pale.

Distinguishing our SEAK ferns from the far more common and widespread *G. dryopteris* requires a careful look: *Gymnocarpium* ferns are divided into three lobes (ternately compound), and one must look carefully at the lower two where the pinnae (leaflets) on it are sessile (connected without a stalk) and the lowest (basal) pinnules (the smallest division of a fern) are markedly different in length with the lower one much longer than the upper on *G. disjunctum*, visible in my photograph.

Along the Steep Creek dike paved trail it almost forms a ground cover. It is abundant on the East Glacier Trail and small plants can be viewed at eye level from the stairs where it is especially abundant. The underground stem is nearly pencil thick and runs long distances, sending up fronds all the way along, so when one encounters a group of these ferns, they are all likely the same individual. In the fall the fronds turn nearly white in color as this photo shows.

Family Aspleniaceae Newman 1840 **spleenworts**

Asplenium Linnæus 1753

Latin a (as in cat)-SPLEH-nee-um, American ah-SPLEE-nee-um

Greek σπλήνα *splen*, spleen, thought by Dioscorides to be useful for treating spleen diseases.

Asplenium viride Hudson 1762, green spleenwort

veh-RIH-dee Latin *viride*, green.

Taxonomy: Formerly placed in the Polypodiaceae. This poor little fern has a complicated nomenclatural history. It seems Linnæus included two of the same fern in his 1753 *Species Plantarum* naming them *A. ramosum* and *A. tricomanes-ramosum*. Since *A.r.* comes first, it has priority. Others argue that since Linnæus published this as "*Asplenium Trich. ramosum*" it should be rejected as an orthographic error as the reason to accept *A.r.* The 1999 St. Louis Congress voted to consider *A.r*. a "*Nomina utique rejicienda*", name certainly rejected, under International Code of Botanical Nomenclature Art. 56 in favor of *A.v*. as it would "cause a disadvantageous nomenclatural change" because of the confusion.

Notes: This photo is of a clump on the cliff where the East Glacier Trail drops out of the Nugget Creek canyon and turns west and is representative of every place I've seen the fern. This spleenwort is easily identified by its green stipe (frond stalk) and alternate pinnae (leaflets). All references I consult say this fern grows on "limestone and other basic rocks" [FNA]. Here it is growing on a near vertical cliff of metabasalt. Basalt can be relatively rich in calcium. Regardless of the substrate, it needs a cleft where organic matter can accumulate for its vertical rhizome to penetrate and spread out roots to gather nutrients.

Family Thelypteridaceae Ching ex Pichi Sermolli 1970 **marsh ferns**

Phegopteris (C. Presl) Fée 1852

feh-gawp-ter-is Greek φεγος phegos, beech + φτέρη *fteri* thus *pteris*, fern.

Phegopteris connectilis (Michaux) Watt, 1866, northern beech fern, narrow beech fern

Latin *conectere,* join together; referring the the connected bases of the pinnae making them pinnatifid.

Taxonomy: Formerly placed in the Polypodiaceae and Dryopteridacae.

Synonyms:
Polypodium phegopteris Linnæus 1753
Polypodium connectile Michaux, 1803

Phegopteris polypodioides Fée 1852
Dryopteris phegopteris (Linnæus) C. Christensen 1905
Thelypteris phegopteris (Linnæus) Slosson 1917

Notes: This fern is identifiable at a glace as a fern with a single frond with the lowest pair of pinnae strongly down-curved. This is a fern of the moist open forest where it doesn't have to compete with a dense shrub understory. This is not a common habitat in the Juneau area except for the flats and adjacent slope on the East Glacier Trail.

Family Woodsiaceae Herter 1949 **woodsias**

Woodsia R. Brown 1810

WOODS-ee-uh Honorific for English botanist Joseph Woods (1776-1864).

Woodsia ilvensis (Linnæus) R. Brown 1813, rusty cliff fern, rusty woodsia, oblong woodsia

Ilvensis is the Latinization of Elba, the island off Tuscany and why this fern that probably does not occur there (it is a circumboreal plant). Linnæus gives this description: "*Habitat in Europae frigidiffimae rupibus*" which means "of cold cliffs" [*Species Plantarum* v.2 p.1071]. It makes me wonder if Elba has any of these?

Reading "Out near Nugget Falls, crevices in the cliffs held the first green fronds of the rusty cliff fern..." in Mary Willson's *On the Trails* article in the Juneau Empire on April 20, 2012, forces me to put out my feelers this new fern. It takes me until today to find it, here on East Glacier trail. The slow pace and reverse direction without the burden of leading give me a different view of the trail and I'm able to spot it on June 17, 2012. I'm familiar with *Woodsia*, and this one has a general feeling of them in a loose sort of way. Most are, well, rusty! This one shows none of that, yet the underside with the sporangia gives identity away easily. FNA describes them as "Indusia of narrow, hairlike segments, these uniseriate throughout, composed of cells many times longer than wide, usually surpassing mature sporangia." The whitish hairs that intertwine to look like wool on these pinnae are diagnostic. This fern can easily be mistaken for parsley fern when just casually observing while walking the trails.

Two of the common names given are simply awful. No one other than a pteridophile would call anything a "woodsia", and then they would know enough to use the scientific name. Where the "oblong" comes from I've no idea as I would not describe the fronds, pinnae or pinnules as being this. Perhaps it relates to the indusia that can be oblong. It's not the sort of word I hear in "common" English. Rusty cliff fern sounds like a "common" name and I far prefer it.

Family Blechnaceae (C. Presl, 1851) Copeland, 1947 **Deer Fern Family**

Blechnum Linnæus 1753

BLEK-num Greek βλεχνον *blechnon*, an ancient name for ferns in general.

Blechnum spicant Roth 1794, deer fern, hard fern, redwood fern

spih-CANT Latin *spica*, spike.

Taxonomy: Formerly placed in the Polypodiaceae.

Notes: As an evergreen fern it survives the snowy winter blanket and exposes its fronds allowing photosynthesis as soon as it escapes from the snow cover. It has dimorphic fronds where the fertile have a different form than the sterile. Fronds from the previous season lay prostrate on the ground while the new growth rise quickly from the rootstock. The fertile fronds arise late in the year, the end August through September, and have narrower pinnae than the fertile. The sori form two nearly continuous line of brown on the fertile fronds.

I learned this fern in the redwood forests of northwestern California as "redwood" fern as it is common there in the shade of the tall trees. I encounter it regularly on the East Glacier Trail along the rock cuts where it commonly grows in tufts from the base. All of these rock cuts face west and get bountiful sunlight and counters my experience with it in the redwood forest where it is in deep shade. On the West Glacier Trail it is occasional and in more shaded areas, but still rocky. I've only found it in two places on the Rainforest Trail, which would be most like its habit in the redwoods. It is abundant on the Auke Nu Trail in the ecotone between the spruce forest and the muskeg.

Family Athyriaceae Alston 1956 **lady ferns**

Athyrium Roth 1800

uh-THEER-ee-um Greek αθυρος *athyros*, doorless; the sporangia only tardily push back the outer edge of the indusium.

Athyrium filix-femina (Linnæus) Roth 1800 ssp. ***cyclosorum*** (Ruprecht) C. Christensen 1937, lady fern

fill-ix- Latin, fern-feh-min-uh Latin femina, woman, female, feminie; hence "lady fern"sigh-clo-sore-um Greek κύκλος *kuklos*, circle + Ancient Greek σωρός *sōrós*, stack, pile, heap; referring to the circular sori.

Taxonomy: Formerly placed in the Polypodiaceae. This species is one confused mess! Here are just some of the synonyms I've found for this boreal form: *A alpestre* (Hoppe) Milde var. *cyclosorum* (Rupr.) T. Moore; *A. angustum* (Willdenow) C. Presl var. *boreale* Jennings; *A. a.* var. *elatius* (Link) Butters; *A. filix-femina* (Linnæus) Roth var. *californicum* Butters; *A. f-f.* var. *cyclosorum* (Rupr.) Ledeb.; *A. f-f.* var. *sitchense* (Rupr.) Ledeb. As western floras tend to use subspecies more than varieties, I'm going with Hultén's treatment.

FNA notes: "*Athyrium filix-femina* is circumboreal, and this or closely related species extend into Mexico, Central America, and South America. The delimitation and infraspecific classification of *A . filix-femina* need detailed study." And they further note that "*Athyrium filix-femina* var. *cyclosorum* is most similar to the European var. *filix-femina* ; it differs in having broader, nearly equilateral pinnules and medial to supramedial sori."

Weakley notes "Kelloff et al. (2002) and Kelloff & Werth (1998) support recognition of two taxa at either specific or infraspecific levels, based on morphology, allozymes, and spores" and elevates two in the southeastern flora to species level: *A. f-f.* ssp. *angustum* (Willdenow) Clausen to *A. angustum*; and *A. f-f.* ssp. *asplenioides* (Michaux) Hultén to *A. asplenioides*)

Notes: If you look carefully at the large ferns (about waist high), there are only two to learn, this and shield fern (next species). Lady fern is the common fern of the Alaska temperate rain forest. It can be as small as a hand tall (1 dm) or taller than a man's waist (1.5 m). If the dissected fern is tapered at both ends (elliptic or oblanceolate in gross form), it is lady fern. But this is not the only fern that does this, so be careful! Anderson's holly fern does this also, but is smaller, narrower when larger, darker green and less divided. When sporulating, the sporangia are curved, hooked or horseshoe-shaped. It can be found in any habitat including the alpine where it is always in dwarfed form. As one walks on either the East Glacier Trail or West Glacier Trail, this is the most common fern and is what they eye sees trailside almost everywhere at lower elevations.

The fiddleheads are considered by many to be culinary superiors, but they must be harvested while still very tight as the stems can be loaded with brown scales whose texture detracts from the flavor.

Family Dryopteridaceae Herter 1949 **wood ferns**

Dryopteris Adanson 1763, wood fern

dry-op-tur-is Greek δρυς *drys*, tree + φτέρη *fteri* thus *pteris*, fern.

Dryopteris expansa (C. Presl) Fraser-Jenkins & Jermy 1977, shield fern, spiny shield fern, spreading wood fern, s'aach

eks-span-sah Latin *expansum*, to expand.

Taxonomy: According to FNA "*Dryopteris expansa* is diploid and is one of the parents of *D. campyloptera*. Where their ranges overlap in eastern Canada, these two species are very difficult to distinguish except by chromosome number". [*D.e.* 2 n = 82; *D.c.* 2 n = 164]

Notes: I first learned shield fern in the redwoods of northern California where it grows to mammoth—over waist high—size. When first learning the ferns here in Juneau, I called all the larger ferns this species and considered it the most common; but it is not, lady fern is. It takes a practiced eye to separate the two on a walk as the ultimate pinnae of the two ferns are very similar making the two appear as one. This species tends to have a more frilled look to it, but that is not a good field mark. The definitive field mark is the triangular shape of the blade (as opposed to lady fern's tapering at both ends. Here is the description from FNA: "Pinnae ± in plane of blade, lanceolate-oblong; basal pinnae deltate, slightly reduced, basal pinnules equal to or longer than adjacent pinnules, *basal basiscopic pinnule longer than basal acroscopic pinnule*; pinnule margins serrate." The key here is what I have italicized: the second pinnule from the rachis on the lowest pinnae is the longest and is visible in this photograph. Learning it is a parent of *D. campyloptera* explains why the fern seems so familiar as that species is the common wood fern of the high elevation Appalachians. Now the question that comes to mind, usually the form with the most chromosomes is the large, but that does not seem to be the case with these two species, particularly with the redwood forest population, so what's going on here?

Polystichum Roth 1800

pah-LIH-stih-come Greek πολλοί *poly*, many + στοίχος *stoichos*, row; referring to the rows of sori on each pinna.

Polystichum andersonii M. Hopkins 1913, Anderson's sword fern, Anderson's holly fern

ander-sown-ee-ekye Honorific for Alaskan botanist Jacob Peter Anderson (1874-1953).

Taxonomy: Formerly placed in the Polypodiaceae and Aspidaceae. While originally described as a distinct species, this fern has been interpreted as a variety of Braun's holly fern.

Synonyms:
Polystichum braunii var. *andersonii* (M. Hopkins) Hultén 1968 and *P. jenningsii* Hopkins 1917
Polystichum braunii (Spenner) Fée subsp. *andersonii* (M. Hopkins) Calder & Roy L. Taylor 1965

FNA notes "*Polystichum andersonii* is an allotetraploid (D. H. Wagner 1979); its diploid parents are *P. munitum* and *P. kwakiutlii*." The former is the very common sword fern of the Pacific slope to southern California. The latter is known only from the type specimen, collected at Alice Arm, British Columbia. What distinguishes it from *P. braunii* are the presence of bulblets (visible in the photo on the right) on the upper third of the frond. The fronds are 1-pinnate-pinnatifid where Braun's holly fern is 2-pinnate.

Notes: As many times as I've walked the East Glacier Trail and looked thoroughly at the ferns, it wasn't until September of 2011 when I spotted a fern on the lower end of the trail (when walked clockwise) between the two bridges that looked quite different. The first time I just casually compared it to the ferns around, but on September 29 I found one with a gall on it that caused me to look far more closely at the host for the gall. The fern is dark green, narrow and tapered top and bottom. Each pinna ends in one to several bristles at the tip of the teeth (this gives it the name holly fern). The rachis has a groove running the length of the blade that runs into the midrib of each leaflet. The sori are round with an indusium that opens from the outside to the middle and the individual sori are spherical and dark brown. It grows in the clefts of damp rock or the soil nearby. In the rocks it grows smaller, < 1 m, in the soil about 1 m.

In examining what I thought was a gall (photo on the right), I find nothing in it other than fern tissue. It looks mostly like a normal bud with miniature fern parts in it. It turns out this is a *bulblet*. These are fern tissue that when removed or falling off the plant have the ability to grow an entirely new, and genetically identical plant.

Be careful about using the frond narrowing at both ends, as that is what I've been doing in misidentifying this fern as Lady fern for several years! I had to change the tag on a number of photos when preparing this account that were wrong! This fern is smaller, narrower, darker and less cut than the lady fern.

Family Polypodiaceae Berchtold & J.C. Presl 1820 **polypodys**

Polypodium Linnæus 1753

polih-poe-dee-um Greek πολλοί *poly*, many + πόδι *podi*, little foot, in allusion to numerous knoblike prominences of the stem.

Polypodium glycyrrhiza D.C. Eaton 1856, licorice fern

gly-kih-rye-zah Greek γλυκόρριζα *glykorriza*, licorice.

I have to admit that I've taken the name of this fern for granted until September of this year (2009) when I finally reached into a thick patch of the fern on the East Glacier Trail and ripped off a half-inch piece of rhizome and passed it on to a couple of people on the trip (as well as a little piece for myself) and the taste truly is a delightful one of licorice—and this from one who really doesn't like it! Last year (2008) I commented on this for my notes at Chilkat State Park, but now I've taken it up for real. It is good! On September 17 I pulled up a 3 cm section to share with my guests and found the sweetness very strong, nearly overpowering the licorice flavor. When I return to Georgia I must try rockcap fern (*Polypodium virginianum*) to see if it has any flavor at all The FNA key includes this (emphasis mine): "Scales on abaxial surface of rachises linear and hairlike, less than 3 cells wide; venation entirely free; *stems intensely sweet, licorice-flavored*."

The sori of polpody's fascinate me with their elegant simplicity. There is no *indument* (a covering of hairs or scales), no *indusia* (a covering or membrane), nor *sporangiaster* (a structure to hold sporangia, spore-producing cells). Rather the spores are produced in a naked agglomeration of tiny sporangia spheres arranged in a circle midway between the midrib and the margin and midway between the veins hanging from the surface of the underside of the pinnae. Note that they are larger toward the rachis and smaller toward the distal end of the pinnae. Is this simply due to the smaller size of the substrate tissue? What is in the tissue that causes the growth of these cells anyway? They usually are arranged in perfect opposite symmetry (first photo), but note their absence from the base of the leftmost pinnae but an unopposed sori at the base of the third pinnae (second photo) as well as several single sori at the distal ends. In the first photo they are a pale, translucent yellow which means they are not yet ripe and spores have not been produced. The become gold, dull and grainy when mature and the spores are being released as in those closest to the rachis in the second photo.

This fern is common on any lateral glacial moraine where it is epipetric on of boulders covered with moss, particularly on the East Glacier Trail and West Glacier Trail. It is a strictly West Coast endemic (with one outlier in Idaho).

Division Acrogymnospermae Cantino, Doyle, Graham, Judd, Olmstead, D.E. Soltis, P.S. Soltis & Donoghue 2007*, Extant Gymnosperms*

Taxonomy: Molecular genetic research is slowly closing in on the relationships of what we usually call gymnosperms (cycads, ginkgos, conifers and Gnetales), given the name Gymnospermae by Prantl in 1874. The Gnetales differ from the other gymnosperms by having vessel elements to transport water far more like the angiosperms (flowering plants) and have been segregated out as division Gnetophyta Bessy 1907. To distinguish the remaining gymnosperms as a monophyletic grouping, Cantino et al. coined the term Acrogymnospermae to encompass the remaining members. Other well-entrenched alternatives include Phylum or Division Coniferophyta B. Hansen or Pinophyta Cronquist, Takht. & W. Zimm. ex Reveal 1996 as the conifers. The suprafamilial taxonomy is unclear so the nomenclature is muddled.

Class Pinopsida Burnett 1835 Conifers

Order Pinales Dumortier 1829 *Extant Conifers*

Notes: Unlike most places where I've lived, the diversity of conifers here is extremely limited. With these five species, *all* are covered for the Juneau area. Two utterly dominate the landscape and account for the most biomass [Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*)]. There are 19 species of just pine in California and 10 in Great Smoky Mountains National Park! Here, there is only one.

Family Pinaceae Sprengel ex Rudolphi 1830 pines

Picea A. Dietrich 1824, spruce

Latin PIE-key-ah, American pie-SEE-ah Latin *picis*, pitch; name of a pitchy pine.

Taxonomy: *Picea* was originally thought to be a *Pinus* (pine) by some and an *Abies* (spruce) by others. Albert Gottfried Dietrich, curator at the Botanical Garden in Berlin and an instructor at the institute of horticulture at Berlin-Schöneberg, elevated it to genus in 1824.

Picea sitchensis (Bongard) Carrière 1855, Sitka spruce, shéiyi

sich-en-sis Of or about Sitka, where originally described.

Synonyms:
Pinus sitchensis Bongard 1832
Abies falcata Rafinesque 1832

Notes: Found exclusively on Pacific slope forests from the Kenai Peninsula in Alaska to the Mendocino coast in California, this is *the* tree of the Juneau Landscape. When one just glances at the forest, this tree dominates the landscape of the recently deglaciated landscape. As the new growth of this season expanded and became quite blue, the color difference with the yellowish green of hemlock becomes obvious on nearly every mountain slope in and around town wherever I go. There are some very large (>1m dbh) specimens on the Rainforest Trail and along the Herbert Glacier Trail.

Needles give the good clues for identifying spruce: they radiate in all directions from the stems ina bottle brush arrangement; they are stiff with very sharp points that make for a "sticky spruce" experience when handling; the base constricts rapidly to a woody peg that wraps down the twig; and new growth is blue-gray-green in two prominent stripes on the underside. While all other spruce have square needles, Sitka and Brewer's are flattened.

New growth on spruce is stiff and either straight up or straight out at a 90° angle in whorls. A new whorl is produced each year making it easy to determine how old younger trees are. But be careful, after just a few year, the older branches start to hang down and even look droopy, so stiff and out will only be at the top of older trees.

While most descriptions call the bark "grayish-brown" or "orange-brown", to my eyes the bark of nearly all ages of Sitka spruce (*Picea sitchensis*) has a purplish tinge to the gray-brown, or perhaps mauvey-chocolate. The bark is nearly always scaly, especially on young trees, but can be seen on old growth as thick, corky scales.

Much is made here of "spruce tips" and they have quite a following since they are so loaded with vitamin C. I find them rather astringent and, well, "piney" on the tongue, rather imagining tasting a pine based toilet bowl cleaner! When used as a flavoring in Haines Brewing Company's Spruce Tip Ale—the tiny brewery's most popular—it is downright wonderful or in Alaska Brewing Company's Winter Ale. I'll take my tips this way!

Pinus Linnæus 1753, pines

PIE-nus Latin *pinus*, pine that may derive from the Indo-European base **pīt-* 'resin for the tree's abundant sap.

Pines are conifers where the single to five needles are wrapped in a fascicle. Those with hard wood and two or three needles per fascicle are the yellow pines (subgenus *Pinus*); single-needle and some two-needled are the foxtail or pinyon group (subgenus *Ducampopinus*) and the white pines have five needles (subgenus *Strobus*). We have but one species of pine in our area.

Pinus contorta Douglas ex Louden 1838 var. ***contorta***, beach pine, shore pine, l'él



con-tore-tah Latin *contortus*, to whirl, twist together.

Taxonomy: With the vast stands of lodgepole pine in the interior of North America, I find it fascinating that the type for the species is beach pine, a far less abundant form. The species has been divided into three or four varieties or subspecies, none of which is particularly distinctive. Shore pine cones open, at least partially, and fall off the tree not long after opening, but some will remain for years. Beach pine does develop a distinct look, but I believe it is primarily edaphic, that is, form that is produced more by soil than climate or genetics. Here, it is exclusively a muskeg species, particularly common on bench muskegs, often the base of a former shoreline now lifted by isostacy.

Notes: Shore pine takes on many forms in our wet habitats. It can be a sprawling shrub when in the middle of a muskeg near the deep ponds. It can take a short but very bushy form where the soil is just a bit drier. It can grow as a straight pole to some 10 meters. And it can take any intermediate form as well. Smaller "trees" are often visually striking with their needles arranged like a bottle brush. Staminate cones develop in a tight cluster at the tip of last year's branches and produce prodigious amounts of pollen for their size. Pistillate cones develop on a whorl of two to four near the base of second year growth and take two years to ripen. Flowering alternates between a big and small year for number produced. Trees produce cones at about five years and many young pines are loaded with cones in the Mile 37 muskeg.

This tree is common on Douglas Island in every muskeg I've explored, including those at the end of the road at Outer Point and the boggy "benches" along the Treadwell Ditch Trail and all the way up the Dan Moeller Trail as well as the cross country ski trail muskeg just below Eaglecrest. I have not found it on the Rainforest Trail. On the mainland, shore pine is not present in the urbanized areas and surroundings of Juneau except for Spaulding Meadows on the Auke Nu Trail above Auke Bay, where it is the dominant tree and in the typical muskeg stunted form. "Out-the-road" to the north the tree occurs in the few areas that have muskeg. There are scattered trees in the flats between Amalga Harbor and the Herbert River.

Shore pine is particularly susceptible to Western gall rust (*Endocronartium harknessii*).

Tsuga (Endlicher) Carrière 1855, hemlocks

t'sue-gah Japanese *tsuga*, name for native hemlocks of Japan.

The common name refers to a similarity between the odor of crushed needles and the leaves of poison hemlock (*Conium maculatum*). Hemlock are not poisonous.

Taxonomy: *Tsgua* was originally thought to be a *Pinus* (pine) by some and an *Abies* (spruce) by others. Stephan Friedrich Ladislaus Endlicher created a section within *Pinus* that he named *Tsuga,* borrowing the traditional Japanese word transliterated into English, in his *Synopsis Coniferarum* written in 1847. Élie Abel Carrière elevated it to genus in *Traité Général des Conifères* in 1855.

Tsuga heterophylla (Rafinesque) Sargent 1898, western hemlock, yán




heh-ter-AWE-fill-uh Greek έτερος *éteros*, other, different + φύλλο *fyllo*, leaf; for the alternating leaf length.

Synonyms:
Pinus canadensis Bongard 1832
Abies heterophylla Rafinesque 1832

Notes: This is *the* tree of the old growth forest. When large (>1 m dbh) trees dominate, the forest is old and mature and about 80% this species. Curiously, the Rainforest Trail on Douglas Island is definitely old growth, but the trees are not large. The large trees there are split almost evenly between Sitka spruce (*Picea sitchensis*) and hemlock while the smaller ones fit the 80:20 rule. I enjoy pointing out the overhead view from the stairs on the East Glacier Trail that the small trees are exclusively western hemlock, well suited to their growth in the shade with the flattened splay pattern of the branches to collect the limited light that filters through the canopy. While Sitka spruce (*Picea sitchensis*) is *the* tree of the Juneau area due to recent deglaciation, western hemlock is the most common forest tree of Alaska in areas where humus is abundant.

Wikipedia [http://en.wikipedia.org/wiki/Tsuga] explains "the common name hemlock is derived from a perceived similarity in the smell of the crushed foliage to that of the unrelated herb poison hemlock", something I have not been able to smell on my own.

Tsuga mertensiana (Bongard) Carrière 1867, mountain hemlock, yán or s'éxh

mur-ten-see-aye-nah Honorific for German botanist Franz Carl Mertens (1764-1831).

Mountain hemlock is aptly named as this is its home, be it at sea level or at high elevation in krummholz form. It is easily distinguished from western hemlock (*Tsuga heterophylla*) as the needles are nearly equal in size and arranged in a bottle brush form around the stems. Further, the leaves arise from a prominent woody peg and have stomata on both sides which leads to a thickened needle. The leaf arrangement is less efficient at gathering light in a shaded forest, so this species is far more common in more exposed areas, such as on ridges or light openings or steep slopes where the light is more readily available at lower levels in the forest. In Juneau, it is the common tree at treeline and extremely dominant on Mount Roberts where the trees are flagged, krummholzed and just plain gnarly, including one trunk that has been bent into a complete 360° circle! On Douglas Island they look more like careful bonsai creations in the upper reaches of the mountain valleys such as on the Dan Moeller Trail.

Family Cupressaceae Gray 1822 (nom. cons.) **cypress**

Callitropsis Oersted 1864

kal-ih-trop-sis Greek, resembling *Callitris*, cypress pine, of Australia and New Caledonia.

Callitropsis nootkatensis (D. Don) Oersted ex D.P. Little 2004, Alaska cedar, yellow cedar, Alaska yellow cedar, Nootka cypress, xáay or xháay.

newt-kah-ten-sis Of or pertaining to the area of Nootka Sound or Nootka Island on the west coast of Vancouver Island, the word coming from the name of the Nuu-chah-nulth, the indigenous people of the area.

<u>Taxonomy</u>: Take a deep breath if you dare to wander into the waters that follow!

Debreczy et al. tell us that this tree has a "tortuous nomenclatural history". The tree was described and given its first name, *Cupressus nootkatensis* by Scottish botanist David Don (1799-1841) in 1824 while the librarian at the Linnean Society of London. In 1841 French botanist Édouard Spach (1801-1879) at the Muséum national d'histoire naturelle, found the flat sprays of the leaves to be so much like *Chamaecyparis* that he moved it there and it became *Chamaecyparis nootkatensis* (D.Don) Spach. In 1864 Danish botanist Anders Sandoe Örsted studied the cone structure and considered the Nooka cypress to be distinct enough to move it into its own genus and named it *Callitropsis*. From a nomenclatural rules basis, Oersted (its common spelling outside of Denmark), described the genus and clearly intended that this species be in it, but he never wrote out the name as *Callitropsis nootkatensis* meaning it was not a valid name. Carl Rudolf Florin (1894-1965) intended to move the species into his new genus *Neocallitropsis* in 1944 and wrote out the name *Callitropsis nootkatensis* validating that name! All the technicalities of naming rules led to these new names largely being abandoned and the tree lived as *Chamaecyparis nootkatensis* until the 2000's.

Here the story becomes interesting from a natural history rather than nomenclatural view. In 1999 a totally new conifer was discovered in the remnants of a moist karst forest in northern Vietnam. Aljos Farjon (1946-) of the Royal Botanic Gardens, Kew and Vietnamese botanist Tiên Hiêp Nguyễn (1947-) placed it in a new genus as *Xanthocyparis vietnamensis* Farjon & H. T. Nguyễn. Farjon did a morphological study of 54 characters that convinced him that the new tree was sister to *Chamaecyparis nootkatensis* so it needed to be moved into the new genus as *Xanthocyparis nootkatensis* (D.Don) Farjon & D.K.Harder in 2002.

The nomenclatural problems rise again when Damon P. Little of The New York Botanical Garden, while doing a genetic and morphological analysis on the tree that confirmed Farjon's conclusions, pointed out the new name was invalid:

> ... based on the International Code of Botanical Nomenclature, this new genus name cannot stand. The genus *Callitropsis* Oersted (non *Callitropsis* sensu Compton 1922) with *Callitropsis nootkatensis* (D. Don) Oerst. was described in 1865 and has the priority over the recent name *Xanthocyparis*. Because *Xanthocyparis vietnamensis* and *Callitropsis nootkatensis* are sister taxa and appear to be relatively closely allied, Little (in Little et al. 2004, p. 1879) tranferred *X. vietnamensis* to the genus *Callitropsis* and made the following new combination: *Callitropsis vietnamensis* (Farjon & Hiep) D.P. Little.

Little, D.P., A.E. Schwarzbach, R.P. Adams & C. Hsieh. 2004. *The circumscription and phylogenetic relationships of* Callitropsis *and the newly described genus* Xanthocyparis *(Cupressaceae).* American Journal of Botany 91 (11): 1872–1881.

However well researched and properly published, this name was not well received on numerous levels. The genetic relationships indicated with this study would have the additional effect of removing all the North American cypress from the genus *Cupressus*. The International Plant Names Index includes this remark:

> D. P. Little made this new combination inadvertently; he listed "*Callitropsis nootkatensis* (D. Don in Lambert) Florin, Palaeontographica, Abt. B, Paläophytol. 85: 590. 1944." as an accepted name (given in Roman) and gave a full reference to the basionym (cited in italics). Regarding "ex" authorship, Little ascribed "*Callitropsis nootkatensis*" to Florin, whereas Florin ascribed it to Oersted.

It's status as of 2009 is summarized here where the authors give three alternatives but prefer the first.

> Based on recent DNA sequence comparisons, the distinctive Nootka Cypress can appropriately be treated in a monotypic *Callitropsis*, in a ditypic genus with the Vietnamese Yellow Cypress (originally published as *Xanthocyparis vietnamensis*), or in a larger generic clade with the New World *Cupressus*.

Debreczy, Z, K. Musial, R. Price & I. Rácz. 2009. *Relationships and nomenclatural status of the Nootka Cypress* (Callitropsis nootkatensis (*Cupressaceae*). Phytologia 91 (1).

R.R. Mill and A. Farjon (2006) formally requested the conservation of the name *Xanthocyparis* for consideration at the 2011 International Botanical Congress, but it never reached the nomenclature committee for consideration. Until acted upon by that body, the name *Callitropsis nootkatensis* is the only valid name.

James Eckenwalder states that leaf chemistry and DNA sequences show that Alaska Cedar belongs in *Cupressus*.

Eckenwalder, J.E. 2009. *Conifers of the World*. Timber Press, Portland, Oregon.

The 2012 Jepson Manual takes a somewhat radical view that changes the names even further. It retains Port Orford cedar as *Chamaecyparis lawsoniana* (A. Murray bis) Parlatore while recognizing *Callitropis nootkatensis* (D. Don) D.P. Little as the only currently valid name for Alaska cedar, but it moves all the Western cypress into *Hesperocyparis* Bartel & R.A.Price.

Adams, R.P., J.A. Bartel, & R.A. Price. 2009. *A new genus* Hesperocyparis *for the cypresses of the Western Hemisphere (Cupressaceae).* Phytologia 91 (1): 160–185.

Notes: However complex the story of this tree's name, it is very easy to identify as there are no similar trees in the Juneau area. The tree has an instantly recognizable cypress look with flattened sprays of tight awl-shaped leaved that droop in an elegant manner. Its green is distinct enough from the spruce and hemlock that its color is often what strikes the eye and helps find the tree. In the upper reaches of the muskeg valleys on Douglas Island this species is common, especially near the cabin on the Dan Moeller Trail. The trees here are smallish, most less than 15 m tall.

During Gastineau Guiding training sessions in 2009, I learned there is a single specimen on the East Glacier Trail, but wasn't told where it was in a bit of a tease by fellow guides to make me find it myself. Each hike on this trail I'd search for the tree but came up empty. In July I found a 1.5 dm long dry, brown spray on the second cabled trail cut. I looked around but did not see a tree. So I placed it on a shelf of the rock at my eye level to remind me to look for the tree near there. The frond remained there all summer! On September 28 I hiked the trail by myself (to take photos) and at the frond site I was determined to find it and I did, only five feet from the trail! The reason I missed it is, as the photo illustrates, the tree is just a sapling at only 1.5 m tall and is growing in a 1 m wide crevice on a rock ledge, not it's usual habitat. The responsibilities of leading a group and maintaining a pace "interfered" with my search on work hikes!

In July 2010 while leading an East Glacier Trail hike, we come upon three young adults carrying large packs of yellow cedar bark strips that obviously came from large and mature trees. I asked them where they found them and what they were planning to do with them. "Up Nugget Creek" was the most detailed location information they gave me and "for baskets" was the use. It made me wonder what the Forest Service would think about stripping so much bark from these trees. I have not yet explored Nugget Creek for these large trees.

I find this is an exceptionally beautiful tree with its flattened branches of leaves gracefully hanging down. In the main part of the range (we are near its northern limit) of this tree it can reach 50 m tall and 3.6 m in diameter, but being confined to nutrient deficient muskegs in this area, the trees are far smaller and more often small arborvitae-like trees or large shrubs about 5 m tall.

Flowering Plants

Taxonomy: The phylogenetic relationships of the flowering plants are slowly evolving and the old name *Angiospermae* Lindley 1830 has been used to describe a subkingdom, a phylum, a subphylum, a division, a subdivision, and a class leading to a very confused nomenclature. I'm following here the work of the Angiosperm Phylogeny Group (APG) with their 2009 classification called APG III which *does not rank* the divisions above order. It's tree is placed with the introduction to vascular plants. Synonyms include *Magnoliophyta* Cronquist, Takhtajan & W. Zimmerman, 1966, *Anthophyta* and *Spermatophyta* Britton & A. Brown 1913.

Primitive Angiosperms

This is a convenient grouping of basal angiosperms without being ranked.

Order Nymphaeales Dumortier 1829

The Nymphaeales are basal to the magnoliids, monocots and eudicots.

Family Nymphaeaceae Salisbury 1805**, water lilies**

Nuphar Smith 1809

new-far Medieval Latin *nuphar* or *nenuphar*, from Arabic *nīnūfar*, from Persian *nīlūfar*, from Sanskrit *nīlōtpala*, the name for the blue lotus flower.

Nuphar polysepala Engelmann 1865, yellow pond lily


poly-see-pah-luh Greek πολλοί, *polloi*, many + sepal, coined from Latin *petalum*, petal + *separatus*, separate, distinct.

Taxonomy: FNA notes "The taxonomy of the genus is problematic" and adds that "molecular studies of *Nuphar* currently in progress (D. J. Padgett, pers. comm.) have clearly shown the North American taxa to be distinct from the Eurasian *Nuphar lutea*..." If this is so, the far more common name of this plant, *Nuphar lutea* (Linnæus) J.E. Smith 1809 and all of its children, must be rejected including what I've always called this, *Nuphar lutea* (Linnæus) Smith subsp. *polysepala* (Endelmann) E. O. Beal 1956. This North American circumscription includes eight species with only *N. polysepala* in Alaska. If these intergrading species are considered part of a single species, the nomenclature becomes hopelessly complicated as they all must fall under "*Nuphar sagittifolia* (Walter) Pursh, the oldest name that has hitherto been applied only in a geographically restricted sense" where new combinations must be published to validate them.

Notes: Simply because I spend so little time in muskegs, my only regular observation of this plant is in the rather urban pond at the intersection of Mendenhall Loop Road and Mendenhall Mall Road where I spot the flower in May every year. It is abundant in the deep ponds on the muskeg trail just before Eaglecrest as well as the Dan Moeller and Point Bridget trails. With fewer deep ponds, it is far less frequent at Spaulding Meadows. Curiously, it is nearly absent from the beaver ponds in the Dredge Lakes area. Is this because the beaver find it too good to eat?

The flowers of this plant seem to always be alive with insects, here with some unidentified species of small fly, yet most sources indicate that our North American plants are predominantly beetle-pollinated.

> A comparison of pollinator spectra in the two Old World and three New World *Nuphar* species studied so far suggests that the relative contribution of flies, bees, and beetles to pollen transfer in any one population depends more on these insects' relative abundances ... and alternative food sources than on stamen length differences between Old World and New World pond-lilies.

Lippok, B., A.A. Gardine P.S. Williamson & S.S. Renner. 2000. *Pollination by flies, bees and beetles of* Nuphar ozarkana *and* N. advena *(Nymphaeaceae)*. American Journal of Botany. 87(6) 898-902.

Syrphid flies are apparently abundant here and a major pollinator of our coral root orchids (*Corallorhiza* sp.) and are probably what I'm seeing on these plants.

Monocots

Taxonomy: Traditionally known as the monocots or with the formal name Monocotyledonae (from the single cotyledon of the fruit) as one of the two great divisions of plants, current understanding of flowering plants is far more complex which the traditional taxonomy is inadequate to describe. Monocots are now viewed as the oldest—and unranked—monophyletic branch of the Mesangiospermae under Angiospermae with all the more advanced plants branching off from them, but below the Magnoliids and primitive angiosperms.

Class Liliopsida Batsch 1802

Order Alismatales Robert Brown ex Berchtold & J. Presl 1820

Family Araceae de Jussieu 1789 arum

Lysichiton Schott 1857

lie-see-kie-ton Greek λύσις, *lýsis* from *lýein*, to separate, a loosening, setting free, releasing, dissolution, dissolve + Greek χιτών, *khitōn*, a Greek tunic referring to the spathe enclosing the inflorescence that withers soon after flowering.

Lysichiton americanus Hultén & H. St. John 1931, skunk cabbage, x̱'áal'





uh-mer-ih-cane-uh Of or relating to the Americas.

The first flower of the season is predictable. With its ability to produce heat with some ectothermic chemical reactions it apparently has the ability to melt some of the snow around it to emerge at the time the *Pelecomalium testaceum* beetles are active and ready to eat the pollen and use the spadix as a mating site. Since there are no photosynthetic tissues out when the plant emerges, it has to use stored energy from the roots, and presumably the heat is produced when the plant is converting stored starch in the roots to sugar the cells can use. Since this involves some oxidation and that process usually produces heat, this must be the source of the heat. Is it because these plants are so large and grow so fast that the heat becomes manifest? And is it this process that drives off the musky odor that gives the plant its name? With such an interesting and obvious plant, I'm amazed to find little in the way of real research of this entire process, finding only one on the eastern skunk cabbage. I have to admit that I never once even put my hand down near an inflorescence to check if it was warm! This was featured on Botany Photo of the Day for February 9 and one of the posts asked about the heat and drew these two responses:

> With regards to the heat producing process of the Skunk cabbages. These are members of the aroide family which has a number of species that produce heat in and along the flower spathe. Since one of the most famous is *Monstera deliciosa* it seems unlikely that the intent is to melt snow as *Monstera* grows in the tropical jungles of Central America. Rather, the heat producing mechanism is entirely a part of the flowering process and its purpose is to provide a nice warm humid environment for the pollinating beetles to spend the night out of harms way and as well as the cold environment outside the flower. When day comes the beetles move out to the next flower. The female portion of the flower is the heat maker, hey, when you're hot you're hot and this signals receptivity for pollen. Since the male portions of the flower mature at a different rate than the females the process encourages cross pollination and very little or any self pollination occurs. The poor beetles are at the mercy of the females as alas most of us males beetle or not. Posted by: Bill Barnes at February 5, 2009 3:53 a.m.

> Thermogenesis in at least one aroid has been linked to snow melting. The very early spring flowering eastern skunk cabbage, *Symplocarpus foetidus* often emerges out of the ice. Thermogenesis in other aroids, as well as flowers such as Magnolia, is thought to play a role in scent volatilization, but this seems less likely the case in *S. foetidus*, were the creation of "heat islands" seems more important. Check out the article by Seymore and Blaylock in the Journal of Experimental Botany, 50(338), 1525-1532, (1999) [http://www.ubcbotanicalgarden.org/potd/2009/02/lysichiton_americanus_1.php]

The spadix is composed of perfect flowers with 4 tepals and stamens and an ovary with 2 locules and vary in color from green to yellow to nearly cream white. Only rarely did I find any insects at all on the inflorescences and never looked closely at any of them and I never really got a good whiff of anything disagreeable, just a musky scent. The yellow spathe is truly spectacular, arresting one's vision while driving or hiking! They wither within about a week as the flowers pollinate.

The fruits develop very slowly and the peduncle continues to grow, just like the leaves, throughout the season so the fruit can reach nearly 1 meter above the ground before it gets so heavy that it topples to the ground. The tightly arranged fruits (actually berries!) remain green for most of the summer, only turning to various shades of yellow, orange and red in late August. Curiously, by September it is almost impossible to find a fruit anywhere on the Rainforest Trail. I never saw anything eat these and have never seen a bear in this forest, so who eats them?

The leaves continue to grow through most of the summer and some reach nearly 2 m in length! They start to wither in mid-September. The bears use the roots as food when they emerge from their winter nap, but the indigenous people considered the plant a "famine food" [FNA vol. 22]. The Tlingít used the leaves for rain hats, medicines and as a wrapping for steaming fresh salmon in a fire pit, but did not eat the plant because of the oxalic acid [Kayanní p. 19].

Familly Tofieldiaceae Takhtajan 1994 **false-asphodel**

Taxonomy: see notes under Liliaceae.

Triantha (Nuttal) Baker 1879

try-ann-thuh Greek τρία *tria*, *tri-*, three, and Greek ανθώ *anthos*, flower, alluding to the flowers aggregated in threes.

Triantha occidentalis (S. Watson) R. R. Gates 1918 ssp. *brevistyla* (C.L. Hitchcock) Packer 1993, sticky false asphodel

ox-ih-den-tal-is Of or relating to the western world (opposite of oriental).

Taxonomy: I learned this at Crater Lake as a *Tofieldia*, and as such ours would be *To. glutinosa* (Michaux) Persoon var. *o.* (S. Watson) C. Linnæus Hitchcock. Since then it has been elevated to species and moved into a new genus. This has a long history with the first name as *Triantha* was in 1879. A 1991 study demonstrated cladistic support for the segregate genus. P&M (p. 103) take *To. g.* in the broad sense.

Notes: My expectations for this plant were far greater than the reality. In the bogs and creek side gardens at Crater Lake this plant would put on a real show of lovely white ball-headed stalks. Here this is an uncommon plant of the muskegs, yet it was one of the most abundant on the alpine slopes near Cordova. While the flowers are actually showy, this plant becomes more showy in fruit when the pea-sized red-purple capsules develop where each flower was. "Sticky" is indeed appropriate in that the entire plant is covered with glandular hairs.

Familly Zosteraceae Dumortier 1829**, eelgrass**

Phyllospadix Hooker 1838

fill-oh-spay-dix Greek φύλλο *fyllo*, leaf, and σπαδίκ *spadik-, spadix,* from *span*, to draw; botanically small flowers crowded on a thickened, fleshy axis.

Phyllospadix scouleri Hooker, 1838, Scouler's surf-grass

school-ur-eye Honorific for John Scouler, (1804-1871) botanist on the Hudson Bay Company's voyage to the Columbia River 1824–1825.

Potamogetonaceae Dumortier 1829 **pondweed**

Potamogeton Linnæus 1753

Latin poe-tah-MAWH-geh-ton, American poe-tah-moe-get on Greek ποταμός *potamos*, river + Greek γείτων *geiton*, neighbor.

Potamogeton natans Linnæus 1753, floating pondweed

nay-tans Latin *natare*, swim; float.

If you hear this scientific name pronounced po-tah-MOH-geh-tahn, you're either speaking with someone from Europe or who is classically trained in Latin. I've always heard it pronounced po-tahm-o-geh-tun. In warmer summers it can form huge colonies in the still waters of ponds, particularly in Dredge Lakes.

Order Liliales Perleb 1826

Family Melanthiaceae Batsch 1802 **bunchflower**

Taxonomy: see notes under Liliaceae.

Veratrum Linnæus 1753

ver-AYE-trum Classical Latin *veratrum* for the white hellebore.

Veratrum viride Aiton 1789 var. ***eschscholzianum*** (Roemer & Schultes) Breitung 1957, green false hellebore, green hellebore, white hellebore, Indian hellebore, Indian poke, corn lily, green corn lily, cornhusk lily, s'íksh

vah-RIH-dee Latin *viridis* fresh, green; blooming.esch-holz-ee-aye-num Honorific for Baltic German physician, botanist, zoologist and entomologist Johann Friedrich von Eschscholtz (1793-1831), naturalist aboard the Russian ship Rurik (Рюрик) under the command of Otto von Kotzebue during his exploration of the Pacific.

Taxonomy: It has been elevated to species rank as *V. eschscholzianum* A. Gray (as *eschscholtzii*) because the inflorescences commonly droop but have erect flowers and is distributed west of the 110th meridian (FNA vol. 26 p. 74).

Notes: I reject the name "false hellebore" as it is neither false nor a hellebore! Corn lily is a far more appropriate common name, and one I learned from the white-flowered species (*V. californicum*) of the Sierra Nevada while at Camp Whitsett as a Boy Scout in the 1960's. Abundant in the Juneau areas in many habitats from sea level to alpine, as long as they are moist to wet—something easy to find in a rain forest!—I find it on every trail but the Moraine Ecology. I first found it flowering on the lower reaches of the Perseverance Trail and it continues there all the way to the end. On the Mount Roberts Alpine Loop Trail there are several places where it forms a single species stand!

It seems hoary marmots find the emerging shoot tips edible, as quite a number have the top 1 or 2 cm nipped off along the Alpine Loop Trail. When the plant elongates, all the leaves are cut off and ragged, making a curious sight difficult to explain unless the nipped buds were seen early in the season.

P&M (p. 13) make a strong note on its toxicity: "one of the most violently poisonous plants on the Northwest Coast" and "for even to eat a small portion of it would result in loss of consciousness, followed by death". Heller (p. 2) notes it "contains several toxic alkaloids know to be fatal to sheep and other animals" and that "death results from asphyxia". FNA vol. 26 p. 72 includes these details:

> The medicinal/poisonous properties of *Veratrum* involve a complex of cerveratrum and jerveratrum alkaloids, some with proven hypotensive properties and others that are highly toxic to humans and livestock (S. M. Kupchan et al. 1961; A. Osol et al.1960; I. W. Southon and J. Buckingham 1989). Veraloid, a standard mixture of the most hypotensive *Veratrum* alkaloids, was widely prescribed until late in the nineteenth century, when emetic side effects greatly curtailed its use. The types and concentrations of alkaloids vary with the species, plant part, and season (C. A. Taylor 1956, 1956b).

Family Liliaceae A.L. de Jussieu 1789 **lillies**

Taxonomy: The traditional "lily" family has long been known to be problematical as being both artificial and polyphyletic. It has remained a *senso lato* family for some two centuries due to the cohesiveness of the 3-merous floral parts. However, early on, botanists questioned how close some of the members were. Until modern genetic tools began to untangle the mess, the broad circumscription seemed most conservative until the entire mess, not just parts of it, could be understood. It is remains unresolved, but the most widely accepted delineation of the group is found in this massive set of works:

Kubitzki, K., J.G. Rohwer, and V. Bittrich, eds. 1993. *The families and genera of vascular plants. II. Flowering plants - Dicotyledons - Magnoliid, Hamamelid and Caryophyllid families*. Springer, Berlin.
——, ed. 1998a. *The families and genera of vascular plants. III. Flowering plants - Monocotyledons - Lilianae (except Orchidaceae)*. Springer, Berlin.
——, ed. 1998b. *The families and genera of vascular plants. IV. Flowering plants - Monocotyledons - Alismatanae and Commelinanae (except Gramineae)*. Springer, Berlin.
——, ed. 2004. *The families and genera of vascular plants. VI. Flowering plants - Dicotyledons - Celastrales, Oxalidales, Rosales, Cornales, Ericales*. Springer, Berlin.
——, and C. Bayer, eds. 2003. *The families and genera of vascular plants. V. Flowering plants - Dicotyledons - Malvales, Capparales, and non-betalain Caryophyllales*. Springer, Berlin.
——, C. Bayer, and P.F. Stevens, eds. 2007. *The families and genera of vascular plants. IX. Flowering plants – Eudicots – Berberidopsidales, Buxales, Crossosomatales, Fabales p.p., Geraniales, Gunnerales, Myrtales p.p., Proteales, Saxifragales, Vitales, Zygophyllales, Clusiaceae alliance, Passifloraceae alliance, Dilleniaceae, Huaceae, Picramniaceae, Sabiaceae.* Springer, Berlin.
——. 2011. *The families and genera of vascular plants. X. Flowering plants – Eudicots – Sapindales, Cucurbitales, Myrtaceae*. Springer, Berlin.

This circumscription used by Weakley (2012, p.169) summarizes the changes where plants are distributed among five orders!

- Alismatales
  - Tofieldiaceae: *Harperocallis, Pleea, Tofieldia, Triantha*.
- Liliales
  - Alstroemeriaceae: *Alstroemeria*.
  - Colchicaceae: *Colchicum, Uvularia*.
  - Heloniadaceae: *Chamaelirium, Helonias*. (or to be included in Melanthiaceae)
  - Liliaceae: *Clintonia, Erythronium, Lilium, Medeola, Prosartes, Streptopus, Tulipa*.
  - Melanthiaceae: *Amianthium, Anticlea, Schoenocaulon, Stenanthium, Veratrum, Toxicoscordion, Zigadenus*.
  - Smilacaceae: *Smilax*.
  - Trilliaceae: *Trillium*. (or to be included in Melanthiaceae)
  - Xerophyllaceae: *Xerophyllum*. (or to be included in Melanthiaceae)
- Asparagales
  - Agavaceae: *Camassia, Manfreda, Schoenolirion, Yucca*. (or to be included in Asparagaceae)
  - Amaryllidaceae: *Allium, Crinum, Galanthus, Habranthus, Hymenocallis, Leucojum, Lycoris, Narcissus, Nothoscordum, Sternbergia, Tristagma, Zephyranthes*. [including Alliaceae]
  - Asparagaceae: *Asparagus*.
  - Hostaceae: *Hosta*. (or to be included in Asparagaceae)
  - Hyacinthaceae: *Hyacinthoides, Hyacinthus, Muscari, Ornithogalum*. (or to be included in Asparagaceae)
  - Hypoxidaceae: *Hypoxis*.
  - Iridaceae: *Alophia, Calydorea, Crocus, Crocosmia, Gladiolus, Herbertia, Iris, Nemastylis, Sisyrinchium*.
  - Orchidaceae: *Aplectrum, Arethusa, Bletilla, Calopogon, Cleistesiopsis, Coeloglossum, Corallorhiza, Cypripedium, Epidendrum, Epipactis, Galearis, Goodyera, Habenaria, Hexalectris, Isotria, Liparis, Listera, Malaxis, Platanthera, Pogonia, Ponthieva, Platythelys, Pteroglossaspis,*

Sacoila, Spiranthes, Tipularia, Triphora, Zeuxine.
Ruscaceae: *Convallaria, Liriope, Maianthemum, Nolina, Polygonatum*. (or to be included in Asparagaceae)
Themidaceae: *Dichelostemma*. (or to be included in Asparagaceae)
Xanthorrhoeaceae: *Hemerocallis*. (or to be split, and then in Hemerocallidaceae)
Dioscoreales
Burmanniaceae: *Apteria, Burmannia*.
Dioscoreaceae: *Dioscorea*.
Nartheciaceae: *Aletris, Lophiola, Narthecium*.
Pandanales
Stemonaceae: *Croomia*.

Fritillaria Linnæus1753

Fri-till-AIR-ee-ah. Latin *fritillus* dice-box, checkered; alluding to the markings on the tepals of many species.

Fritillaria camschatcensis (Linnæus) Ker Gawler 1809, chocolate lily, black lily, Indian rice, northern rice root, kóox

Latin Kahm-shat-ken-sis, American kahm-shat-sen-sis. Of or pertaining to the Kamchatka Peninsula in Russia.

While P&M (p. 110) uses the common name "chocolate" for *F. lanceolata* from Washington and British Columbia, nearly everyone here calls all our fritillary lilies "chocolate". It actually makes more sense, for this species has much more maroon in the tepals for the chocolate color. The rice root name is especially appropriate as the bulb is quite unique in that it has at least two series of "scales" that illustrate the bulb is actually a "stem" with "leaves". The golf ball to fist-sized cluster of the small bulbs look a great deal like a fist full of moist rice, and even have the starchy almost non-flavor that white rice has. Most find the sensation blah at best, but this was, and still is among some traditionalists, an important food for the Tlingít people.

A common plant of edges and meadows, one can't miss this in June on the Perseverance Trail, Sheep Creek Trail, Treadwell Mine Trail, and Dan Moeller Trail. I have not found one on either the East Glacier Trail or West Glacier Trail or the Rainforest Trail. They are common on the drier edges of most muskegs including Spaulding Meadows.

Streptopus Michaux 1803, twisted stalks , tleiñw kahínti

STREP-toe-puss. Greek στρέπτος *streptos*, twisted, + Greek πούς; *-pous* a foot, alluding to the bent or twisted peduncle.

Streptopus amplexifolius (Linnæus) de Candolle 1804, clasping twistedstalk, watermelon berry, tlei<u>k</u>w kahínti

am-plex-ih-foal-ee-us. Latin *amplexi-*, embrace, clasp, clasping + Greek φύλλο *fyllo*, leaf; for the clasping leaves.

<u>Taxonomy</u>: FNA (vol. 26 p. 146) notes "Several poorly defined races described by N. C. Fassett (1935) as varieties based chiefly on minute difference in leaf-margin serration are not here recognized" yet PLANTS recognizes four, including a hybrid as a proposed species. Tropicos lists five Fassett names as well as two others.

<u>Notes</u>: This is a nearly omnipresent plant in the rainforest. It seem not to have any strong ecological requirements not met nearly anywhere plants area common here, including above treeline on the Mount Roberts Trail. It is hard to find on the Moraine Ecology Trail, here the abundance of regular moisture is a problem for the plant. Abundant on the East Glacier Trail, I see it every day. On the Rainforest Trail it is far less numerous than the rosy twisted stalk. Does it do better in slightly disturbed areas?

Are the berries poisonous or edible? This is an unsettled question. Nearly all the guides call it "watermelon berry" and eat them with great delight—me too! When ripe, the berries strongly resemble grapes in size and color, but when picked at near perfect ripeness, the very thin skin nearly pops on picking. The pulp is very watery but quite pleasant to the taste on the front of the tongue. I tell my guests to eat them like a pomegranate berry. Really good ones give an immediate flush of flavor very much like a watermelon. Six-year-old Sophia Stage-Harvey and I enjoy them on all of our Shepherd of the Valley hikes and she's now an expert at spotting the species.

P&M note:

> Young shoots of clasping twisted stalk were eaten by some of the Alaska peoples, but this apparently was learned from the Europeans. Most aboriginal people regard the plants and berries as poisonous (p. 01).

The Native American Ethnobotany web p. [http://herb.umd.umich.edu/herb/search.pl] has 37 matches for the genus with these basic uses:

> Chewed roots taken to produce labor in case of protracted delay. Infusion of stems and berries taken "for sickness in general." Parts of plant used for spitting blood, gonorrhea, kidney trouble. Heller, Christine A. 1953 *Edible and Poisonous Plants of Alaska*. University of Alaska: berries used for food; young, tender shoots used in salads(p. 69).

The Kayaaní Commission ethnobotany field guide to selected plants found in Sitka, Alaska (2006) lists tleik̲w kahinti as watermelon berry for both species and notes:

> The berries of this plant are edible, but not used by Tlingít people traditionally, and were formerly believed to be poisonous. The leaves can be eaten as salad greens, and are tasty in the spring, and are now a favorite of the commissioners for salad. The leaves taste a bit like cucumber, hence one common name "wild cucumber." Medicinal uses: berries can be laxative, but were not used for this purpose. They are also know anecdotally as a hangover cure. (p. 1)

Streptopus lanceolatus (Aiton) Reveal 1993 var. ***curvipes*** (Vail) Reveal 1993, rosy twistedstalk, tleikw kahínti

lan-see-oh-lay-tus. Late Latin *lancea*, lance; long light spear.cur-vih-pees Latin *curvus*, curved, bent, arched + Latin *pes*, foot; for the strongly curved fruit stalk.

Taxonomy: from FNA (vol. 26 p. 146)

> *Streptopus lanceolatus* has replaced the long-used name *S. roseus*, based on the recent lectotypification (J.L. Reveal 1993d) of Aiton's *Uvularia lanceolata*. This widespread North American species has been divided into four intergrading varieties or races (N. C. Fassett 1935) based on variation in rhizome internode lengths and density of leaf-margin ciliation. These include var. *roseus* in the southern Appalachians, var. *longipes* in the western Great Lakes region, var. *lanceolatus* (= var. *perspectus* Fassett) in the northeast, and var. *curvipes* in the west.

Notes: Dan Hopson and I found hundreds of them on the Bishop Point Trail in June of 2010. They are abundant to the extreme on the Rainforest Trail on Douglas Island! It occurs along East Glacier Trail, but only scattered individuals and only then in the older parts of the forest. It is abundant in the flat valley of Sheep Creek where the large black cottonwood (*Populus trichocarpa*)s are found. Seeming to prefer older, well-established forests more than clasping twisted stalk and I now consider it an old-growth plant.

Is this common plant edible? Quite a number of our guides regularly eat them, but I think they are not distinguishing this plant from clasping twisted stalk that everyone here calls "watermelon berry" and eats with abandon. The fruit of this species remains bright red but has the same watery pulp and watermelon-like flavor when "popped on the tongue". I'm uneasy eating it in any quantity or sharing it with guests. I've let six-year old Sophia Stage-Harvey know *not* to eat this one and she's become an expert at distinguishing the two plants. P&M make no mention of any ethobotanical use. As the season progresses, I find myself eating them more often, with no apparent harm and a rather nice enjoyment. They seem just like clasping twisted stalk except red when ripe. Here is what *Poisonous Plants of North Carolina*, Dr. Alice B. Russell, Department of Horticultural Science says:

> Poisonous Part: Berries. Symptoms: Unknown cases, but suspected due to close relationship with known toxic plants. Toxic Principle: Possibly

cardiac glycosides. Severity: CAUSES ONLY LOW TOXICITY IF EATEN.Edibility: EDIBLE PARTS: Tender young shoots with leaves may be added to a salad. A few berries make a pleasant nibble. SOURCE: Angier, B. 1974. Field Guide to Edible Wild Plants. Stackpole Books, Harrisburg, Pa, 255 Peterson, L. 1978. A Field Guide to Edible Wild Plants. Houghton Mifflin Co., Boston, 330 [http://www.ces.ncsu.edu/depts/hort/consumer/poison/Strepsp.htm]

Family Orchidaceae A.L de Jussieu 1789 **orchids**

Taxonomy: see notes under Liliaceae.

Notes: All orchids produce minute seeds, sometimes in the millions, that lack endosperm. Endosperm is the stored food in the cotyledon for the emerging plant providing the initial energy for growth before photosynthesis can occur. It is the big part of a peanut or lima bean that normally becomes cotyledonary leaves. Lacking this stored energy, orchid seeds must land in a place where the proper species of fungi is present in the soil to develop a mycotrophic relationship in order to sprout and grow.

Corallorhiza Gagnebin 1755, coralroot

co-ral-oh-rye-zah. Greek κοράλλιον *korallion*, coral + Greek ῥίζα *rhiza*, a root; for the coral-like appearance of the roots.

Taxonomy: The orthographic variant *Coralorhiza* is commonly found as this is the proper form for the Latinized name. The double *l* orthography of Gagnebin was conserved by the International Botanical Congress making the single *l* invalid.

Notes: All *Corallorhiza* except *C. trifida* are confined to the New World and lack chlorophyll. All species are mycotrophic, dependent upon fungi for nutrition. Weakley (2012 p. 178) notes "The mycotrophic nature of *Corallorhiza* is well established, but the exact means of the transfer of nutrients from the fungal hyphae to the orchid is not yet understood." Some references indicate the fungus is in the Russulaceae, a family with many representatives here.

All *Corallorhiza* have a system of rhizomes that branch with nodules that resemble ocean coral which gives them their common name. The fungal relationship takes place in these nodules. The literature seems confused in its use where "mycotroph" means mutualism and "mycoheterotrophy" means parasitism in regard to these two symbiotic relationships. It seems an assumption that most plants that utilize fungi for nutrition do it in a mutualistic manner. I've no idea how this is determined! Since all but *C. trifida* cannot provide food for itself or a host, I'm assuming it is a one-way, and hence parasitic, relationship on logic—however misguided—alone.

Corallorhiza mertensiana Bongard 1832, western coralroot, Pacific coralroot, Mertens' coralroot

mer-ten-see-aye-nah. Honorific for German botanist Franz Carl Mertens (1764-1831). While this is the explanation in several sources checked, I'm wondering if it isn't actually for F.C. Mertens' son, Karl Heinrich Mertens (1796-1830) who was naturalist aboard the Senyavin under Captain Lieutenant Fedor Petrovich Litke who explored the North Pacific coasts of Asia and America collecting thousands of specimens.

Taxonomy: FNA (vol. 26 p. 638)notes "In the Pacific Northwest *Corallorhiza mertensiana* is largely sympatric (occur in the same geography where contact with the species happens) with *C. maculata* and occasionally intergrades with it. It frequently forms large clumps." This explains why I first called it *C.m.*!

Notes: Wife Annette first found and photographed this plant in 2007 along the Auke Village Recreation Area trail and she's found it there each season since, and as this photo shows, it is in a large clump. The leaves are all from *Maianthemum dilatatum*, not from the orchid as its leaves are reduced to blackish scales on the stems. I find it there every summer. On June 22, 2012, I found another patch in the large spruce woods on the trail out to Point Louisa.

Corallorhiza trifida Châtelain 1760, yellow coralroot, early coralroot, pale coralroot

TRIH-fid-uh. Latin *trifidus*, divided to form three prongs.

I first spotted a mysterious orchid fruit (photo on right) on the East Glacier Trail on July 27, 2007 which had to go unidentified for two years! Then while leading a hike on the East Glacier Trail in 2009, I spotted what I recognized as a single coralroot orchid stem growing out of a thick moss patch just two feet from the side of the trail about 50 yards up from the Devil's Club stream and bridge. I knew it was not *C. maculata*, but I did not have a camera with me and had to make notes to identify the plant using Hultén when I got home—not included in P&M, it required the big gun! With only two coralroots here, it was easy to determine the species as the few flowers have very short pedicels, are very small (8 mm vs. 20 of spotted coralroot) and the whole plant is tawny yellow in color. This species is far more widespread than *C. maculata* and is truly circumboreal according to Hultén's map (p. 29). FNA (vol. 26 p. 636) has this amazing note: "*Corallorhiza trifida* is largely autogamous [self-fertilizing], although a syrphid fly (*Syrphus cinctellus*) was reported as a pollinator by F. Silen (1906)."

My notes for 2010 call it "the year" for the number of flowering plants found of this special plant, but this spring eclipses last year by a large amount. I'm seeing this plant on almost every hike I take in the Mendenhall Glacier Recreation Area. I find this large patch of stems where the dike approach meets the Trail of Time just before the lower Steep Creek bridge. It is the biggest patch of this plant I've ever seen.

The spring of 2011 proved to be "the year" for the yellow coralroot as I found in many times on the Moraine Ecology Trail as well as the East Glacier Trail. Walking the ME as often as I do, it was fun to watch the plants progress through their phenophases. The plant at the junction I protected with a rock aborted the top bud that withered, visible in my photographs. Also visible is evidence that the flowers—unlike most orchids—are non-resupinate, that is, not twisted in the stalk. When told the plant has no leaves, I must disagree as there is a single sheathing leaf that clings to the stalk arising from the underground parts of the plant. There is just a hint of green on some of the plants, but most are almost pure tawny yellow. Is the green from some small amount of chlorophyll? This plant is widely considered to by an obligate mycoheterotroph (it must have a fungus associate to be able to obtain nutrition from plants around it).

It seems Annette and I have become experts at spotting this diminutive plant as each year we continue to find more and more of them! I can no longer call any year "the" year as of 2014 this is a species I *expect* to see, often in large groups such as I found in 2012.

This plant is mostly mycotrophic, rootless (the underground parts are rhizomes and technically stems) and leafless which makes it very interesting. Lacking roots and leaves and with a very short—but present—supply of chlorophyll in the stem and single sheathing bract of the stem, the plant has to get most of its carbon, water, or nutrient supply through a symbiotic association with fungi.

The Flora of North America notes "*Corallorhiza trifida* is largely autogamous, although a syrphid fly (*Syrphus cinctellus*) was reported as a pollinator by F. Silen (1906)". On June 9, 2012, I lay on my belly to photograph these flowers and by happenstance come to find a number of different insects climbing upon the flowers. I ran into Bob Armstrong the day before and we chatted about the eruption of these flowers and he told me he observed "swarms" of insects on them. That's close to what I find today and some are visible in these photographs. Here are six things I observed on these flowers today:

Meliscaeva cinctella (Zetterstedt, 1843). 1 cm long, abdomen ring-striped; clear wings that lie flat. Thorax awl-shaped and black. The rear legs clasp the lip of the flower with the entire head inside the flower. With the help of BugGuide, I'm able to determine this is the hoverfly that FNA mentions where the photos match my flies exactly. *Syrphus cinctellus* Zetterstedt in Coe (1953) is a synonym.

Unidentified fly. 0.5 cm long, wings 2 × thorax; head and thorax the same size, both black; long segmented antennae about half the size of the wings. The fly is very actively working the flowers.

Unidentified fly. 2 mm long, so it must be a midge or no-seeum. This one crawls inside the flower at the column.

Unidentified Beetle. 1 cm long, cylindrical, mostly composed of abdomen with a small head. Antennae are spreading and obvious, about 3 mm long. Proboscis long, about 4 mm. Overall color black and wings very dark. Walks on outside of the flowers and I see none on the stem.

Unidentified Beetle. Copper-colored; large thorax carapace with very small head in proportion to it; 0.5 mm antennae. Mostly on the stem.

Unidentified spider. 0.5 mm long and very dark; so small I can't see any detail and have no magnification with me today.

The flowers are at peak form today, fully formed and open. The lips are all spotted with lovely maroon to pink dots, most of which are round but definitely not uniform in shape or size. The petals are mostly yellow but with areas of clear white as well. The column is the same greenish-yellow as the stem. The pollinia (masses of pollen grains that stick together) are cream colored and in place on about half the flowers and missing on the other half, so these insects may well have collected some and carried them away or eaten them.

The ovaries of all the lower flowers (the first opened) are well-expanded and appear to be developing into fruits. By probable coincidence, these are the flowers most likely to have lost their pollinia. The conclusion that they have been pollinated by these insects seems logical, but based upon the FNA account that the plant is autogamous, self-fertilized, may be in error and confirmation by experiment would be in order to determine.

My observations lead me to think that, since the flowers are visited by many species of insect, there has to be the possibility at least that the plant is pollinated by them. Since the reference to the Syrphid is from 1906, I'm wondering if many people have closely examined this flower and its visitors?

Dactylorhiza Necker ex Nevski 1937

dak-till-oh-ri-za. Greek δάχτυλο *dactylo*, finger + Greek ῥίζα *rhiza*, a root, in reference to the fingerlike tuberoids of the more primitive species.

Dactylorhiza viridis (Linnæus) R.M. Bateman, A.M. Pridgeon & M.W. Chase 1997, frog orchid

vih-RIH-dis Latin *viridis* fresh, green; blooming.

Taxonomy: Many synonyms exist, below is a list from FNA [vol. 26 p. 580 and line drawing] followed by their comment on DNA studies yet retaining the species within *Coeloglossum*, seemingly in contradiction to the evidence. Since it is "strongly supported" in *Dactylorhiza*, I'm going with that name. Infraspecific distinctions appear weak and require detailed work to sort out the circumpolar variation. Hultén includes two forms, one as a quadrinomial: *C.v.* (Linnæus) Hartm. ssp. *viride* var. *islandicum* (Lindley) Schulze!

Satyrium viride Linnæus, 1753; *Coeloglossum viride* (Linnæus) Hartman, 1820; *Coeloglossum viride* ssp. *bracteatum* (Muhlenberg) Hultén; *C. viride* var. *islandicum* (Lindley) M. Schulze; *C. viride* var. *virescens* (Muhlenberg) Luer; *Dactylorhiza viridis* (Linnæus) R. M. Bateman, Pridgeon &

M. W. Chase; *Habenaria bracteata* (Muhlenberg) R. Brown; *H. viridis* (Linnæus) R. Brown; *H. viridis* ssp. *bracteata* (Muhlenberg) Clausen; *H. viridis* var. *bracteata* (Muhlenberg) A. Gray; *H. viridis* var. *interjecta* Fernald

Recent molecular studies, in which nuclear ribosomal DNA internal transcribed spacer (ITS) sequences were analyzed, showed that within the palmate-tuber clade *Coeloglossum* is embedded within a strongly supported, monophyletic *Dactylorhiza* (A. M. Pridgeon et al. 1997); subsequently the monotypic *Coeloglossum* was formally transferred to Dactylorhiza (R. M. Bateman et al. 1997). The latter authors note that although *Coeloglossum* differs from *Dactylorhiza* in many morphologic characters, relatively little molecular divergence has occurred. In this treatment we continue to recognize them as separate but closely related genera.

Notes: While on the Juneau Audubon Mount Roberts hike with Bob Armstrong, he points out this amazing flower well up on the way toward Goldmine Ridge in a patch of diminutive green plants is a bit of a soggy spot. Had he not pointed the plant out, I'm sure I would have sailed right by it. The top of the plant is rather malformed and appears to have been browsed off in the bud by some mammal (marmot?). Entirely green, the flowers are small, about 5 mm long with many perianth and associated bract parts seemingly arranged in a vertical mess forming something of a hood over the column. P&M (p. 22) make note of an inflated spur and lip with three lobes, but these are not distinguishable in today's plant. The leaves are quite fleshy and remind me a good bit of round-leaved orchid.

Goodyera R. Brown 1813

GOOD-yur-ah. Honorific for British botanist John Goodyer, 1592-1664.

Goodyera oblongifolia Rafinesque 1833, rattlesnake plantain

ob-long-gi-foal-ee-ah. Oblong, a narrow leaf with roughly parallel leaves + Latin *folia*, leaf.

Taxonomy: FNA vol. 26 p. 515 makes the following note on venation patterns:

Plants with leaves white-reticulate on the lateral veins have been described as *Goodyera oblongifolia* var. *reticulata.* This segregate, essentially coastal in distribution, occurs from northern California to southeastern Alaska and is less frequent inland from British Columbia to New Mexico and in Michigan and Wisconsin. Because garden transplant experiments (J. A. Calder and R. Linnæus Taylor 1968, vol. 1) have shown that both reticulate and non-reticulate leaves are found within the same clone, varieties are not recognized.

Notes: Abundant on the rich humus of the bench just above the seashore on the Rainforest Trail on Douglas Island and scattered in rich soil on the East Glacier Trail, this easily spotted orchid pleases they eye with it's gorgeous leaf vein pattern even when not in flower. On the Rainforest Trail, the plants budded out in early June but remained that way until the end of July! The flowers only lasted about a week before withering and the capsule began swelling with flowering. On East Glacier, many rosettes did not produce flowers. We are at the far northwest of its range and on Douglas Island I find the reticulate and non-reticulate leaves growing right next to each other with the latter being far more common.

Listera Robert Brown 1813

LIH-stir-ah. Honorific for English physician and naturalist Martin Lister (1638-1711).

Listera caurina Piper 1898, northwestern twayblade

caw-righ-nah. Late Latin *caurinus*, of, belonging to the northwest wind.

I nearly always find both species of twayblade together as this photograph from the Tolch Rock Trail illustrates where *L. cordata* is on the left and *L. caurina* is on the right. The leaves of these two are very similar (both have clasping bases) and take quite a few observations to be able to quickly discern the difference when not in flower. *L. caurina* has egg-shaped leaves that are twice as long as broad wit nearly parallel sides, and a pale green. The flowers are very different with this species being greenish yellow to yellow with a very broadly expanded lip. The lip is usually more yellow then the other flower parts. There are horns at the base of the lip, but they are a tiny 0.5 mm and not at all obvious. The capsules ripen a bit earlier and are larger than *L. cordata*.

There are hundreds of both species in the mossy flat forest on the West Glacier Trail and scattered about on the Rainforest Trail.

Listera cordata (Linnæus) Robert Brown 1813, heart-leaved twayblade

kor-dah-tah. Medieval Latin word *cor*, heart; mind, soul; hence cordate, heart-shaped.

Taxonomy: Two varieties have been named and the FNA key attempts to separate them:

1 Leaf blades 0.7–2 cm wide; lip 3–4 mm; flowers yellow-green, green, or reddish purple. 2a var. cordata+ Leaf blades 1.8–3.8 cm wide; lip 5–6 mm; flowers green to yellow-green. 2b var. nephrophylla

Listera cordata (Linnæus) Robert Brown 1813 var. ***cordata***, heart-leaved twayblade

Listera cordata (Linnæus) Robert Brown 1813 var. ***nephrophylla*** (Rydberg) Hultén 1937, Western heart-leaved twayblade

Greek νεφρός *nephros*, kidney + φύλλο *fyllo*, leaf; hence kidney-leaved, curious as nothing about the shape of the leaf resembles a kidney!

The two varieties are barely distinct enough to deserve names as the species is highly variable and our plants are intermediate between the two and grow side by side in many places.

Notes: The leaves are only loosely heart-shaped in that the base is truncate, not cordate, on most of our plants. They are just a bit longer than broad and a deeper green than *L. caurina.* The flowers really separate the species with a lip divided into two segments and two horns at the base that with the column make the shape of a man. The capsule develops very early, long before the flower has been pollinated and is well-formed when the perianth withers. Where I find this species, I usually find the other. There are at least a dozen plants on the East Glacier Trail in the old cut flume between the cable crossing and the scenic overlook trail in rich mossy soil where I have not found *L. caurina*.

Platanthera Richard, 1817 rein-orchids, bog orchids

plah-TAN-thur-ah. Greek πλατύς *platus*, flat; spread out 'flat'; broad + Greek ἀνθηρός, *antheros*, a flower; for the broad anthers.

Many well-used older floras include this in a broadly circumscribed *Habenaria* Willdenow 1805.

Platanthera dilatata (Pursh) Lindley 1833 ex L.C. Beck var. ***albiflora*** (Chamisso) Ledebour 1853, white bog-orchid, bog candles

dill-ah-tay-tah. Latin *dilatatus*, dilated; widened out. Latin al-BIH-fluhr-uh; American al-bih-FLOOR-uh Latin *albus*, white, pale, fair + Latin *Flora*, goddess of flowers.

Taxonomy: The three varieties in the flora are separated by variations in the spur, with this one being "shorter than lip, clavate to slightly capitate".

Notes: This gorgeous orchid is abundant in every open muskeg as well as in the weeps above the ditch on Glacier Highway that I enjoy on my bike rides from the Valley into town. While a regular on the West Glacier Trail, one must keep an eye open to find it. I've never found it on the East Glacier Trail. It is abundant in the northwestern pond area end of the Moraine Ecology Trail. I spotted it once with only one plant on the Nugget Falls beach trail. The local name, bog candles, is particularly delightful as they do appear as if someone placed a multitude of white candles out in the bogs!

Most of my sources make note of the scent, and FNA (vol. 26 p. 556) makes this note: "An intense clove scent distinguishes *Platanthera dilatata* from related species across most of its range, but in the far northwest a more complex blend of spicy fragrances predominates." I have yet to enjoy such a smell from these flowers! I first learned this species at Crater Lake and do not remember any scent among those flowers either. Is this yet another example of the peculiarity of my olfactory system (like yellow trillium and Florida anise)? I finally enjoy a faint spicy aroma on the

Moraine Ecology Trail when I hold a recently broken flower stalk to my nose. It is subtle, but spicy and very pleasant.

Platanthera stricta Lindley 1835 slender bog-orchid

strik-tah. Latin *strictus*, tight, close, strait.

This is the common green bog orchid, with the flowers arranged in a tight spike, giving it the common name. It is far less common than white bog orchid, but still found in nearly every muskeg I explored. It is nearly absent from the roadside slopes along Glacier Highway. When examined closely, the spur is inflated or saccate (or as FNA says, scrotiform!). I'm amazed to learn from FNA that this species is apparently very closely related to, and has been confused with, *P. gracilis*, a plant of southeastern North America including my back yard in Marietta, Georgia! I don't find them all the similar at all.

Order Asparagales Bromhead, 1838

Family Iridaceae A.L. de Jussieu 1789 **iris**

Taxonomy: see notes under Liliaceae.

Iris Linnæus 1753

EYE-riss. Greek ιρις *iris*, rainbow.

Iris setosa Pallas ex Link 1820, wild flag, beachhead iris

see-TOE-sah. Latin *seta*, hair; for the many-colored corolla hairs.

Taxonomy: This east Asian and North Pacific species needs critical work to determine if any of the subspecific names are valid. "*Iris setosa* was originally described from Siberia; whether our populations are an extension from or were formerly continuous with the Asian ones is not known. Two varieties from Japan, var. *hondoensis* Honda and var. *nasuensis* Hara, with 2n = 54 may be triploids." [FNA vol. 26 p. 380]. FNA doesn't even mention the Hultén name ssp. *interior* (Anders) Hultén which is barely separable from the species.

Notes: This is a common seaside flower that looks just as gorgeous as any garden iris. The flowers are large, with petals ~2 cm long, rich purple-blue and larger sepals (up to ~ 1.5 x 5 cm) with yellow and white bases and dark purple lines radiating from the base. The leaves are stiff and wide, some ~2 cm, and in a clump of a dozen to several dozen. It is a joy to walk along the beach section of the Rainforest Trail in mid-summer and find this beauty in amongst the much taller beach grass. This patch produced capsules that were filled to the brim with seeds. It produces an amazing show in the shallow pond between Glacier Highway and the Eagle Beach picnic area road.

Ruscaceae M. Roemer 1840 **ruscus**

Taxonomy: see notes under Liliaceae.

Maianthemum F.H. Wiggers 1780

my-ANN-theh-mum. Latin *Maius*, May + Greek ἄνθος *anthos*, a flower; hence, Mayflower as many flower in May.

Maianthemum dilatatum (Alphonso Wood) A. Nelson & J.F. Macbride 1916, false lily-of-the-valley, two-leaved Solomon's seal, May-lily, deer heartleaf, snakeberry

dill-uh-TAY-tum. Latin *dilatatus*, dilated; widened out.

With my general policy of rejecting any name with "false" in it, I find that I can neither use "May" for this flower either as I never find it in flower then! If this were the reason for giving a name, in should be "June flower" here. This plant hardly resembles the Solomon's seal (*Polygonatum biflorum*). "Snakeberry" is a strange name that I've never heard used for *any* plant. That appellation has been given to several species including: *Solanum dulcamara* (not in Alaska), some *Waldsteinia* (barren strawberries) with large red fruits, but most commonly *Actaea rubra*. The name apparently comes from a plant with red, poisonous fruits:

> In general, "snake" indicates a plant supposed to be poisonous, or one which exerts a malign influence, yet sometimes it is applied to a plant that is thought to act as an antidote to the venom of snakes. A botanist from St. Stephen, N. B., writes: "Almost any unfamiliar berry is or may be snake-berry, and all snake-berries are poisonous; so a boy dares not eat a berry till some one tells him that it is good. Hence, though no two agree as touching the identity of the snake-berry, the name is very common."

Bergen, F.D. 1892. *Popular American Plant Names*. Botanical Gazette, 17(11), 363-380.

In Ms. Bergen's six treatises on this subject, she doesn't include "snakeberry" for *any* plant! That leaves me with the name Jessica Smith uses, deer heartleaf. It is common—nearly omnipresent—in shady woods, but particularly abundant in old growth forest when near the ocean, such as on the Rainforest Trail on Douglas Island and at along the wooded trail at Auke Village Recreation Area (Auke Rec), Amalga Salt Chuck and along the Bishop Point Trail. The flowers last just a short time, not much more than a week. The berries develop slowly but become full-sized (like a small grape) fairly quickly. They stay a greenish-tan with red spots for more than a month before ripening into a red berry in the fall. Yet this photo was taken on September 29 and it's still spotted. Just how long does it take for them to ripen? The world-wide range is from northern Japan through the Kamchatka Peninsula across coastal Alaska down to northern California.

For liliaceous plants, and even the rest of this genus with the exception of *M. canadense*, these are unusual as being 2-merous, flowers with parts in two's or multiples of two. The two sepals and two petals are petaloid tepals looking identical. The stamens are arranged in two whorls of two each (but this is very difficult to see). The stigmas are two-lobed.

Are they edible? Good question. Hultén notes (p. 11) that the plant "contains glycosides (derivatives of sugars), active on the heart" that doesn't sound like this would be good, at least in quantity. P&M (p. 03) note that the berries were "formerly eaten" but "seldom highly regarded as food". Native American Ethnobotany has numerous accounts of "occasionally eaten".

Order Poales Small 1903

Family Juncaceae A.L. de Jussieu **1789 rushes**

Luzula de Candolle 1804, woodrushes

LUZ-you-lah. Possibly from Italian *lucciola*, to shine, sparkle, or Latin *gramen luzulae* or *luxulae*, diminutive of *lux*, light, because hairs of several species have shiny appearance when covered with dew.

Luzula multiflora (Ehrhart) Lejeune 1811 subsp. *kobayasii* (Satake) Hultén 1968, common woodrush

mull-tih-floor-uh. Latin *multus*, many + Latin *Flora*, goddess of flowers. co-buy-ah-see-eye Honorific for Japanese biologist M.J. Kobayashi.

Taxonomy: This species represents a real taxonomic mess with at least 65 names being applied, including this quadrinomial that PLANTS recognizes: *L. m.* (Ehrh.) Lej. ssp. *m.* var. *kobayasii* (Satake) Sam.! Until someone tackles this mess, it really seems prudent to take only the major subspecific populations and give them names as FNA does.

Notes: A common edge plant of many habitats, in late May and early June the flowers of this rush make a near showy appearance. The flowers are in a dense head with their parts very difficult to see except for the showy yellow 2 mm long stamens held out on longer filaments. Their drooping habit makes them all the more endearing. The leaves of this rush are rather wide, ~5 mm and the plant is a tall 0.5 m.

Cyperaceae A.L. de Jussieu 1789 **sedges**

Carex Linnæus 1754, sedges

CARE-ex. Latin *carex*, name for reed-grass; sedges; rushes.

Carex canescens Linnæus 1753, silvery sedge, gray sedge, hoary sedge

cane-ess-sens. Latin *canescere*, become covered in white, whiten; grow old.

Taxonomy: TROPICOS lists 45 sub-specific names for this taxon! FNA only recognizes the species and one subspecies. It is a widely circumpolar distribution with many local forms and a species in need of much more work to sort out the populations.

Notes: This may be the most common plant of the drier parts of the muskeg community and one that is especially obvious in the fall when the green leaves turn a brilliant gold that starts from the tip of the leaf and works its way in. As the tip dies, it becomes more straw colored yet there will often be a bit of living green tissue at the base. While the leaves only live for one year, they are marcescent are remain attached to the plant well into the next year as new greenery erupts from the halo of dry leaves at the outer base. It forms clumps that seem to develop a bit more soil, or at least something of a raised drier spot than the surrounding muskeg. The plants I encounter here usually have a single head of flowers

Carex pauciflora Lightfoot 1777, few-flowered sedge

paw-sih-floor-uh. Latin *paucus*, little, small in quantity, few + Latin *Flora*, goddess of flowers.

This is one of the few sedges that I can recognize on sight! This is made easy by the small number of flowers and thus fruits that develop. The strongly spreading or reflexed perigynia become a light tan to nearly white color and stand out well from the muskeg base so they are very easy to spot as well. The short (~ 30 cm) leaves and stems are quite thin and rather stiff. "*Carex pauciflora* has a catapult dispersal mechanism" [FNA vol. 23 p. 560]. They are most common in areas of the muskeg with lots of *Sphagnum*.

Carex viridula Michaux 1803, green sedge

vihr-id-you-lah. Latin *viridis* fresh, green; blooming.

Eriophorum Linnæus 1754 cotton grass

air-ee-AWE-for-um. Greek ἐριο *erio*, wool or cotton, + Greek φορος *phoros*, bearing.

Eriophorum chamissonis C.A. von Meyer 1829, cotton-grass, Chamisso's cotton-grass, sháchk kax'wáal'i

sham-ih-so-nis. Honorific for German poet and botanist Adelbert von Chamisso (1781-1838) botanist on the Russian ship Rurik under Otto von Kotzebue's world voyage including the Bering Sea and Alaskan coast.

Taxonomy: FNA (vol. 23 p.25) makes this note: "The *Eriophorum chamissonis* complex contains taxa based mainly on stem size and bristle color (M. Raymond 1954). Much of the variation appears to be continuous with abundant intermediates; experimental studies are needed to determine the biological basis of the variation." I only find three subspecific names in Tropicos and PLANTS elevates one to full species that FNA maintains in this species.

Notes: It takes a careful look to distinguish the cotton grasses. This species has well-developed rhizomes that lead to extensive beds, but the other species can appear this way as well. This species has basal leaves that are less than 2 mm wide and fruits that have a tan to cinnamon color, at least on the base of the bristles. I've found this can wash out with abundant sunlight (as we had this summer) and not be visible from eye height while walking or driving. Strictly a wetland plant, these are found in muskegs and perched ponds above the Mendenhall River.

Eriophorum angustifolium Honckeny1782 ssp. ***angustifolium***, tall cotton-grass, sháchk kax'wáal'i

an-gus-tih-foe-lee-um. Latin *angustum*, small, confined, narrow space; hence narrow + Latin *folia*, leaf for the narrow leaves.

This is the most common cottongrass in our muskegs and forms large stands in the meadows of the Dan Moeller Trail area that become quite showy when the bristles develop in mid-summer. This photo shows that the character of extensive beds must be used carefully as I'd sure call this an extensive bed, but there is no color to the bristles or their bases and there are leaves along the stems which confirms this species. There is a stand of this in the perched pond just past the Mendenhall River bridge on Back Loop Road.

Family Poaceae (R. Brown) Barnhart 1895 **or Graminae** A.L. de Jussieu 1789 **grasses**

Agrostis Linnæus 1753

uh-GRAW-stiss. Greek word agrostis, ἄγρωστις a grass.

Agrostis scabra Willdenow 1797, hair bentgrass

SCAY-bra. Latin scaber, rough, scabrous from disease, scabby; hence rough to the touch; covered with scales or scurfy.

This low, tufted grass is widespread in North America and all but the northernmost parts of Alaska. It has thin stems and a very open inflorescence that is usually a diffuse purple in color and easily spotted at a distance. The tuft includes the long flower-bearing stalks as well as far shorter leaves.

Calamagrostis Adanson 1763

cal-uh-ma-GRAW-stiss. Greek κάλαμος *kalamos*, a reed, the plant or its stem, or that of a similar plant + Greek word agrostis, ἄγρωστις a grass.

Calamagrostis canadensis (Michaux) P. de Beauvois 1812 var. ***langsdorffii*** (Link) Hultén 1942, bluejoint

can-uh-DEN-sis. Of or pertaining to Canada. Honorific for Prussian aristocrat, politician and naturalist Georg Heinrich von Langsdorff (1774-1852).

This is the tall (~ 1+ m), tufted grass with the often nodding pink panicle that is common on the shorelines of Mendenhall Lake and the gravel-edged beaver ponds. The stamens are quite large (~4 mm), white and often almost showy as they are clearly visible in the photograph. The leaves are flat and a bit floppy and glabrous.

Deschampsia P. de Beauvois 1812

des-CAMP-see-uh. Honorific for French naturalist Louis Deschamps (1765-1842).

Deschampsia beringensis Hultén 1927, tufted hairgrass

bear-ing-en-sis. Of or pertaining to the Bering Sea.

This densely tufted low gras is extremely hardy, able to withstand the worst of Alaska's weather and environments. Here it is thriving on the rocky beach at Point Louisa just barely above high tide line where it is blasted regularly with salt spray and frequently inundated with very high tides or storm waves. In more favorable environments, Hultén (p. 114) indicates it can grow to 1 m!

Leymus Hochstetter 1848.

LAY-mus. Greek ἔλυμος *elumos*, a grass but with the first two letters reversed from *Elymus*.

Leymus mollis (von Trinius) Pilger 1947 ssp. ***mollis***, dunegrass, beachgrass, dune wild rye

MOLL-is. Late Latin *mollis*, soft; flexible; tender, gentle; smooth.

Taxonomy: Carved out of *Elymus* with the Grass Manual on the Web [http://herbarium.usu.edu/webmanual/], Hultén (continuing to use quadrinomials!) treats it as *Elymus arenarius* Linnæus ssp. *mollis* (Trin.) Hultén var. *mollis* and P&M as *E.m.* Trin. *E.a.* represents the European form when considered a single circumboreal species.

Notes: Abundant on gravel beaches throughout the Juneau area but particularly so on the north shore of Douglas Island and the Rainforest Trail as well as along Eagle Beach. Most of the rocky reefs and small islands in Stephens Passage have abundant stands of the grass as well. This photograph was taken on April 23rd when the grass was just erupting from the ground. This grass can be very tall, up to 1.5 m and form a dense stand in a band about 10 m wide along the storm tide line on rocky beaches. As the photo shows, old leaf bases are persistent and probably serve to help anchor the plant as well as provide some addition organic matter to the soil (or lack thereof!).

Eudicots or Eudicotyledons Doyle & Hotton 1991

Taxonomy: This is an unranked monophyletic grouping (clade) that includes everything traditionally known as dicots when the magnoliids and other basal primitive dicots removed to their own clade. The name traditional Magnoliopsida Brongniart 1843 is polyphyletic as it includes the magnoliids and primitive dicots and should be dismissed. Synonyms include Eudicotidae, tricolpates (from the three-grooved structure of the pollen of all the members of this clade) and the very general traditional term Dicotyledons that usually includes the basal clade.

Order Ranunculales A.L. de Jussieu ex Berchtold & J. Presl 1820

Family Ranunculaceae A.L. de Jussieu 1789 buttercups

Aconitum Linnæus 1753, monkshood, aconite, wolf's bane, leopard's bane, women's bane, devil's helmet blue rocket

Latin ah-CAW-nih-tum American ack-oh-NIGH-tum. Greek ἀκόνιτον *akoniton*, without struggle, for its quick-acting toxin and thus the name for wolfbane, a plant used by the ancient Greeks to kill wolves. The English bane comes from the Old English *bana*, killer, slayer, murderer, hence the devil, the archaic meaning for the word, a poison that leads to death.

The toxic chemical name aconitine (the "Queen of Poisons") is derived from the genus and found in all its species which are recognized as toxic throughout their ranges. Aconitine is found in all parts of the plant, but especially in the roots. It is a powerful alkaloid that when ingested can lead to death in minutes but usually within 20 minutes to two hours due to a combination of neurologic paralysis and cardiac arrhythmias. It is easily absorbed by human mucus membranes and through the skin. Skin absorption is very slow since it is only very slightly soluble in water (the Merck Index), and it would take a large amount of rubbing to reach a dose that leads to poisoning. I've rubbed the leaves on my skin many times with no effect. "The main causes of death are refractory ventricular arrhythmias and asystole and the overall in-hospital mortality is 5.5%." [1]

Aleuts used decoctions of the plant on spear tips for whale hunting, causing paralysis and drowning. [2]

[1] Chan TY. 2009. *Aconite poisoning*. Clinical Toxicology 47 (4): 279–285.
[2] Heizer, R.F. 1943. *A Pacific Eskimo invention in whale hunting in historic times*. American Anthropologist.

Aconitum delphiniifolium de Candolle 1818, mountain monkshood, larkspurleaf monkshood







dell-fin-ih-foal-ee-um. Of or pertaining to delphinium + Latin *folia*, leaf; hence leaves that look like larkspurs.

Taxonomy: Three poorly supported and intergrading subspecies, *delphiniifolium*, *chamissonianum* (Reichenbach) Hultén and *paradoxum* (Reichenbach) Hultén remain recognized by PLANTS but not FNA.

Notes: I can count on monkshood at the Mendenhall Lake stop on the Moraine Ecology Trail for our Whales and Trails hike to the glacier. It is just under the shade line of the trees and long-flowered. The first plant in 2009 lasted nearly two weeks before someone breaks the stem. I prop it up with a stick and it stays healthy for another week. Not long after, several more plants grew and flowered just west of this single plant. The West Glacier Trail is another place where I can count on seeing this flower.

On July 14, 2012, I find one of the plants has a most unusual flower color. Here the flower is mostly white with only a pale lavender outer edge and veining. The filaments and developing achenes are also lavender, but not as deeply or richly colored as the normal plants just a few feet away. So why haven't I seen this color pattern here before? Is this a new plant grown from a seed produced by parents when where there was a faulty copy of one of the genes for deep purple flowers? That seems to be the best answer at the moment.

Albinism, leucism, hypopigmentation and hypochromism are terms used to describe this condition. All simply refer to the lack of, or reduction of, pigmentation in the cells. This is caused by a faulty gene. In the horticultural trade, these are often highly sought after as they can produce stunningly beautiful flowers. Variegation is another common word used for white tissue showing up in plants, but it usually restricted to just the leaves or green stems. Since the leaves of the pale-flowered plants seem identical to the nearby normal plants (they are just as green and thus full of the same amount of chlorophyll), the condition I'm seeing here is limited to just the flower structure.

Toxicity: find references to the toxicity of the plant fascinating, particularly with regards to skin contact. It is well-known as extremely poisonous when ingested. "Aconitine and related alkaloids found in the *Aconitum* species are highly toxic cardiotoxins and neurotoxins. The wild plant (especially the roots and root tubers) is extremely toxic". [1] I continue to read many warning in many popular guides against touching monkshood, but find the risk greatly over stated when simply handling wild plants. While there are many published reports of dermal poisoning, including fatalities, a systematic review of them leads only to the recommendation that "the public should be warned of the danger in using these topical aconite preparations and the risk of systemic toxicity following percutaneous absorption of Aconitum alkaloids." [2] I often pick a leaf or two and rub it on the inside of my arm on tender skin and have never had any discernible reaction to it. There is a great difference between casual handling of the leaves and making a concoction to rub into the skin.

[1] Chan, Y. 2009. *Aconite poisoning*. Clinical Toxicology. Philadelphia. Apr; 47(4):279-85.
[2] Chan, Y. 2012. *Aconite poisoning following the percutaneous absorption of Aconitum alkaloids*. Forensic Science International. Nov 30;223(1-3):25-7.

Actaea Linnæus 1753, baneberry

ack-TEE-uh. Greek ακτεα *aktea*, the ancient name for baneberry.

Actaea rubra (Aiton) Willdenow 1809 red baneberry

ROO-bruh. Latin *ruber*, red, ruddy, painted red; from the red berries.

Taxonomy: Most current reference separate the baneberries in to a North American boreal species (*A. rubra*) with mostly red berries, an eastern or southeastern North American species (*A. pachypoda*) with mostly white berries (called doll's eyes), and a European species (*A. spicata*) with black berries. I strongly suspect that our North American baneberries are conspecific, and probably even so with the European species. I think a detailed study of the three species will confirm that they represent population with a continuum of characters. The differences I see of this plant from the eastern *A. pachypoda* are minimal, especially when including the white-fruited forms of each. A primary character to distinguish the forms is the color of the pedicle, something I consider very minor. FNA (vol. 3) includes these notes:

> *Actaea rubra* is part of a circumboreal complex and is very similar to the black-fruited European species *A. spicata* Linnæus, with which it is sometimes considered conspecific. The western North American plants of *A. rubra* have been called *A. arguta* and were distinguished on the basis of their smaller berries, more pubescent leaves, and narrow, more dissected leaflets. Those distinctions, however, are weak; specimens from the West often have fruits and leaves similar to those of plants from the East. A thorough study of *A. spicata* in the broad sense, on a worldwide scale, is needed to resolve the delimitation of taxa within this complex. Plants with white fruit, sometimes distinguished as *Actaea rubra* forma *neglecta* (Gillman) H. Robinson, are frequent and are more common than the red-fruited form in many localities. [FNA uses an incorrect initial for Robinson.]

FNA 1993+, Jepson 2012 and Weakley 2012 do not recognize lower taxa. If one is a splitter, our southeastern Alaska plants can be confidently placed into the western subspecies *arguta*. It has also been considered as a full species (*A. arguta* Nuttall 1838), a variety [*A.r.* var. *arguta* (Nuttall) Breitung 1957] and as a form (*A.r.* forma *arguta* Huth 1893). If considered a circumboreal complex, the name for ours is *Actaea spicata* Linnæus subspecies *arguta* (Nuttall) Hultén 1944.

Toxicity: with a common name baneberry, one should be cautions about eating the rather attractive fruits, whether they be red or white. The old meaning for the word *bane* is something, typically poison, that causes death. All members of the Ranunculaceae have the chemical ranunculine that when ingested is metabolized into toxic protoanemonine.

> The sap of any plant of the family Ranunculaceae has a burning taste and may cause reddening of skin followed by swelling and even blistering. If swallowed in large quantities, stomach irritation may follow and further develop into stomach colic and extreme gastroenteritis and diarrhea mixed with blood. ... Anyone collecting or handling plants of the family Ranunculaceae with bare hands should be careful not to holding them for long as the sap irritates the skin and can cause blisters. [1]

> Native Americans used various preparations made from the roots of *Actaea rubra* medicinally to treat coughs and colds, sores, hemorrhages, stomachaches, syphilis, and emaciations; preparations from the entire plant as a purgative; and infusions from the stems to increase milk flow. It was also used in various ceremonies (D. E. Moerman 1986). [2]

The Native American Ethnobotany web site results seem to indicate a general consideration that the plant is poisonous, yet it had medicinal purposes. This is probably in concert with the common idea that powerful poison could be powerful medicine. Heller notes "the berries of this plant are poisonous. As few as six berries can cause increased pulse, dizziness, burning in the stomach and colikcy pains. The rootstok is a violent purgative and emetic (Heller, p. 4).

While researching the active chemical that causes the poisoning, I came upon what may well be my most favorite scientific article ever with this excerpt from one of her several articles on poisonous plants:

> In the fear that children, attracted by the beauty of the fruit, might eat to their own undoing, an experiment in the qualities of the berries was entered upon with the following result.
>
> A small dose was taken after the mid-day meal, as caution seemed advisable; but the only effect noted was a slight burning in the stomach. The question, however, of children eating the forbidden fruit was definitely settled at once, as no child, youth, sane adult, not even a hungry school-boy would ever devour it from deliberate choice; the taste is most nauseous, bitter, puckery; indeed, several even more drastic adjectives might be applied with perfect truth.
>
> Having survived the first attempt, the experimenter hopefully tried again two days later, allowing time for the first dose to be completely eliminated from the system. On this occasion double the first quantity was taken, and in less than half an hour there was a decided quickening of the pulse and a return of the burning in the stomach, this time more severe than before. These symptoms were transient, lasting perhaps fifteen minutes.
>
> Two days later twice the former amount was taken. Half an hour afterward all curiosity on the subject of red baneberry was abundantly satisfied, for this one experimenter at least. At first there was a most extraordinary pyrotechnic display of blue objects of all sizes and tints, circular with irregular edges: as one became interested in the spots a heavy weight was lowered on the top of the head and remained there, while sharp pains shot through the temples.
>
> Then suddenly the mind became confused and there was a total disability to recollect anything distinctly or arrange ideas with any coherency. On an attempt to talk, wrong names were given to objects, and although at the same time the mind knew mistakes were made in speech, the words seemed to utter themselves independently.
>
> For a few minutes there was great dizziness, the body seeming to swing off into space, while the blue spots changed to dancing sparks of fire. The lips and throat became parched and the latter somewhat constricted ; swallowing was rather difficult ; there was intense burning in the stomach with gaseous eructations, followed by sharp colicky pains in the abdomen and also pain across the back over the kidneys. The pulse rose to 125, was irregular. wiry, tense; the heart fluttered most unpleasantly.
>
> These symptoms lasted about an hour and were followed by a feeling of great weariness, but in three hours from the time of taking the dose all seemed to be again normal. The experiment was carried no further, as the effects in heart and brain were danger signals not to be ignored.
>
> The conclusion reached is, that while the very unpleasant taste will prevent it from being dangerous in general, the fruit of the red baneberry evidently contains a poison having a powerful effect on circulation and brain; a dozen berries would probably be enough for a fatal dose, half that amount sufficing for the above experience. [3]

The question is pretty settled with her account. Yet the next day after reading this I tasted one of the berries, and it was very foul indeed and I spit it out almost immediately.

[1] ____. undated. *Ranunculosides or Ranoculins*, in Department of Animal Science - Plants Poisonous to Livestock, Cornell University. http://www.ansci.cornell.edu/plants/toxicagents/ranunculoside.html
[2] Ford, B. 1997. *Actaea*. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 3.
[3] Bacon, A.E. 1903. *An Experiment with the fruit of red baneberry*. Rhodora 5: 77.

Actaea rubra (Aiton) Willdenow 1809 ssp. ***arguta*** (Nuttall) Hultén 1944, baneberry, red baneberry, snakeberry

are-GOO-tuh Latin *argutus*, clarify, sharp, perceptive, shrewd; hence sharp-toothed.

Notes: While pretty and white when flowering, this plant comes into its own in fruit in late August and September with its deep and glossy red berries that simply command attention. It is widespread in this area in nearly all habitats. There is a cluster of three healthy plants right at the edge of the forest with the littoral zone on the Rainforest Trail. There is a robust group at the top of the old Trail of Time at the upper Steep Creek Bridge. A small group can be found at the beach on the Moraine Ecology Trail. They are widely scattered on the East Glacier and West Glacier trails.

Actaea rubra forma ***neglecta*** (Gillman) B.L. Robinson 1908, white baneberry

neh-GLEK-tuh neglected, presumably for the reluctance to consider it a full species.

Taxonomy: If one is an extreme splitter and needs to give a name to every form, there is an available name. Robinson notes in making his new combination (reducing Henry Gillman's 1884 full species to a form) "This is the problematic *Actaea*, seemingly merely a color form of *A. rubra*, which has white berries on slender pedicels."

Robinson, B.L. 1908. *Further notes on the vascular plants of the Northeastern United States*. Rhodora 10(112): 66.

Notes: The white-flowered form in common about the Mendenhall Glacier Visitor Center, particularly on the Steep Creek viewing area. The gore of natural landscape between the stairs and the ramp to the pavilion is the only place I can count on seeing the white form, with the red not far away.

Anemone Linnæus 1753

uh-nehm-oh-nee. Greek ἄνεμος anemos, wind; then ἀνεμώνη *anomeone*, the name for windflower.

Anemone narcissiflora Linnæus 1753 var. ***monantha*** de Candolle 1824, narcissus anemone

nahr-sis-ih-floor-uh. Narcissus + Latin *Flora*, goddess of flowers; hence leaves like narcissus.moe-NAN-thuh Greek μόνος *monos*, alone; single + Greek ἄνθος *anthos*, a flower; for the entirely separate anthers.

Taxonomy: This complicated widespread species has been interpreted many ways. FNA recognizes three varieties in the flora and our variety has these synonyms: *A. narcissiflora* ssp. *alaskana* Hultén; *A. narcissiflora* ssp. *interior* Hultén; *A. narcissiflora* ssp. *sibirica* (Linnæus) Hultén; *A. narcissiflora* var. *uniflora* Eastwood.

Notes: Absolutely abundant, and even forming nearly a ground cover over large—house-sized—areas in the right habitat, this is one spectacular beauty. It is common in the open areas on the Alpine Loop Trail on Mount Roberts and in vast numbers in the bowl above the Dan Moeller cabin and scattered about on the edges of the muskegs along the trail to the cabin. Not a muskeg plant, this is a plant of alpine meadows.
My photo doesn't capture the yellow of the ripe anthers as it should be as it is obvious on first seeing that these are the reason for the name "narcissus" as they do look at least—"vaguely" according to P&M—similar to the corona of that flower.

Aquilegia Linnæus 1753, columbine

a-kwih-LEE-gee-uh. Latin *aqua*, water, sea, lake + Greek λέγω legein, to speak; the name for columbine.

Aquilegia formosa von Fischer ex de Candolle 1824 var. ***formosa***, western columbine

for-moe-sah.   Latin *formosus*,beautiful, finely formed, handsome.

This beauty pleases nearly everyone walking from the Steep Creek bridges up to the glacial scour outcrop where it is abundant on its rocky face. As this photo implies, the plant likes lots of light. It is very common along the streams along the upper end of "the flats" of West Glacier Trail as well on many of the exposed rocky crevices as the trail climbs the "stairway to heaven". A few can be found along the cliff face above Nugget Falls on the East Glacier Trail. It is especially abundant along Perseverance Trail, especially in the weepy open rock face just before Ebner Falls.

Many people recognize it as a columbine as they are common in cultivation and the blue one is the State Flower of Colorado. I'd say more people know this than any flower on any of our walks.

The tube and nectary have always fascinated me and with what must be thousands of observations of columbines in North America, I've never seen one being pollinated or visited by anything but small ants. Clearly, the tube and nectary are designed to attract an animal with a long tongue or beak, I came upon a fascinating article on columbine tube lengths and their pollinators. Short tubes around a centimeter or so, are pollinated by bumblebees while longer tubes by hummingbirds and the longest with up to 12 cm tubes are pollinated by hawk moths. They claim no overlap, but our western columbine has spurs a bit longer than short and not quite to middle and have reports of being both bumblebees and hummingbirds. [1] I observed no bumblebees nor hummingbirds near any of these flowers but did find bumblebees to be far more common than hummingbirds. I'm absolutely guessing here, but I think ours could be pollinated by both. Further, the extension of the tubes accomplished simply through cell shape along a single direction, *anisotrophy*!

> *Aquilegia* petal spurs develop via anisotropic cell expansion. Furthermore, changes in cell anisotropy account for 99% of the spur length variation in the genus, suggesting that the true evolutionary innovation underlying the rapid radiation of *Aquilegia* was the mechanism of tuning cell shape. [2]

[1] Whittall, J.B. & S.A. Hodges. 2007. *Pollinator shifts drive increasingly long nectar spurs in columbine flowers*. Nature 447: 706-709.

[2] Puzey, J.R., S.J. Gerbode, S.A. Hodges, E.M. Kramer & L. Mahadevan. 2011. *Evolution of* Aquilegia *spur length diversity through changes in cell anisotropy*. Proceedings of the Royal Society B.

Coptis Salisbury 1807

COP-tiss.   Greek κόπτω koptein, cutting, as in a slaughter; referring to the dissected leaves.

Coptis aspleniifolia Salisbury 1807, fernleaf goldthread

ass-plen-ee-ih-foal-ee-ah. The genus *Asplenium*, a fern, + Latin *folia*, leaf; hence leaves like an asplenium.

Taxonomy: FNA vol. 3 notes

> *Coptis aspleniifolia*, *C. laciniata*, and *C. occidentalis* form a group of morphologically similar, allopatric [organisms whose ranges are entirely separate] species that are probably recently derived. The species may have originated in response to the opening of the western Cordilleran landscape after Pleistocene glaciation and could be considered localized variants of a single species. Although most individuals can be readily distinguished, some can be difficult to place.

Notes: If *C. trifolia* is here, as all the distribution maps I examine show, I haven't spotted it among all the trifoliate leaves on the forest floor. Nor have I connected the flowers I've seen with a trifoliate leaf. Every flower and fruit head I've seen matches perfectly with the highly divided leaf of *C. aspleniifolia*.

The easily overlooked early spring flower is most curious as the tiny showy parts are the greatly reflexed bright white to greenish-white 6-11 (-15)× 0.3-1 mm sepals. The inconspicuous petals are greenish white and about half as long and, with a hand lens to view, include a nectary about ¼ the length out from the receptacle. While abundant, it takes a practiced eye to spot this incredible example of floral architecture as the flower forms well before the more showy leaves expand fully. An even closer look at some fully expanded flowers might yield one that only has stamens, lacking any pistils at all! I find both flowers on a plant to be either both bisexual or both staminate, never a mix of the two.

The follicles grow far larger than the flower and become more obvious than the flower as they develop. They form a rosette of spoons held together by their handles with an acute point held up and out at the end. The plant is in fact easier to spot in fruit than in flower. When the follicles are green, long before ripening, they form prominent spokes that are far large than the flower. When they mature, an opening develops on the upper side of the far end of the fruit which gives each separate follicle the look of an ancient oil lamp (as the photo illustrates). Presumably the opening is on the upper side so that winds stronger than just a breeze cause the follicle to shake and spread the seeds farther than if the opening simply faced down.

The complexly divided leaves (1 to 3 pinnate or pinnate pinnatifid or even ternate-pinnatifid) are such a deep, glossy green, that though small, they are easily spotted at eye level on any walk through our coniferous woods. They are abundant on the Rainforest Trail and are common on the steep slope the stairs ascend on the East Glacier Trail.

Kumlienia Greene 1886

koom-lee-EN-ee-ah. Honorific for Swedish-American naturalist Thure Kumlien (1819–1888).

Taxonomy: The genus *Ranunculus* with well over 600 species in seven distinct subgenera (that have often been elevated to generic rank) is in serious need of world-wide revision. Greene created the genus *Kumlienia* in 1886 when he placed *Ranunculus hystriculus* A. Gray into it. TROPICOS, PLANTS and ITIS and Jepson 2012 accept *Kumlienia*.

Kumlienia cooleyae (Vasey & Rose) Greene 1894, Cooley's buttercup

KOO-lee-aye. Honorific for American botanist George R. Cooley (1896-1986).

Taxonomy: Until sorted out, *Ranunculus cooleyae* Vasey & Rose would be the most conservative and consistent name. In 1894 Greene moved *R. cooleyae* into *Kumlienia* joining *K. hystriculus* as the only two members of the genus.

Notes: An alpine plant, the only place I found it is on the Mount Roberts Trail. While obviously a buttercup, this is a distinctive one among a group that are remarkably similar. One first notices the pale yellow petals that are rather loosely arranged on the receptacle that just barely outnumber and are longer than the very similarly colored sepals, both arising from their own distinct easily seen whorls. The flowers arise singly on a scape from a rosette of round leaves and there are no stem leaves. There can be many plants crowded into a tiny place and many scapes from each plant so the flowers can appear *en masse* and be very showy. They can be found in the rock outcrop near Father Brown's Cross and the wind sock, but I've never found them lower. Yet at the Whales & Trails beach there are three plants that reliably flower each year in a place that is decidedly not alpine. But the environment mimics that of the alpine so it, along with several other alpine plants, can be found at low elevation.

Ranunculus Linnæus 1754, buttercups

rah-nun-cue-lus. Latin *rana*, frog, *unculus*, little, allusion to the wet habitats in which some species grow.

****Ranunculus acris*** Linnæus 1753, tall buttercup, meadow buttercup

uh-kriss. Greek άκίς *akis,* sharp, referring to the ends of the achenes.

This is a most abundant roadside plant throughout the Juneau area, always in disturbed places that are usually somewhat wet most of the time. This is a good description of an invasive weed, and the plant is considered such by the Alaska Exotic Plant Information Clearinghouse (see below). It's name tall buttercup is especially appropriate as one can always tell this apart from our other buttercups as it stands sometimes a meter off the ground, well above all the others. Rhizomatous plants in the Aleutians may well be native [FNA vol. 3].

> ***Impact on community composition, structure, and interactions***: The poisonous compound protoanemonin is released in the sap of creeping buttercup and tall buttercup. Protoanemonin can kill grazing animals if ingested. Geese and other birds readily eat the leaves and seeds of buttercup (Lovett-Doust et al. 1990). The flowers are visited by honey bees, butterflies, moths, and beetles for pollen or nectar. Creeping buttercup and tall buttercup are known hosts for many microorganisms, viruses, insects, and nematodes (Harper 1957, Lovett-Doust et al. 1990, Royer and Dickinson 1999). Hybridization has been documented between *Ranunculus acris* and *R. uncinatus* (Welsh 1974).
>
> ***Impact on ecosystem processes***: These *Ranunculus* species readily occupy open areas and may hinder colonization by native species.

AKEPIC 2011. Alaska Exotic Plant Information Clearinghouse database (http://akweeds.uaa.alaska.edu/). Alaska Natural Heritage Program, University of Alaska, Anchorage.

Ranunculus aquatilis Linnæus 1753, white water-buttercup, water crowfoot, common water-crowfoot, white water-crowfoot

Latin uh-KWAH-tih-lis, American awe-kwah-TIH-lis. Latin *aqua*, water + -*tilis*, of or pertaining to water.

Because of concerns for the return of coho salmon up Steep Creek, the U.S. Forest Service authorized the destruction of the beaver dam where Steep Creek parallels Glacier Spur Road resulting in the drying up of the pond that formed behind it. By late July of 2010 (this photo was taken on the 31st), an entire flora of plant and fungal material took advantage of this new opportunity to grow with the most abundant being this buttercup. It began growing as the water level dropped and as the newly exposed muds became "dry land", they continued to thrive in the open sun and even formed a nearly complete ground cover. So many flowers formed on these pioneer species that a white glaze developed over the mud visible from the road driving by. After several days of seeing the white, I made a point of stopping there on my own time and examine what it was and immediately recognized the flower as a buttercup and remembered something in my past about "aqua-something" so it didn't take long to make a definitive identification. The leaves are filiform as many aquatics are, presumably to allow the water—vastly denser than air—to easily flow through the leaves. While thin, they are dense, to maximize its ability to gather sunlight in the water.

In 2011 the dam remained dismantled and no water backed up into the former pond and I could not a single water buttercup flower! Do the seeds require a period of submersion to germinate? With the gradient of the stream a bit steeper without the dam, the stream course remained sandy rather than muddy as the water flow was great enough to carry all the silt and mud further downstream.

There are two patches in the perennially wet wood plank and bridge pools on the bus lot approach trail to the Moraine Ecology Trail that I've never seen flower. Dime-sized rosettes of linear leaves appear in July along with creeping stolons that create new rosettes. I've never seen a flower, let alone a flower bud on these plants.

Ranunculus occidentalis Nuttall 1838 var. ***brevistylis*** Greene 1896, western buttercup

ox-ih-den-tah-lis; . Latin *occidens*, sunset, west (of the west referring to the Western Hemisphere). breh-vih-sty-liss Late Latin *brevis*, short, little, small + style, part of the pistil; hence short style.

Taxonomy: Synonym *R.o.* ssp. *insularis* Hultén. FNA notes "*R.o.* var. *brevistylis* may be difficult to distinguish from var. *occidentalis*; the two have sometimes been combined. The pubescence character distinguishing them is well correlated with geography, however, so I am provisionally maintaining both of them."

Notes: I have to admit to never paying too much attention to this widespread and common buttercup, or even taking a close look at the flower, I'm confident of this identification, largely based on geography, so long as the maps I consulted (Hultén, FNA, PLANTS) are correct. This flower is common anywhere light and regular moisture with a rich humus are ample. Hence, it is not found in the forest or on the glacial outwash plain but is abundant in roadside ditches, the disturbed ground on open trails and in the median of Egan Drive. It can be showy and pretty.

****Ranunculus repens*** Linnæus 1753, creeping buttercup

Latin REH-pens, American reh-PENS.   Latin *repere*, creep, crawl.

Is this a weed? Probably, but it a well-naturalized one as it has become part of the flora of North America in most areas where moisture is abundant (see the distribution map in FNA vol. 3). The comments of the Alaska Exotic Plant Information Clearinghouse under *R. acris* apply to it as well. It is very easily identified since it is an obvious buttercup but creeps along the ground rather than rising like most species. The petals are particularly broad and long for a buttercup, making this little plant showier than some of its larger brethren. Common here in disturbed places, including trail sides. I is especially common near the culverts of Steep Creek on Glacier Spur Road where it provides lovely color when in flower, a vexing problem for invasive plant managers. The back Steep Creek Trail viewing platform has a population that is declining as the willow and other shrub layer is shading it out. Here the plant was the dominant ground cover in 2010 but by 2014 was just one of many plants competing for light.

Ranunculus uncinatus D. Don, 1831, woodland buttercup, little buttercup.

Order Saxifragales von Berchtold & J. Presl 1820

Family Grossulariaceae de Candolle 1805 **currants**

Taxonomy: Most references include this in a broad circumscription of the Saxifragaceae. Molecular evidence supports the distinctness of the Grossulariaceae, however it is much more closely allied with the Saxifragaceae than other families that have been carved out of it. It is a family of one genus.

Ribes Linnæus, 1753, currants and gooseberries

Latin RIH-bess, American RYE-bees.   Arabic *rībās*, rhubarb, mistakenly applied to currants.

Most budding naturalists have difficulty identifying this genus to species. Two broad divisions are readily observed as the currents are unarmed and the gooseberries have thorns, spines or bristles. They all have maple-shaped leaves and most can be identified by their leaf, but it requires a close look and examination of lots of plants to be confident.

Ribes bracteosum Douglas 1832, stink currant, shaax or shaaxh

brak-tee-Oh-some. Having or bearing bracts; here below the pedicel.

Easily identified from our other *Ribes* by the copper-colored flowers often held out stiffly and the very large (to 20 cm) maple-looking leaves with deep that give a distinct skunky smell when crushed. The leaves usually have 7 lobes. The fruits can become as large as a marble, ~30 mm, and are covered with a whitish or grayish bloom and many glands. While pulpy, the name gives away the taste, not pleasant! There is a large stand of this shrub on the first ravine bridge on the East Glacier Trail in with grove of Devil's club.

Ribes lacustre (Persoon) Poiret 1812, black gooseberry, prickly currant, swamp currant, ýaaheiwú

lah-CUSS-tree. Latin *lacus*, lake; from its common location in moist, wet or streamside habitats.

This plant is abundant on the West Glacier Trail, particularly on the ridges, as well as in most forested areas, where it's heavily armed stems distinguish it at a glance from the currants. It is also very common in the Auke Recreation area on roadcuts and the rocky forest edge at Point Louisa.

In popular nomenclature, currants are unarmed (without spines or prickles) and gooseberries are armed, so the name prickly currant is a little confusing. While not thorns, the prickles are abundant and sharp. The inflorescence usually hangs down from the stems but can be slightly spreading. The fruits taste the best of all our *Ribes*, but that's not saying much!

Ribes laxiflorum Pursh 1814, trailing black currant, kaneilts'ákw

lax-ih-floor-um. Latin *laxus*, unstrung; relaxed, at ease + Latin *Flora*, goddess of flowers; for the drooping flowers.

The flowers can be green and purple-tinged but not salmon-colored like stink currant, and are usually in small clusters. The maple-like leaves are usually 5-lobed. The fruits are very dark and waxy, and while not exactly pleasant, they don't taste awful and could be easily eaten if necessary. The plant has a spreading habit giving its name, and often grows in thin soil atop flat boulders on the lower portions of the East Glacier Trail where it is abundant.

Ribes triste von Pallas 1797, red currant, swamp red currant, swamp currant, wild red currant, northern red currant, American red currant

TRISS-tee. Latin *tristis,* sad, sorrowful.

Distinguishing this species from trailing black currant takes a practiced eye. The color of the flower is often more red, but color here can fade with age and exposure to the sun and should not be used definitively. A better character is to look at the leaves which are strongly 3-lobed with two very much smaller lobes making up the final two. It does seem to find the more wet places home as befits its name. The fruits, while red, can be very dark in our area and this is also not a definitive feature for identification. Stick with the leaves!

Saxifragaceae A.L. de Jussieu 1789 **saxifrages**

Heuchera Linnæus 1753, alumroot

Latin HEW-koo-ruh, American hew-CURE-uh. Honorific for Austrian-born medical botanist Johann Heinrich von Heucher (1677-1747).

Heuchera glabra Willdenow ex Roemer & Schultes, 1820 smooth alumroot

GLAY-bra. Latin *glaber*, smooth; hairless, smooth.

If one knows this genus, this is an easy plant to identify as it has the basal rosette of 5-lobed leaves—very deep and coarsely serrate here—and an open inflorescence of small (~5 mm across) mostly hanging flowers. The tiny 2 mm petals are reflexed strongly off the showy white hypanthium (the bowl formed with tissue of the sepals, petals, and stamens) which is worth a hand lens view. Common on the East and West Glacier trails on wet rock cliffs, the shoreline of Mendenhall Lake, and a few can be found in the moist, rocky places in the hemlock forest on the Alpine Loop Trail. The September 10, 2010 fall colored plants are on slate and greenstone outcrops high on Mount Roberts in the subalpine zone in 7:13 p.m. alpenglow.

Leptarrhena R. Brown 1823

lep-tar-ren-ah. Greek λεπτός *leptos*, slender, and *arrhen*, male, alluding to stamen filaments.

Leptarrhena pyrolifolia (D. Don) Robert Brown ex Seringe 1830, leatherleaf saxifrage

peer-ih-foal-ee-uh. Greek πυρο, fire + Latin *folia*, leaf; for the bright leaf color like a flame.

When this plant first grows its flower stalk, it can be confusing to identify as the flowers are so tightly arranged into a ball (center photograph) that it almost is like a complex head, and they stay this way for a week or so before expanding into more typical saxifrage-like flowers with their small hypanthium and spatulate to oblanceolate petals so narrowly attached. The peduncle is a stout 3-4 mm in diameter and covered with a reddish bloom of glandular hairs. The deep-veined slightly rounded dentate leaves are all in a basal rosette and are indeed leathery by glossy green. The plant is showiest when fruiting as the follicles are bright maroon-red and 2 to 3 times larger than the flower. A nice population grows on the flat slabs of rock near the Mendenhall Glacier Visitor Center. I've also found it near tree line up Salmon Creek and in the bowls with soil on Mount Roberts well above treeline (left photograph).

Micranthes Haworth 1812, New World saxifrages

my-CRAN-theez. Greek μικρός *mikros*, small + Greek ανθώ *anthos*, flower.

<u>Taxonomy</u>: *Micranthes* was removed from *Saxifraga* in 1812 and again in 2001, this time on molecular phylogenetic evidence. Most works in print have them in *Saxifraga* so I'm including their name in that genus.

Soltis, D.E., et al. 2001. *Elucidating deep-level phylogenetic relationships in Saxifragaceae using sequences for six chloroplastic and nuclear DNA regions*. Annals of the Missouri Botanical Gardens 88: 669–693.

Micranthes nivalis (Linnæus) Small 1905, alpine saxifrage.

nigh-val-is. Latin *nivalis*, snowy, snow-covered, snow-like.

<u>Taxonomy</u>: As a saxifrage it's name is *Saxifraga nivalis* Linnæus.

<u>Notes</u>: The flattened basal leaves are distinct enough from most things to make this plant an easy spot and when you add the blue-green blade color with the rusty to maroon margin it stands out even more. The stout red and conspicuously hairy peduncle gives rise to a lovely compact inflorescence of slightly zygomorphic white-petaled flowers.

That all being the case, with a closer look I find that I've been misidentifying this as *M. ferruginea*! This species is smaller, has ovate (rather than oblong) leaves and the very compact inflorescence. It is normally an alpine plant, here, like the moss campion, growing not far above sea level in an environment that mimics the alpine.

Micranthes lyallii (Engler) Small 1905, Lyall's saxifrage, red-stemmed saxifrage

lie-AL-ee-eye. Honorific for Scottish botanist David Lyall (1817-1895).

Taxonomy: As a saxifrage it's name is *Saxifraga lyallii* Engler. In the north of the range (here) the plants are larger and have been given the name var. *hultenii* Calder & Savile.

Notes: This is probably our most common saxifrage as it occurs in most seep areas and is more easily spotted by its uniquely shaped leaves than its flowers. They've been called "spoon-shaped" but this just doesn't quite fit my image of them. The petiole is the same texture and green as the blade and is flattened. It starts out narrow and widens a bit to about 3 mm at the leaf base. While technically cuneate, from eye level on a walk it seems almost truncate and P&M (p. 62) say "abruptly narrowing" which is definitely the case. The blade is silver dollar (old ones!) sized and sharply dentate. The peduncle is a dark red and loosely flowered with 2-3 mm long white petals with two green spots near the base (this takes a hand lens to adequately see).

Mitella Linnæus 1753, miterwort

my-TELL-uh. Latin *mitra*, turban or headdress, and -*ella*, diminutive, alluding to cap-shaped fruit.

Mitella pentandra Hooker 1825, five-stamened mitrewort

pen-tan-druh. Greek πέντε *pente*, five + Greek ἀνήρ *aner*, a man; for the five stamens.

Spotting the typical mitrewort flowers, I'm surprised by this species large (4 - 8 cm) cordate (heart-shaped) two or three basal leaves. Their stiff hairs are obvious to even a slight touch. The flowers indeed have five obvious stamens opposite each petal, each the same yellow-green color. The inside of the hypanthium is copper-colored and obvious even while walking as this is how Eugene Wofford spotted in a ditch on Thane Road. The petals are deeply pinnately divided into linear final segments that, because of their color, blend into the background when the eye spots the color of the hypanthium cup. I found this most common along the mountain side of Thane Road and all along the Bishop Point Trail and far less common on East and West Glacier, but it is there.

Saxifraga Linnæus 1753 saxifrages, here used *sensu strictu* (in the narrow sense)

Latin sax-IH-frah-gah, American sax-it-FRAY-gah. Classical Latin *saxum*, stone + Latin *frango*, to break; hence rock-breaker, for their habit of growing in rock crevices or for use in treating kidney stones.

Saxifraga bronchialis Linnæus subsp. ***austromontana*** (Wiegand) Pipe 1906, matted saxifrage.

brawn-kee-al-is Greek βρόγχια *bronchia*, end of the windpipe; hence divided in branches as the bronchial tubes. The epithet *bronchialis* was thought by Gmelin (in 1769) to be derived "from information given to Linnæus that the plant was used by the natives of Siberia as a cure for respiratory complaints" [Webb D.A. & R.J. Gornall. 1989. *A Manual of Saxifrages*. Timber Press, Portland, OR]

oss-tro-mon-ta-nuh From Latin *auster*, the south wind to *austral*, of the south + *montana*, Latinized form of the Spanish *montaña*, mountains = southern mountains; apparently due to its more southern range than the other subspecies.

Taxonomy: Linnæus gave the name *S. bronchialis* to a plant from China in 1753. The plant was originally given full species status in 1900 as *S. austromontana* Wiegand. It has also been *Leptasea austromontana* (Wiegand) Small 1905, *Ciliaria austromontana* (Wiegand) W.A. Weber 1982, and *S.b*. var. *austromontana* (Wiegand) M. Peck 1941.

Notes: Today's plant is far into its flowering cycle with flowers below and many developing twin fruit capsules above.

While writing this report I check with the Flora of North America account of the species and note the key that divides the two subspecies separates them on the petals being clawed or not and the distal dots being purple- or red-spotted. The petals clearly show yellow dots proximally but they darken appreciably distally. The petals of this plant are *not* clawed. When taken together, I've got to conclude that this is not the more common Alaskan subspecies, *funstonii*, but the more inland form.

The photograph from *E-Flora BC: Electronic Atlas Of The Flora Of British Columbia* [http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Saxifraga%20bronchialis%20ssp.%20austromontana&redblue=Both&lifeform=7] matches with the lack of claw but the spotting is more dramatic, perhaps because it is a fresher specimen. The atlas page shows collections of plants surrounding the northern panhandle of SEAK so I'm not out of range—something the FNA infers by not including Alaska. Subspecies *funstonii* [http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Saxifraga%20bronchialis%20ssp.%20funstonii] clearly shows strongly clawed petals and pure yellow dots, both lacking in my specimen.

My experience writing notes on this plant (well-separated in time from the photograph) illustrates how a careful look and comparison with published accounts is always useful. I've learned with both *Saxifraga* and *Micranthes* here in SEAK to be very careful of what I call plants when walking by when not making careful—and close—observations. Today my photograph saved me as I took enough time to get details on flowers and fruits.

Saxifraga bronchialis Linnæus 1753 subsp. ***funstonii*** (Small) Hultén 1929, prickly saxifrage, matted saxifrage, yellow-dot saxifrage, Funston's saxifrage




brawn-kee-al-is. Greek βρόγχια *bronchia*, end of the windpipe; hence divided in branches as the bronchial tubes The epithet *bronchialis* was thought by Gmelin (in 1769) to be derived "from information given to Linnæus that the plant was used by the natives of Siberia as a cure for respiratory complaints" [Webb D.A. & R.J. Gornall. 1989. *A Manual of Saxifrages*. Timber Press, Portland, OR].

fun-stone-ee-eye Honorific for Frederick N. Funston (1865–1917) who led a botanical survey to Alaska from 1892-1893.

<u>Taxonomy</u>: syn. = *Saxifraga funstonii* Small; *S. funstonii* (Small) Fedde

<u>Notes</u>: The tightly gathered basal more or less linear leaves of this saxifrage are diagnostic, as well as the habitat of growing in the slightest areas of soil on dark rock outcrops. It can be found on the most open rocks around the Mendenhall Glacier Visitor Center with just a short search ant any time of year. The tight clusters of evergreen leaves are obvious to any observer of rock crevices and the yellow-dotted petals with long stamens are quite showy during the flowering season.

Saxifraga cespitosa Linnæus, tufted saxifrage

sess-pih-toe-sus. New Latin *caespitosus* from the Late Latin word *caespes*, grassy ground, grass; earth; from their habit of clumping or growing in tufts.

<u>Taxonomy</u>: It has the orthographic variant of *S. caespitosa* Linnæus as Hultén and PLANTS recognize but it isn't spelled this way in *Species Plantarum* as Linnæus wrote. FNA (vol. 8 p. 46) notes "It seems futile at this time to recognize any of the infraspecific taxa that have been described..."

<u>Notes</u>: This lovely little tufted plant has such a short flowering period—less than a week—that if you miss it, you're done for the season! While each plant has only one or two flowering stems, many such plants grow together and make a mass of flowers. The petals grow so close to each other it appears from eye level that they form a tube at the base. Each petal has a small (< 0.5 mm) notch in its tip with a raised midvein often just below. The yellow stamens give each flower a bright yellow "eye". It grows on the glacially-rounded slopes that have some mossy soil near the Mendenhall Glacier Visitor Center.

Saxifraga mertensiana Bongard 1832, wood saxifrage


mur-ten-see-aye-nah. Honorific for German botanist Franz Carl Mertens (1764-1831).

Telling the saxifrages apart by their leaves requires some careful observations. This one is very similar to Lyall's saxifrage, but the leaves are rounder with very broad lobes that are dentate. The petiole is round, not flattened and can be either long (normally up to ~20 mm) or short. The peduncle is green, not red or maroon and the thyrse is many-flowered and widely spreading. The flowers are appear smaller than our other saxifrages in the loose arrangement. The petals are pure white. At least some of the flowers are replaced by bulbils (a small, sterile bulb-like growth where the flower should be). It grows commonly all along the lower reaches of both the East and West Glacier trails, and tends to show up more in areas with a bit more soil than rock in or on the moss carpet.

Saxifraga oppositifolia Linnæus 1753 ssp. ***oppositifolia***, purple mountain saxifrage


uh-paws-ih-tih-foal-ee-uh. Latin *oppositus*, opposing; intervention; opposite; against + Latin *folia*, leaf; for the opposite leaves.

Of all our saxifrages, this is my favorite. Every time I turn the bend on the East Glacier Trail from the Nugget Creek drainage out onto the cliff face, rather than look at Mendenhall Lake, I look at the saxifrages. When in flower in early spring, they are a cascade of lovely purple-pink down the dark rock face. The petals are ovate and with the long stalk characteristic of saxifrages rising vertically from the hypanthium, it gives the impression the flower has a tube and the flowers can be nearly 1 cm long, seemingly out of proportion from the rest of the plant. When not in flower, the tiny leaves are appealing with their scale-like overlapping structure, very different from the big, juicy green leaves of Lyall's or wood saxifrage. The plant finds a crack in the rock in which to find a home then grows a bower down the rocks. Considered an alpine plant through most of its circumboreal distribution, it here seems to use the recently deglaciated areas to its advantage with their cool air drainages and rocky faces that mimic the high alpine or tundra environment.

Tellima R. Brown 1823

TELI-ih-muh Anagram of generic name *Mitella*.

Tellima grandiflora (Pursh) Douglas ex Lindley 1828, fringecup

Classical Latin *grandis*, full-grown, grown up; large + Latin *Flora*, goddess of flowers; hence large-flowered.

The only plant this can be confused with this are the mitreworts, and this plant got its first name as *Mitella g.* Pursh in 1813 and moved into *Tellima* in 1828. It shares with them the pinnately fringed petals arising from the hypanthium, but with this species the cup is very large—up to 9 mm—and widely urceolate giving the plant its entirely appropriate common name. The peduncle of fringecup has a series of leaves on it, each getting smaller and closer to the stem as they reach the flowers. The whole plant is much larger, almost to waist height on robust plants. In deep shade they are smaller. It is common nearly everywhere there is some filtered light at the edge of the forest as well as on the back side slopes of Mount Roberts. It is long-flowered as the inflorescence begins at the bottom and works up and may have three dozen flowers! The cup remains with the development of the capsules.

Tiarella Linnæus 1753

tee-are-ell-uh. Latin *tiara*, turban, and -*ella*, diminutive, alluding to capsule shape.

Tiarella trifoliata Linnæus 1753 var. *trifoliata*, foamflower

try-foal-ee-ah-tuh. Latin *tri*-, three + Latin *folia*, leaf; for the three leaflets.

Taxonomy: There are three species in the genus, all names for their leaves. *T. cordifolia* in Eastern North America with a heart-shaped leaf, ours with three subspecies named on their leaves (var. *trifoliata*, three-leaved; single leaved, var. *unifoliata*; and irregularly and deeply divided, var. *laciniata*) and *T. polyphylla* from Asia with many leaves. Our varieties “often remain distinct in sympatric populations” (FNA vol. 8 p. 115). This is a group of plants that, while amazingly similar in everything but leaf structure, remain distinct.

Notes: When I see this lovely small flower I’m immediately back in the Great Smoky Mountains where its cousin grows in great abundance in exactly the same manner as this in Alaska. They both are long-flowering plants with a few going in late September. Even though the flowers are a tiny 2 -3 x 5 mm in size, a mass of them on a single stalk in a population of many dozens of plants can make a nice white “foam” on the forest floor. This is frequently the view of the more open areas of the forest floor on the Rainforest Trail in the old growth woods there. In the recently deglaciated areas they don’t have the opportunity to grow in as large a mass and aren’t as showy.

Family Crassulaceae J. Saint-Hilaire 1805 **stonecrops**

Rhodiola Linnæus 1753

Latin row-DIE-oh-lah, American row-dee-OH-lah, Greek, ῥόδον *rhodon*, rose, alluding to odor of rootstock in *R. rosea.*

Rhodiola integrifolia Rafinesque 1832 ssp. *integrifolia*, roseroot, ledge stonecrop




in-teg-rih-FOE-lee-uh. Latin *integer*, fresh troops; untouched, entire, whole + Latin *folia*, leaf; for the entire leaves, that is, smooth-edged with no teeth.

Taxonomy: A pile of synonyms includes these full species names: *Sedum alaskanum* (Rose) Rose ex Hutch.; *S. atropurpureum* Turcz.; *S. integrifolium* (Raf.) A. Nelson; *Rhodiola atropurpurea* (Turcz) Trautv.; *R. rosea* Linnæus, *Tolmachevia integrifolia* (Raf.) A. Löve & D. Löve. Here is another amazing example where the autodidact Constantine Samuel Rafinesque—along with Linneaus—seems to have been right:

> Populations of *R. integrifolia* in western North America appear to have persisted both north and south of the Cordilleran Ice Sheet during the most recent (Wisconsinan) glacial advance, and have subsequently recolonized glaciated western Canada primarily from the north since the last glacial maximum.

Guest, H.J. & G.A. Allen, Geraldine. 2008. *Molecular phylogeography of* Rhodiola integrifolia *(Crassulaceae): postglacial recolonization of western North America*. Botany, Botanical Society of America.

This is good evidence for the segregating out the genus *Rhodiola* from *Sedum*.

Notes: A common plant of rocky places, be it weepy slopes, alpine or beach heads, one can find this anywhere there are exposed rocks. The plant has a thick and fibrous tap root that works its way deep into the crevices of the rocks and makes it very hard to pull out. When it is, and the rhizome bruised, it gives off a pleasant rose-like smell, giving it one of its common names. Curiously, catching it in flower seems to have eluded me this year. I found it in abundance on the rocks of Bishop Point on May 7, then kept finding it on the East Glacier Trail in many spots showing some color in the opening buds as in this photo from May 9, but I never found the flowers open! That they did is sure, as fruits developed. How did I miss the flowers since I walked the EGT so often? Perhaps it is because the flowers are unisexual and I was seeing mostly the females without the fairly showy stamens, or that the head-like cluster of flowers never really opened this year?

Order Fabales Bromhead 1838

Family Fabaceae Lindley 1836 **peas**

Lathyrus Linnæus 1753, peas

LA-thih-rus. Greek λάθυρος *lathuros*, the name for peas.

Lathyrus japonicus Willdenow 1802 var. ***maritimus*** (Linnæus) Kartesz & Gandhi 1991, beach pea

jah-PON-ih-cuss. Of or pertaining to Japan; hence found in Japan. muh-RIH-thi-muss Latin *maritimus*, maritime; of, near; hence found near the ocean.

<u>Taxonomy</u>: Synonyms include *Lathyrus japonicus* Willdenow ssp. *maritimus* (Linnæus) P.W. Ball; *L.j.* Willdenow var. *glaber* (Ser.) Fernald; *L. maritimus* Bigelow; *L.m.* Bigelow var. *glaber* (Ser.) Eames; *Pisum maritimum* Linnæus; *P.m*. Linnæus var. *glabrum* Ser. Since Linnæus named it *Pisum*, the earliest name in the genus *Lathyrus* is from 1802 is by Willdenow and thus has priority over Bigelow's 1824 name. Hultén's *L.m.* L is incorrect.

<u>Notes</u>: With its very beautiful reddish-purple flowers, this is a showy plant clambering around and over the other plants—particularly beach grass—on the rocky beach of the Rainforest Trail. The stems are not angled and the tendril-tipped leaves have more than 6 leaflets and all are rather gray-green. The stems and leaves tend to hide among the other plants but the flowers are obvious.

<u>Ethnobotany</u>: Wikipedia notes (without reference) "The pods can be eaten but like many members of the genus *Lathyrus* they contain β-oxalyl-L-α,β-diaminopropionic acid, which can cause paralysis called lathyrism. The leaves of the plant are used in Chinese traditional medicine" yet P&M notes some natives ate the seeds (p. 91).

Lupinus Linnæus 1753, lupine, lupin (this mostly European)

LOO-pin-us, in America, sometimes loo-PINE-us or loo-PIE-nuss. The Latin *lupus*, wolf to *lupinus* of the wolf; from a belief that the plants were harmful to soil quite opposite from their beneficial effect of fixing nitrogen, or, as killers of wildlife. The exact derivation is lost to antiquity.

This is one of the most easily recognized genera in the plant kingdom in that after a single encounter with a lupine, all the others will be recognized immediately. If one sees pea-like (papilionaceous) flowers arranged in a spike with palmately compound leaves, it is a lupine. That being said, the circumscription of all the species in the genus is extremely confused and the number of species worldwide is nothing other than a guess. They range from very large woody shrubs to diminutive ephemeral annuals, but all share the leaf and flower arrangement.

> The difficulty of separating the perennial species in northwestern North America can be attributed to successive lupine migrations following the recession of the Pleistocene glaciers. The withdrawal of the ice enabled several formerly separated species to meet and to interbreed along their zones of contact. Hybridization is seen, for example, in the distribution patterns of *L. arcticus*, *L. nootkatensis*, and *L. polyphyllus* ..., which come together in southern Alaska, southwestern Yukon and northwestern British Columbia.
>
> The center of distribution of the genus is the western part of both North and South America and the Mediterranean area of Europe, Asia and Africa. Estimates of the number of species are somewhat inaccurate because of the plasticity of the populations and the very large number of names that have been applied to the group by various authors. The suggestion of 200 species by Turner (1959) and Smith (in Abrams, 1944) is reasonable for North America, although Hitchcock et al. (1961) gave a more conservative number of "probably 100 or more."

Dunn, D.B. & J.M. Gillett. 1966. *The lupines of Canada and Alaska*. Canada Department of Agriculture, Research Branch, Monograph No. 2.

Lupinus arcticus S. Watson 1873 ssp. ***arcticus***, Arctic lupine, kantákw

ark-tih-cuss. Latin *arcticus*, arctic, northern; from the Greek ἄρκτος *arktos*, a bear; from the northern constellation The Bear (the Big Dipper).

<u>Taxonomy</u>: Three subspecies are recognized today with *arcticus* the most northern ranging south to the northern third of British Columbia, including southeast Alaska. Hultén indicates hybrids with Nootka lupine occur (p. 36) and this is a list of synonyms for this confusing complex:

L. nootkatensis Donn var. *kjellmannii* Ostenfeld 1910. (Type: King Point, Yukon, Ostenfeld, 1908, isotype CAN)*L. borealis* Heller 1912. (Type: Rink Rapids, Klondike River, Yukon, Macoun 58426, RENO)*L. relictus* A. Nelson 1946, pro syn. (NY); *L relictus* Hultén 1947, nomen nudem in synonymy *L. gakonensis* C. P. Smith 1949. (Type: Gakona, Alaska, Anderson 8532, ISC)*L. multicaulis* C. P. Smith. 1949. (Type: Glenn Highway, Alaska, Anderson in 1944, ISC)*L. donnellyensis* C. P. Smith. 1949. Type: Donnelly Dome, Richardson Highway, mile 253, Alaska, Anderson 2281, ISC)*L. multifolius* C. P. Smith. 1949. (Type: Kluane Lake, Yukon, Anderson 9449, ISC)

<u>Notes</u>: More common to our south at lower elevations, this is mostly a mountain plant in our area, at least that's where I've found it on the Mount Roberts Trail. It is most easily distinguished from Nootka lupine by the very long petioles on the basal leaves, usually "2 to several times longer than the diameter of the leaf" (Hultén p. 35). This photograph illustrates a young plant still covered with its "downy" hairs that serve to protect fragile tissues from both the brilliant light as well as cold temperatures. As the plant matures, most of these hairs are lost save for the stems. It overwinters with its deep taproot and stout caudex (a thickened section of stem usually just below and just above ground level). That these plants are well-adapted to the tough condition here is attested to by this experiment:

> Seeds of the arctic tundra lupine (*Lupinus arcticus*) at least 10,000 years old were found in lemming burrows deeply buried in permanently frozen silt of Pleistocene age in unglaciated central Yukon. They readily germinated in the laboratory and have since grown into normal, healthy plants.

Porsild, A. E., C. R. Harington & G. A. Mulligan. 1967 Lupinus arcticus *Wats. Grown from Seeds of Pleistocene Age*. Science, 6 October 1967, 158 (3797): 113-114.

Lupinus nootkatensis Donn ex Sims 1810 var. ***nootkatensis***, Nootka lupine, kantákw

newt-kuh-ten-sis. Of or pertaining to the area of Nootka Sound or Nootka Island on the west coast of Vancouver Island, the word coming from the name of the *Nuučaańuł,* Nuu-chah-nulth, the indigenous people of the area.

<u>Taxonomy</u>: Numerous local forms have been given names (TROPICOS includes eight) that are now rejected and even Hultén is reluctant to

name varieties and simply notes in the text "plants with more sericeous pubescence [fine silky hair] have been called var. *fruticosus* Sims" named in 1820. If one is compelled to lower taxa names, *The Illustrated Flora of British Columbia* gives this little key:

> Two sympatric extremes are usually recognized. 1. Hairs spreading, long and shaggy; stems 10-15 mm in diameter.................var. *nootkatensis* 1. Hairs appressed or short and soft-wavy; stems usually less than 9 mm in diameter................ var. *fruticosus* Sims

Nootka lupine is found in many open environments from sea level to rather extreme elevation where edaphic (soil) and local climate strongly effect the stature and hairiness of the plant. History should have taught us that pubescence is a poor character to base distinctions on, and it seems best to me to simply leave it at the species level allowing for ample variation within a really rather small geographic region.

Notes: This is *the* signature plant of the Moraine Ecology Trail as a showy and long-flowering plant. From my first flower on May 22, 2009 I continue to be able to find a flower to show the pea morphology until the first week of September of in all my years in Juneau. If one takes even a cursory glance at the plants in the more elevated portions of the Gastineau Channel at the Mendenhall River, one simply cannot miss the masses of this gorgeous plant. If I had to name "a" plant of Juneau, I think a very strong case could be made for this gorgeous lupine. It doesn't hurt that I was born into the geographic center—California—of the genus where there are 119 taxa named.

Most folks seem to enjoy my little discourse on the papilionaceous (resembling a butterfly, *papilio* in Latin) form of this flower. Many are familiar with sweet peas and this flower strongly resembles them. The most obvious difference is that the *banner* (also called a standard) is folded back on itself whereas on sweet peas it is spread open and quite large. Below that, the two blue *wings* are joined ever so slightly together at their tip which hides the two petals that form the *keel*, what I call the "viking warship" complete with a "navigator" standing on the tip which is the stigma atop a long style, just barely under the pointed end of the keel. It also looks like a bear claw! When I gently pull the keel off, it exposes the stamens with their bright orange pollen.

Nootka lupine is perennial from a stout and woody underground stem base. In spring, new growth emerges among the dead and dried stems of last season, often with the black legume cases. As the leaflets unfold, their long-shaggy underside is prominent, only to be hidden underneath by the glabrous upper surface when the leaflet flattens out.



When the inflorescence buds form, they appear egg-shaped and shrouded in long (3+ cm) pointed green bracts covered with long (0.5 cm +), silky hairs. When in bud, these hairy bracts are the most obvious part of the inflorescence, but as the flowers grow they turn pale yellow and seem to be simply outgrow by them. They wither away loosing the long silky hairs as the flowers form and are completely gone at full flowering. I find no description of these bracts in the scientific literature but find them appealing to the eye in spring as a sign of the glorious flower to come. As the buds open, the wings cover the sexual parts as they await their ripening.



Sometimes as the flowers open the banner lies flat above the other petals. “The Story” goes that the banner uses color to alert the pollinators (presumably the bumblebees) as to which flower is ready for pollen and which have already been pollinated. What is true is that the younger flowers (near the top of the inflorescence as it flowers from the bottom up) have a banner that is largely white with a dollop of pale yellow with a few vertical dashes of purple. As the flowers age, the center fold of the banner turns a vibrant magenta-purple fading to blue at the edges. From this, most of us learned that the white gets the attention of the bees, the yellow shows the bee where to go and the dashes give the final directions. The bee sits or heavily hovers on the wings which cause them to drop and expose the keel with its load of pollen. “The Story” tells us when the banner turns dark, the flower is pollinated and tells the bees not to bother with it. Trouble is, I see bumblebees hovering around both the white and the purple bannered flowers! I have opened a couple hundred flowers of both colors and do find the purple ones have been pollinated with the pistil already growing into a legume. Are the bees a bit confused? This story may have some very general truth to it but has lots of exceptions.



The legumes are quite pubescent, up to ~6 cm long (though usually ~4 cm) and develop quickly emerging from the still pretty keel. As the legume ripens, it turns almost black as it dries. The two suture veins dry faster than the more fleshy sides creating a significant stress that causes the pod to twist. When the stress exceeds the strength of the sutures, they fail dramatically and instantly. On nice, sunny late summer afternoons when the humidity is low, I can hear the sound of the popping legume as I walk the trails. It's not very loud, but once one hears it, the sound is distinctive enough to remember and listen for in future walks. The warm, sunny summer of 2013 provided great opportunity to enjoy this subtle sound. When walking among ripe lupines, my ears are always open for this enchanting sound. On the rare occasion—two at the point of this writing—when I've seen the legume split it seems likely the seeds can be propelled at least a meter away.


The "non-summer" year of 2012 began with a very cool April that never seemed to warm and continued into a very wet summer. Lupine flowers were plentiful, but they didn't fruit. This weather seems to have had a significant negative effect on the population of lupine pollinators, most notably the bumble bee (undetermined species in the genus *Bombus*). Normally the outwash plain below Mendenhall Lake is lush with flowering lupine and extra-specially colored bumble bees who have been busy crawling about the keel petal to expose the anthers with their load of orange pollen that sticks to the hairs on their six legs. It's as if they are young girls who have discovered mom's mascara and loaded it on! As they bumble by, they are more orange from the pollen than their usual yellow.

In 2012 I never saw a single bumble bee! That their numbers were dramatically reduced became clear with the vast number of empty flower stalks that would normally have ripening fruits illustrated by the left photo above taken on July 18 when the lower stems should be loaded with ripening fruits. There is only one lone pod in this patch when there should be dozens. It wasn't until September that things warmed up and dried out enough that pollinators worked the lupine flowers and only the very top flowers, the last to open, had a chance at pollination as the photo on the right illustrates, taken on September 20. The best guess I have at what caused the collapse of their population were late frosts that went deep into the ground freezing the bees, then followed by heavy rains that drowned them in their underground overwintering chambers.


The spectacular summer of 2013 produced an amazing garden of lupines wherever they grow, but especially in the Mendenhall Wetlands north of the river. The view in July was a sea of blue-purple as far as the eye could see in the flats. Weather was one for the record books in terms of wonderful with 43 partly cloudy to clear days in June, July and August. These conditions seem to be optimal for the lupine as the showing of this species throughout the entire Juneau area was nothing short of spectacular. Every plant was robust and loaded with full inflorescences. Bumblebees were out and about busily visiting many lupine flowers and becoming covered with their orange pollen. Fruiting was extremely successful (see photo near end of this species account) indicating pollination was thorough.

The very warm and dry spring of 2014 produced its first flowers at the middle parking lot at the glacier on May 18 but proved to be a poor predictor of the wet summer to follow. Fruits developed from the early flowers, but flowers fell off the inflorescence stem unpollinated most of the summer. A few days of clear weather at the end of July allowed pollination and some new fruits with only a small number of bumblebees noted and few legumes produced.


While bumble bees seem to be considered the primary pollinator of this lupine, nearly every time I open a mature flower I find small beetles inside. They look, to my eyes, exactly like *Pelecomalium testaceum*, the skunk cabbage beetle. There is one clinging to the innermost stamen in this photo, grossly enlarged in the next. There will often be six to eight inside the keel (here stripped away to show its contents) crawling about. They are very shiny and don't seem to accumulate much, if any, pollen. They are very active and always moving so it's not hard for me to conclude they could carry pollen about.

However, I remain a bit confused about lupine pollination here. Garden lupines (hybrids that largely come from English horticulturist George Russell's experimenting with the very showy *Lupinus polyphyllus* that included *L. nookatensis*) are usually considered self fertile. Nootka lupine has become a serious pest in Iceland where it is strongly self-fertile and "depends to a large extend on self-fertilization (70%), but cross-pollination by bumble bees also occurs."* Perennials.com [http://www.perennials.com/plants/lupinus-nootkatensis.html] notes "This perennial species will self sow if conditions are to its liking."

If this were the case here, why few fruits here in 2012 and 2014? My observations here of bumble bees and the little beetles and 2012 and 2014's lack of fruits make me think our plant are not self-fertile.

* Magnusson, B. 2010. *NOBANIS – Invasive Alien Species Fact Sheet* – Lupinus nootkatensis. From: Online Database of the European Network on Invasive Alien Species – NOBANIS www.nobanis.org, Date of access February 11, 2012.

Ethnobotany: Hultén notes the seeds "are poisonous, causing inflammation of the stomach and intestines" (p. 36). At least some Alaska natives considered the roots poisonous yet their "roots peeled and inner portion eaten raw or boiled". [1] The Bella Coola Kimsquit people of British Columbia roasted the roots for food [2] and the Tsimshian people from Annette Island just south of Ketchikan apparently ate the roots raw after peeling them. [3] The roots were roasted or pit cooked by the Nuxalk and Kwakwaka'wakw from the area south of Haida Gwaii roasted the roots for food (P&M). There are some rather strange reports of the plant being used as a mild intoxicant: "nothing mindblowing to report about it, but a pleasing mellowing which everyone who has tried it has enjoyed" [4].

It seems the European lupines have been used for food for centuries, and upon receiving New World plants they created a new category for them: sweet lupines were edible and bitter lupines poisonous. [5] It has always been my understanding that New World lupines are poisonous, and one of the nasty alkaloids, lupinine, derives its name from the lupine. A secondary poisoning called Mycotoxic Lupinosis occurs when the fungus *Phomopsis leptostromiformis* grows on the ripening pods. It causes significant mortality in cattle. [6] I think it wise to consider our wild lupines poisonous.

Glacier Bay National Park includes Nootka lupine in a list of plants that brown bear eat. [http://www.nps.gov/glba/naturescience/foods.htm] and P&M note "Grizzly bears relish the roots of Nootka lupine and make large feeding excavations on north coastal estuarine marshes where both lupines and bears thrive."

Ecology: Nootka lupine is a pioneer species that successfully exploits the meager nutrition of the glacial outwash plains, seashore regions and open slopes of Northwest North America that requires full light and is intolerant of shade. As a legume, it is well-known that it hosts the nitrogen fixing bacteria *Rhizobia* in its roots that take the inert atmospheric nitrogen, N_2, and convert it into the more useful ammonium (NH_4). [7] As the above ground plant parts die back each fall, nitrogen is transported into the soil system and available for any plant. In addition, large amounts of other macronutrients flow with it as this study from Iceland found. "Nootka lupin is very rich in calcium and magnesium and near the lupin plants the soil became enriched with exchangeable calcium and magnesium and the pH increased. Soil organic matter increased significantly near the lupin plants." [8]

[1] Heller, C.A. 1953. *Edible and Poisonous Plants of Alaska*. University of Alaska. p. 157.
[2] Turner, N.J. 1973. *The Ethnobotany of the Bella Coola Indians of British Columbia*. Syesis 6:193-220 p. 205.
[3] Compton, B.D. 1993 .*Upper North Wakashan and Southern Tsimshian Ethnobotany: The Knowledge and Usage of Plants*. Ph.D. Dissertation, University of British Columbia p. 249.
[4] Psi Locybe. 2003. *An A4B2 Nicotinic Acetylcholine Agonist??: An Experience with Nootka Lupine* (Lupinus nootkatensis). Erowid.org. Posted Jan 19, 2003. https://www.erowid.org/experiences/exp.php?ID=20544
[5] Hedrick, U.P., ed. 1919. *Sturtevant's Edible Plants of the World*. 387-88.
[6] The Merck Veterinary Manual. http://www.merckmanuals.com/vet/toxicology/mycotoxicoses/mycotoxic_lupinosis.html
[7] Postgate, J. 1998. *Nitrogen Fixation*, 3rd Edition. Cambridge University Press, Cambridge UK.
[8] Björnsson, H. 2007. *Fertilization of Nootka lupin* (Lupinus nootkatensis) *for biomass production and carbon sequestration*. Icelandic Agricultural Sciences 20, 81-92.

****Lupinus polyphyllus*** Lindley 1877, bigleaf lupine, big-leaved lupine, large-leaved lupine, bog lupine, meadow lupine, blue pod, Washington lupine

pah-LIH-fill-us. Greek πολλοί, *polloi*, many + φύλλο *fyllo*, leaf; hence many-leaved referring to the many leaflets.

While perhaps one of the more common and widespread lupines to our south, this robust species is not common here. I only found these four plants in August of 2014 in a most obvious place along Glacier Spur Road. This forces me to be reminded that I must always be observant for the unexpected. The two things that stand out separating this plant from the ubiquitous Nootka lupine are the later development of the flower and the very large size of the leaves, with 5 to 17 leaflets that are 3–15 centimeters (1.2–5.9 in) long. This species has been collected at Lake Atlin in British Columbia some 45 miles northeast of Juneau and in Skagway. These are apparently introductions from plants moved here form further south and are not considered native to our local environment.

Trifolium Linnæus 1753, clover

try-foe-lee-um. Latin *tri-*, three + Latin *folia*, leaf; for the three leaflets.

****Trifolium pratense*** Linnæus 1753, red clover, 06/28/09

pray-ten-sis. Latin *pratensis*, of a meadow.

A weed of yards and roadsides and while obvious, doesn't grow with as much showy abandon as in the lower 48.

****Trifolium repens*** Linnæus 1753, white clover, 06/28/09

Latin REH-pens, American reh-PENS. Latin *repere*, creep, crawl.

A weed of yards and disturbed areas in urbanized Juneau.

Vicia Linnæus 1753, vetch

Lain VIH-key-ah, American VEE-see-ah. Latin *vicia*, vetch.

Vicia americana Muhlenberg ex Willdenow 1802, American vetch, purple vetch, mat vetch

Of or pertaining to America.

This lovely ground-hugging plant can be found along the west shore of Mendenhall Lake in the zone just above the normal range of the rise and fall of the lake during the season and below the area of woody growth on primitive soils. As this photo shows, it thrives in gravel and rocky areas where there is minimal organic matter. It possesses a massive taproot, that can easily reach a meter deep, as well as rhizomes to spread along the surface. The plant has a huge range in North America and grows in the chaparral of the southwest and under forest canopy in the northern areas and is drought resistant. With this vast range comes tremendous variation in the hairiness of the leaves and the color of the flower. Here the leaves are sparsely hairy and the flowers lavender to pink.

Order Rosales Berchtold & J. Presl

Family Rosaceae A.L. de Jussieu 1789 **roses**

Taxonomic order follows that of FNA 2014 based upon

Potter, D. et al. 2002. *Phylogentic relationships in Rosaceae inferred from chloroplst* mat*K and* trn*L*-trn*F nucleotide sequence data*. Plant Systematics and Evolution. 266:5.43.

Rubus Linnæus 1753, bramble, blackberries, dewberries, raspberries

ROO-bus. From Latin *ruber*, red, to *rubus*, an old name for bramble, briar; prickly shrub.

Almost everyone can recognize a blackberry, but it takes a specialist to be able to name many to species. As FNA 2014 says "*Rubus*, especially the blackberries, presents some of the most difficult species-level problems, because of polyploidy, apomixis and hybridization. As a result, differences of opinion on the number of species to be recognized from a give region can vary tremendously..." Worldwide there may be as few as some 250 or as many as 700 or any number in between. FNA 2014 recognizes 37 species in North America.

Nearly everyone knows them by their fruit but few take more than a quick glance but do note the "fruit" has many little balls on it. Each of these little balls are the actual fruit and they are not berries. The whole is called an *aggregate of drupelets*. Each of the little balls is a drupelet as they have a fleshy outer part encloses a hard inner part with a single seed. They develop from a single flower where the pistil has a few to many individual free carpels.

Raspberries differ from blackberries in that when the aggregate is pulled from the flower the receptacle remains on the flower with the fruit having an empty space. When blackberries are pulled, the receptacle comes with it so the center of the fruit is filled. Dewberries are low-growing but have the sexes in separate flowers (dioecious) as in cloudberry.

Among the large, wandy *Rubus*, one must learn to distinguish *primocanes* from *floricanes*. A new wand, called a cane, grows remarkably fast from the rootstock and usually has no side branching and will not produce flowers and is called a primocane. The leaves are nearly always 5-palmate. This same cane, in its second year, will previously dormant lateral buds produce side shoots that produce flowers when it becomes a floricane. The leaves are usually a mix of 3- and 5-palmate.

Rubus arcticus Linnæus 1753 ssp. ***acaulis*** (Michaux) Focke 1910, Arctic raspberry, dwarf nagoonberry, neigóon (the source of the common name).

ARK-tih-cus Latin *arcticus*, arctic, northern; from the Greek ἄρκτος *arktos*, a bear; from the northern constellation The Bear (the Big Dipper).
a-call-is Latin *a-*, without + *caulis* the stalk of a plant; hence without a stem, here meaning no vertical or rising stem.

This identification to subspecies is based on Hultén's key where the flowers exceed the leaves (as all the plants along the forested trail around Floyd Dryden Middle School do) and that the leaflets are more ovate than lanceolate (as in ssp. *arcticus*) and definitely not 3-lobed (as in ssp. *stellatus*). FNA 2014 adds the very helpful "flowers solitary".

The showy red or reddish-pink flowers are unique to this bramble, at least here in Alaska. The fruits of nagoonberry are very similar to five-leaved bramble, but have more druplets and look far more like a raspberry as then can reach 1 cm in diameter. My daughter Bess considers them her favorite, particularly when made into jam and I'm not going to disagree. They are certainly easier to pick than many of our *Rubus*. Common in wet meadows and muskeg edges, some folks around here protect their own little patch by not letting others know of its whereabouts. They are abundant in the drainage ditches along Mendenhall Loop Road near Back Loop Road where they are not especially appealing for collecting due to the traffic and potential pollution. In 2011 there were a profusion of flowers that made all think it would be a banner year for fruits, but very few fruits developed. It seems that the cool spring and early summer hindered the eruption of pollinating insects. As similar thing happened in 2014 when an abnormally warm and sunny May was followed by a record rainfall and cool summer. A substantial population under the middle parking lot salmon viewing platform at the glacier had plants in flower on May 9, 2014; a reflection of the very warm and dry spring. Those alongside the east side of Glacier Spur Road were flowering two days earlier.

Rubus chamaemorus Linnæus 1753, cloudberry, baked-apple berry, néxh'w

cam-ee-more-us Greek χαμαι *chamai*, on the ground, + μούρο *mouro*, mulberry; and a fruit like a mulberry lying on the ground.

Taxonomy: Because of its distinctive nature, it was elevated into its own genus as *Chamaemorus* Hill 1756 with two species: *C. anglica* Greene 1906 and *C. norwegica* Greene 1906.

Notes: Another of our "wild raspberries", cloudberry is a delight to the eye and palate with its large (1 - 2 cm) spreading white flowers and salmon-colored juicy fruit. P&M note it has a "baked apple taste" but I've not gotten that from it at all. In Atlantic Canada it is called "bake apple".It is nowhere near as tart as most raspberries. When not in flower or fruit, the leaves are quite distinctive from our other dwarf brambles being simple but 5-lobed, but the lower two are much smaller and merely indented. The flowers are nearly dioecious, with "male" flowers having non-functional reduced pistils and "female" flowers with similarly reduced and non-functional stamens. The fruit color is unique in the genus. It is abundant in our muskegs yet can be found as almost a weed in quickly drained sands on glacial outwash plains where there is enough ground cover to protect the very thin soil.

Rubus parviflorus Nuttall 1818 var. ***parviflorus***, thimbleberry, ch'eex'

par-vih-floor-us Latin *parvus*, small, little, insignificant + *florus*, bloom or flower; hence small-flowered.

<u>Taxonomy</u>: As must be expected when a plant has such a widespread range, many names have been applied to it. PLANTS only recognizes two varieties and Tropicos lists 21. Until someone takes on this as a serious monograph, the broad sense seems most parsimonious.

<u>Notes</u>: Easily spotted and identified, the giant (up to 25 cm!) 5-lobed palmate leaves growing off unarmed canes, and large (up to 28 mm across) white flowers are unmistakable. The flowers form a bowl, unlike most *Rubus*, and the edges of the petals are crinkled or finely undulate. These flowers are anything but small and makes on wonder how the scientific name was chosen. The fruits range from orange to red and in taste from pleasant to "insipid" (P&M p. 7). I seem to find more of the latter than the former.

The plant forms thickets in disturbed areas where there is light. It grows as nearly a wall along Thane Road above the Rock Dump and the avalanche zone. It is abundant on the lower reaches of the Perseverance Trail.

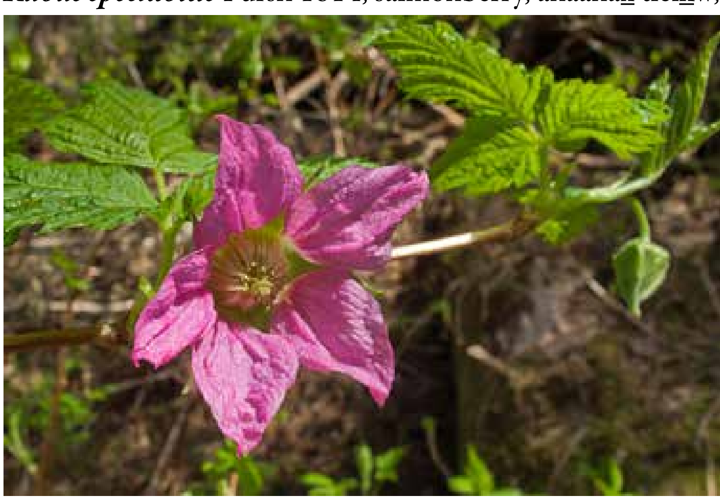
Rubus pedatus J.E. Smith 1791, five-leaved bramble, trailing raspberry, strawberryleaf raspberry


peh-DAY-tuss Latin *pedatus* from *pedis*, foot. Botanically, a leaf palmately divided into three main divisions, the two outer divisions forked into smaller ones.

A plant without a taxonomic morass of names! And my favorite of the wild raspberries. But that gets into a morass of common names in that raspberries, blackberries, boysenberries and the like don't have any real taxonomic value other than raspberries are red and tart-sweet. As my photo shows, this dwarf bramble (a word that originally referred to thorny plants but now by use seems reserved for the genus *Rubus*), this diminutive plant can be a ground cover in deep woods or forest edges as it spreads by thin runners. At each node on the rootstock, a single leaf or leaf and flower arise.

The flower is immediately recognizable as a blackberry with its five white petals. I've not determined how many pistils the flowers have, but when the drupelets develop, the most I've ever seen on one flower stalk is seven with one to three the most common. As they ripen they rapidly enlarge to their mature size of 3 to 5 mm long. They start out bright white and hard like a kernel of corn and gradually become raspberry red from the top down to the base, not uniformly but with gore-shaped white stripes giving the nearly ripe fruit a peppermint candy look to it. When it becomes fully red, it still is not ripe as the texture is stiff when felt. The red deepens in color, then becomes a bit faded and the fruit is perfect for eating! Picking them now is a real problem, as the skin is so soft and the pulp so luscious that they often burst in my fingers, but then I just lick the juice off. I enjoy them best by placing them on the tip of my tongue and popping them against my upper palate and savor the tart and sweet juice. Hultén (p. 01) makes two seemingly contradictory comments "...palatable" and later "...makes an excellent jam, but the plant rarely occurs in large quantities." They are far more than 'acceptable to the mouth' and the plant here does occur in large quantities. It's just that not that many of the flowers bear fruit and when they do it's in very small numbers. Without fruits, the white calyx is persistent and is almost showy as in the second photo showing its ground cover habit.

Rubus spectabilis Pursh 1814, salmonberry, anáanáx̲ tléik̲w, was'x'aan tléighu, tléikhw wás'i




Latin speck-TAH-bih-liss, American speck-tah-BIH-liss New Latin *spectabilis*, noteworthy, outstanding; worth consideration.

Our two large *Rubus* are similar in that they often form thickets, have unarmed (*R. parviflorus*) to barely-armed canes (*R. spectabilis*) and have distinctive color flowers. The canes of well-established colonies often show significant exfoliation that can be visually striking. The solitary uniquely magenta-colored flowers crown this pretty shrub make it easily spotted at a distance, even when hidden below the canes as they sometimes do. The trifoliate leaves are unique in that when the uppermost leaflet is folded back, the lower opposite ones look very much like a butterfly as the are themselves 2-lobed, the lower sometimes just a mere indention.

Salmonberry was the prize find for Georg Steller on Kayak Island in 1741 as he notes

> Of fruit-bearing bushes and plants, I met with only one new and elsewhere unknown species of raspberry, growing in great abundance but not yet fully ripe. Because of its exceptional size and its unique and exquisite taste, this fruit ... deserved that a few bushes of it be taken along in a box with soil to be sent to St. Petersburg to be propagated. [Steller's Island, p. 4]

As he notes the fruits were not quite ripe, it makes me wonder what incredible adjectives he'd give to a tasty ripe fruit! Perhaps having eaten such poor fare since leaving Kamchatka, anything sweet would be a real treat. Like thimbleberry, I find the fruits range from, more commonly, absolutely wonderful to, less commonly, blah and "insipid". I wish I could tell the difference from the plants, as I could make a lot of money in the propagation business! The color, while ranging from yellow to orange to red is often salmon-colored and gives the plant its common name. The druplets really stick together making it a very easy "berry" to pick and store without turning to jelly prematurely.

Of the two *Rubus* native to the Hawai'ian Islands, *R. hawaiensis* is a very close relative of *R. specetabilis* and strongly resembles it, especially in flower color. They have been found phylogenetically very close together with the endemic *R. hawaiensis* a long-distance migrant from northwest North America that has now become its own species. It travelled like our humpback whales!

Morden, C.W., D.E. Gardner & D.A. Weniger. 2003. *Phylogeny and Biogeography of Pacific Rubus Subgenus Idaeobatus (Rosaceae) Species: Investigating the Origin of the Endemic Hawai'ian Raspberry* R. macraei. Pacific Science, v 57, no. 2:181-197.

Geum Linnæus 1753, avens

jee-um (soft g) and gee-um (hard g) are almost interchangeable in America. Take your pick. Greek γεύο *geuo* or γευο *geyo*, to give relish, alluding to the quality of the roots of St. Benedict's herb (*Geum urbanum*) to Latin *geum*, an ancient name for avens.

"Avens" has an obscure history and may come from the Medieval Latin word *avencia*. The name has been applied to these plants in English since the 15th Century.

Geum species can be difficult to identify to species in areas where there are multiple species, often requiring flower, fruit and leaves. The two species in our area are instantly identifiable at a distance, simply by flower or leaf size.

Geum calthifolium Menzies ex J.E. Smith 1810, caltha-leaved avens

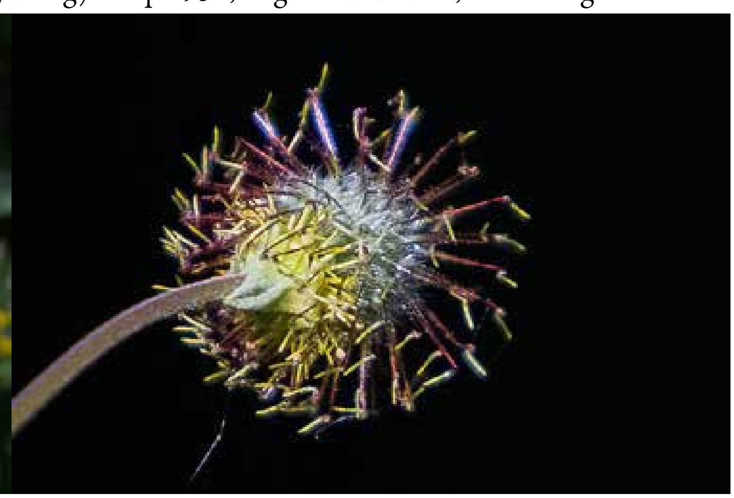


cal-thih-FOE-lee-um. *Caltha*, the marsh marigold + Latin *folia*, leaf; hence with leaves like the marsh marigold.

This is a large-flowered avens forming especially beautiful bouquets in alpine meadows such as the bowl above the Dan Moeller cabin and spots along the Alpine Loop Trail and Mount Roberts trails. The petals are ~1 cm long so the flower can be up to 3 cm across on robust plants. The long-petioled basal orbiculate (circular) to reniform (kidney-shaped) leaves are almost as obvious as the flowers when the plant is not in flower as nothing in the meadow resembles them. The common name comes from their resemblance to the marsh marigold (*Caltha*) When the flowering stalk arises, similarly shaped leaves form on the stem but they are sessile and dramatically reduce in size up stem with the tiny uppermost being trifoliate. The worldwide range is strictly coastal from British Columbia to northern Japan where they are either var. or ssp. *nipponicum*.

This flower gave me lots of trouble identifying it in 2007 as I was sure they were some odd form of *Caltha* with their five broad petals and almost innumerable stamens. It took a very close look at the pistil by dissecting the flower and separating it from the stamens to discover it is in the Rosaceae instead of the Ranunculaceae. This is a lesson I must re-learn rather often.

Geum macrophyllum Willdenow 1809 var. ***perincisum*** (Rydberg) Raup 1931, large-leaved avens, aankanáagu

ma-crow-fill-um. Greek μακρός *makros*, large + φύλλο *fyllo*, leaf; hence large-leaved.

Taxonomy: There are two named varieties are based on pedicel hairs and cauline leaf dissection that I find minor and the populations sympatric (occurring in the same place). The epithet means "thoroughly incised", referring to the cut between the leaflets almost to the base, visible in the left photo. The puberulence (covered in soft, downy hairs) on the pedicel is just barely visible in the left photo where there are glands.

Notes: The basal leaves are quite distinctive and easily spotted as they are lyrate-pinnate with the outermost 3-lobed leaflet many times larger than the others. Similar to *Agrimonia*, the pinnate leaflets are arranged large-small-large-small, all getting smaller down the petiole.

Long-flowered, plants can be seen with flower as early as late May and into early October! The flower can be showy or somewhat hidden in the foliage as it isn't always bright yellow with large (up to 6 mm) petals. The petals are cuneate-ovate with a narrowed base which makes a visible space between the petals at eye height distance. The many stamens are arranged in several dense whorls just above the petals ripening from the outer to the inner. The pistils are in a conical dome and give rise to a unique S-shaped style that remains with the achene when ripe, both very bristly, to attach to any animal walking by.

This just might be the most abundant wildflower of the area as I find the species just about everywhere I go. It is even a common garden weed in Juneau yards. It is nearly always in much drier places than *G. calthifolium*, often along roadsides and sidewalks where the ground has been compacted such as in the parking lot at the Mendenhall Glacier Visitor Center, along Steep Creek Trail and in the median between the bicycle path and Mendenhall Loop Road. The worldwide range is quite similar to *Geum calthifolium* where the Asian material has been named var. *sachalinene*.

Rosa Linnæus 1753, rose

rose-uh. Late Latin *rosa*, rose; rose bush.

Most casual observers don't recognize wild roses as they only have five petals while having a large number of stamens. In the long history of rose cultivation, they have been genetically altered to favor petal production over stamens and some to many of the whorls of stamens have been changed into petals to give the very full look of "modern" roses. A few heirloom roses that are returning to popularity have only five petals.

Rosa nutkana C. Presl 1851 var. ***nutkana***, Nootka rose, k'inchéiyi (referring to the rose hips)

newt-CA (as in cat) -nuh. Of or pertaining to the area of Nootka Sound or Nootka Island on the west coast of Vancouver Island, the word coming from the name of the Nuu-chah-nulth, the indigenous people of the area.

Taxonomy: FNA 2014 recognizes three varieties, PLANTS recognizes four, Tropicos lists eight, but they seem ill-defined and even Hultén uses only the full species.

Notes: The five broadly wide (4 -7 cm) pink to deep rose (or occasionally white) flowers grow singly on short branch tips. Five green sepal hug the base of the petals but have spreading tips and are long-persistent with the fruit. When the stamens are ripe (fresh pollen is being formed), there are nearly always an assortment of flying insects in the flowers, none of which I've taken the time to collect and attempt to identify even though they're in my photos. The plants grow to nearly 2 m at the end of the Airport Dike Trail.

This rose has giant 2 to 4 cm hips that ripen in August and September. When I scrape out the hairy achenes inside, they are sweet and crunchy like an apple. They are easy to pick as this rose is nearly unarmed with prickles (but those that are armed, make up for those that aren't!). The Tlingít collect hips after frost claiming they are sweeter. "Traditionally, rose hip tea was used for cramps, coughs and colds. Rose hips can also be used in jellies and baked goods. Rose petals can be used in salad, sandwiches, tea, jellies and omelets. (Remove bitter white base of petal)."

_____. undated. *Southeast Alaska Traditional Food Guide*. SEARHC Health Promotion, Southeast Alaska Regional Health Consortium, Juneau, AK.

This beautiful rose has an amazing range of habitats here in Alaska, but in the Juneau area I find it normally as a shore plant on the Airport Dike Trail, the beach section of the Rainforest Trail, Eagle Beach, at Point Louisa, and in my back yard.

While considered a shrub, and its size can be substantial (2 m tall). The stems, while stiff and support the large plant, are not at all woody. Older canes dry to what looks like a woody stem but can be snapped off the plant with little effort and feel more like brittle paper. The new stems of each year of my yard roses are densely armed with prickles that are usually soft enough that when I reach in to prune out old growth are not bothersome at all. Some of the plants on the Dike Trail have very stout prickles. Apparently, the closer one gets to the outer coast, the more pronounced and robust the prickles. I do remember this from my days at Humboldt State and the large population on coastal cliffs at Del Norte Redwoods State Park.

I just can't help but include the photo of my friend Mark Carls stopping to smell the roses!

Argentina Hill 1756

Latin ar-GEN-tih-nah, American ar-gen-TEE-nah. Latin *argentum*, silver; for the silver undersides of the leaves.

Taxonomy: *Argentina* is easily separated morphologically from *Potentilla* by its single flowers and runners and has been elevated to generic status numerous times. Jepson 2012 and FNA 2014 subsume it back into *Potentilla* as its genetics are extremely close. See notes under *Potentilla*.

Argentina egedii (Wormskjöld ex Hornemann) Rydberg 1898 ssp. *egedii.* See notes under *Potentilla anserina*.

Potentilla Linnæus 1753, cinquefoil

poe-ten-till-uh. Latin *potens*, powerful, strong, capable + *-illa*, diminutive.

"The scientific name seems to have been influenced by a fusion of ancient names for these plants: Common Tormentil (*P. erecta*) was known as *tormentilla* in Medieval Latin, derived from early Spanish – literally "a little torment", meaning pain that while not debilitating is unpleasant and persistent (such as a belly ache, against which *P. erecta* was used). The change from initial "t" to "p" seems to have been influenced by terms such as *poterium* – Latin for the related burnets (*Sanguisorba*) –, or *propedila* and similar words used for the Creeping Cinquefoil (*P. reptans*) in the now-extinct Dacian language, as attested in Latin herbals." [Wikipedia, unadorned with references, but sounding reasonable!]

Taxonomy: See comments under *Anserina*. *Potentilla* has more often than not been considered *sensu lato*, in the wide sense, but *Anserina, Comarum, Dasiphora, Drymocallis, Duchesnia*, *Horkelia*, *Ivesia*, *Sibbaldia,* and *Sibbaldiopsis* have often been elevated to generic state or subsumed back into *Potentilla*. While the 2012 Jepson manual and FNA 2014 take a narrow sense of the genus, they both return *Anserina* into *Potentilla*.

Erikkson, T., M.S. Hibbs, A.D. Yoder, C.F. Delwiche & M.J. Donoghue. 2003. *The phylogeny of Rosoideae (Rosaceae) based on sequences of the internal transcribed spacers (ITS) of nuclear ribosomal DNA and the TRNL/F region of chloroplast DNA*. International Journal of Plant Science 164 (2): 197-211.

Potentilla anserina Linnæus 1753, subspecies ***pacifica*** (Howell) Rousi 1965 Pacific silverweed




Latin ann-SIR-ih-nuh American ann-sir-EYE-nuh. Latin *anser*, goose +*ina*, of the so "of the goose", apparently from an old European notion that either geese ate the plants or the leaves looked like goose prints!

pah-SIH-fih-cah of or pertaining to the Pacific Ocean, here due to its coastal range.

Taxonomy: FNA 2014 notes:

> The generic assignment of *P. anserina* is problematic... (v9 p122)
>
> *Potentilla anserina* is the atypical and only representative in North America of a primarily southeastern Asian section. Although provisionally retained within *Potentilla*, the morphological distinctiveness of the section has led to the recognition of *Argentina* as a segregate genus ... Molecular analyses ... have confirmed the section is a strongly supported monophyletic clade, albeit including some other species treated by J. Soják (1994) as the segregate genera *Piletophyllum* (Soják) Soják and *Tyhlosperma* Botschantzev. Chloroplast markers ... place this clade sister to all other Pontilleae; nuclear markers ... indicate instead a sister relation to Fragariinae. (v9 p127)

This recent work results in *more* confusion and illustrates the complicated evolutionary history of this group of roses. Many recent works use *Argentina anserina* subsp. *egedei* (Wormskjöld ex Hornemann) Á. Löve & Ritchie 1966. Take your pick!

Synonyms:
Fragaria anserina (Linnæus) Crantz 1763
Dactylophyllum anserina (Linnæus) Spenner 1829
Argentina anserina (Linnæus) Rydberg 1898

Subspecific taxa:

It turns out that the old *Potentilla anserina* Linnæus has been divided up many ways, but remains a complex of forms that are not easily comprehended. FNA 2014 takes a conservative approach and follow J. Soják (1994) in recognizing four subspecies with ours being *pacifica*. Be very careful treading here as the distinctions are very technical. If it's on the coast and the underside of the leaf is densely hairy, it is *pacifica*.

Synonyms:
Potentilla anserina var. *grandis* Torrey & A. Gray 1840
Potentilla anserina var. *egedei* (Wormskjöld ex Hornemann) Torrey & A. Gray 1840
Potentilla pacifica Howell 1898
Argentina egedii (Wormskjöld ex Hornemann) Rydberg 1898 ssp**.** *egedii*
Argentina anserina var. *grandis* (Torrey & A. Gray) Rydberg 1898
Argentina occidentalis Rydberg 1908
Argentina pacifica (Howell) Rydberg 1908
Anserina litorallis Rydberg 1908
Potentilla anserina subsp. *egedei* (Wormskjöld ex Hornemann) Hiitonen 1933
Potentilla egedei var. *grandis* (Torrey & A. Gray) J.T. Howell 1948
Potentilla rolandii B. Boivin 1951
Potentilla anserina ssp. *pacifica* (Howell) Rousi 1965
Argentina anserina subsp. *egedei* (Wormskjöld ex Hornemann) Á. Löve & Ritchie 1966
Potentilla edgedii Wormskjöld. ssp. *grandis* (Torrey & A. Gray) Hultén 1967
Potentilla egedei subsp. *pacifica* (Howell) L.A. Sergienko 1982

Hultén separates four subspecies with *P.e*. ssp.*e.* further split to var. *e.*! PLANTS and ITIS retain only two ssp., *e*. and *groenlandica*, and the distinction between them is not clear. Apparently *A. e*. is the more salt tolerant form while *A. anserina* is inland and, according to Hultén, introduced to waste places from Europe.

The orthographic variant *egedei* is used by TROPICOS for all the taxa that include it with the annotation "as *egedii*". This form is apparently the correct Latinization of Egede's name. All the original descriptions and current floras use *egedii*.

Notes: The five bright yellow petals are obvious by their color and large (2.5 to 3.5 cm) petals that are held singly upright on long (10 to 30 cm) pedicels. They are broadest in the middle and can be bluntly round or slightly pointed at the tip. The edges are often crisped (finely curled or slightly wavy). The naked eye can see the incised veins that can appear darker but this is the result of shadowing. The filaments taper abruptly from a rather stout base to a very thin attachment for the twin anthers that when ripe are held perpendicular to the filament. Some 20 to 200 pistils are crowded inside the stamens, each with a capitate (knob-like) stigma. Long-flowered, I find them from early June in warm sunny spring years (2014) well into August or even early September in a warm, sunny summer year (2010).

The odd-pinnately compound leaves can reach 75 cm but are usually 20 to 30 cm long. Many references and drawings show the leaflets gradually tapering in size being widest near the end and smallest near the base. While every plant I examine does that, it is more often than the upper ⅔ to ¾ leaflets are about the same size, visible in the photographs. The leaflets are bright green above and silver beneath (giving the plant its common name) and are very sharply serrate. While nearly always held upright, they can be trampled in well-travelled places to hug the ground and yet survive. I have yet to find any fruit! As fall approaches, yet before any frosts, the leaves begin to take on a lovely copper to orange-red hue that gets richer as the days grow shorter.

This plant is ubiquitous in the high littoral zone of broader beaches growing under the beach rye and beach pea. It is common along the beach section of the Rainforest Trail, the Airport Dike Trail and all along Eagle Beach. In ruderal areas of Juneau it can be found in street islands and areas of compacted soil such as in the island of the middle parking lot at the Mendenhall Glacier Visitor Center. In places where it can live undisturbed, it can form a nearly single-species ground cover as it can rapidly expand with fast-growing runners that have buds to form a new plant.

The North American range generally follows the coastline all around Alaska to the Arctic and Hudson Bay to Atlantic Labrador and coastal Greenland. From west to east the number of achenes reduces as many Alaskan plants produce large numbers (that I've never seen!),

Potentilla villosa von Pallas ex Pursh 1813, villous cinquefoil, hairy cinquefoil, northern cinquefoil

vil-oh-sus. Latin *villosus*, shaggy; hence overed with soft hairs.

I simply cannot see any common person using the word "villous" in a name and so personally reject this name. "Hairy" is just a translation of the Latin but not quite right as it actually means "shaggy". The plant's distribution is decidedly "northern" so this name works. How about "northern three-leaved cinquefoil" to help distinguish it from the typical members of its genus? Or "rocky cinquefoil" to show its habitat?

The five petals have but a small attachment point to the receptacle where there is visible space between them yet the rapidly flare out into a broad heart shape where they do overlap each other. The veins of the petals from the point of attachment up about 1/5 the way to the top are suffused with a lovely light orange that is darker on the veins than the petal tissue in between. The top left photo shows a curious feature of the opening bud, a bright patch of orange. I'm not sure what this is or represents, but it is beautiful. It flowers early at low elevation and much later higher.

The leaves are trifoliate and coarsely dentate with a visible vein running from the base to the tip of each tooth. They can be completely covered with shaggy hairs on both sides, or almost devoid of hairs! The leaflets usually overlap each other and in a tuft give the plant a very "leafy" look. As the flowers develop, usually one or two much smaller leaves develop on the stem.

A sturdy perennial, it overwinters as a caudex (a thickened stem that is usually both above and below ground level). There are often several to many in one place that makes the plant look tufted. On cliffs, it grows in the cracks and crevices that allow some organic matter to accumulate and develop into soil. In spring, the first leaves erupt from this as short, stout new stems devoid of any of last season's tissue

Here it grows with absolute abandon on the greenstone on the east side of the Gastineau Channel as well as the open rocky cliffs of greenstone at Lena Point where the bottom right photo was taken. I find it at sea level or in the alpine, always in rocky areas where it seems to be a pioneer species. The correlation with greenstone makes me wonder if there is a chemical reason—probably calcium. It's global range is from British Columbia to the Russian far east and in the Olympic and Cascade mountains of Washington and Oregon.

Watch out for misidentifications with this plant as I have done in the past. When I look at my previous notes, I find twice it twice misidentified as *Sibbaldia procumbens*—just because it has three leaflets and grows in the rocks near the water—and even did so on my early spring hike in 2009 to Bishop Point where the top left photo was taken. Look for the fully dentate leaves!

Fragaria Linnæus 1753, strawberry

frah-gair-ee-uh. Classical Latin *fragum*,wild strawberries.

Fragaria chiloensis (Linnæus) Miller 1768 ssp. *pacifica* Staudt, beach strawberry, shákw

Latin key-low-EN-sis, American chi-low-en-sis. Of or pertaining to the country Chile. pah-SIH-fih-cah Of or pertaining to the Pacific Ocean.

Taxonomy: Whether or not this is a northern hemisphere plant that was carried by birds to the southern hemisphere and subsequently named by Linnæus a *F. vesca* ssp. *chiloensis*, or indeed is really the woodland strawberry *F. vesca* will be left up to those more qualified than I. When I first learned this plant in Southern California, I wondered about the Chilean reference, figuring something as obvious as this would have been discovered and named first in the northern hemisphere. These two species, along with *F. virginiana* are diploid, separating them from all others and perhaps is evidence of their sympatry. FNA 2014 recognizes three species in the flora: *F. vesca*, *F. virginiana* and *F. chiloensis*.

Notes: Since most know strawberries, this is an easily recognized plant. The 5-petaled white flowers are large and showy with narrow clawed bases and broad ends. The 15 stamens are arranged in three whorls with horseshoe-shaped anthers at the top. Atop the conical receptacle are 30 to 150 free carpels. What is unusual is that the flowers can be unisexual with either only stamens or only pistils. A single plant can have both pistillate and staminate flowers as well as perfect flowers (trioecious)! Pistillate plants have sterile staminodia that resemble stamens but lack the anther. All of this requires a very close look to see. The “fruit” is actually not a fruit at all, but rather the greatly expanded hypanthium (a special form or receptacle) with the fruits, achenes, embedded in it as the tiny black “seeds” that people see. It is technically called an aggregate accessory fruit.

The leaves are trifoliate and can vary tremendously in shape. They are usually dentate with the apexes more rounded than pointed and more prominent toward the distal (outer) end with the proximal (inner) end almost entire. The plants grow from a single basal rosette that grow long runners that often arch above ground with the ability to grow a new plant, giving it the ability to rapidly expand and become a ground cover.

When near water at the edge of a forest, or even along the beach, this is a common plant. While fishing at the Salt Chuck at Amalga Harbor on September 28, 2009, the plant formed nearly a continuous ground cover in the space between the forest and the pond. It can be found, with careful searching, on the Alpine Loop Trail. It is common on the beach section of the Rainforest Trail. It grows trailside in the open areas of the Perseverance Trail. It is abundant in the grassy lawns of buildings in the Rock Dump.

The common garden strawberry is a hybrid between this species and *F. virginina* and has been named *F.* × *ananassa* Duchesne ex Rozier 1784 first crossed in France in the 1750’s. *F. chiloensis* arrived there from Chile by Amédée-François Frézier in 1714.

Sibbaldia Linnæus 1753, sibbaldia

sigh-bald-ee-uh Honorific for Scottish professor of medicine Sir Robert Sibbald (1614-1722).

Taxonomy: Often subsumed into a broad sense of *Potentilla* or split further to exclude *Sibbaldiopsis*.

Sibbaldia procumbens Linnæus, sibbaldia, creeping sibbaldia

pro-come-bens Latin *procumbere*, sink down, lie down, lean forward; hence laying on the ground.

Try as I might, I can’t find a “common” name for this plant and I don’t find “creeping sibbaldia” a “common” name! While Sir Robert has an esteemed horticultural journal named after him, "sibbaldia" isn't exactly a word one expects "common" people to use. In German it is *Alpen-Gelbling*, literally "alpine chanterelle", a very curious name since it is a mushroom. The Norwegians have us the more descriptive *Trefingerurt*, "three-fingered wort". I'm amazed that such a widespread plant doesn't have a "common" name.

Taxonomy: For a plant named by Linnæus in 1753 with an interrupted circumboreal distribution, how this plant has come to have only one synonym (from the short time it was considered a *Potentilla*) and only four subordinate taxa is nothing short of miraculous.

Notes: Easily confused with *Potentilla villosa* with a casual glance, a careful look reveals many differences.

The green sepals are longer and wider than the pale yellow petals that fall off early. Unlike *Potentilla* with many, there are only 5 stamens whose anthers are yellow.

Each of the three leaflets are obovate, or obtriangular (wider at the tip) and their apex is truncate (cut off or squared) and usually with 3 teeth and entire everywhere else. The leaf is often emarginate with a notch near the middle of the truncated tip created by the teeth.

The plant is found in the same sort of rocky environment as *Potentilla villosa*, here on greenstone at sea level and on rocky scree and outcrops in the alpine. It is easily found on the Mount Roberts trail from Father Brown's Cross up. It often grows in the soil that collects or develops between the cleavage planes of the greenstone outcrops whose surrounding walls must offer the plant some protection for the elements.

In my first encounter with this plant at Crater Lake in the mountains above Cordova, Alaska, I recognized its close relationship to the rare *Sibbaldiopsis tridentata* (three-leaved cinquefoil) I know from the summit of Blood Mountain, Georgia.

Sanguisorba Linnæus 1753, burnet

Latin *sanguis*, blood; family + Latin *sorbere*, drink, absorb; from the Christian communion, referring to drinking the blood of Christ and extending it to the belief that a poultice of this plant would stop bleeding.

Sanguisorba stipulata Rafinesque 1833, Sitka burnet, Canada burnet

stih-pew-lah-tuh   Of or pertaining to stipules at the base of the leaves.

Taxonomy: Most references will include this in a very broadly circumscribed *Sanguisorba canadensis*. FNA 2014 recognizes four species with *canadensis* strictly eastern North America. The western plants are much separated and distinct from their eastern counterparts and are considered distinct. The plants here look very similar to those I've seen in the east, just not as tall or with as long an inflorescence. Both *canadensis* and *stipulata* are acropetalous, flowering from the base upward. I find the ratio of leaf length to width the easiest character to separate these to related species: *canadensis* 2 to 4 times longer than wide; *stipulata* 1 to 2 times longer than wide.

Synonyms:
Sanguisorba canadensis Linnæus 1753
Sanguisorba canadensis var. *latifolia* Hooker 1832
Sanguisorba sitchensis C.A. Meyer 1856
Sanguisorba latifolia (Hooker) Coville 1896
Sanguisorba canadensis var. *sitchensis* (C.A. Meyer) Koidzumi 1917
Sanguisorba stipulata var. *latifolia* (Hooker) H. Hara 1949
Sanguisorba canadensis subsp. *latifolia* (Hooker) Calder & Roy L. Taylor 1965

Notes: While the stipulate, pinnately compound leaves with strongly serrated leaflets are at least reminiscent of a rose, the flower at a glance shows no resemblance at all! There are only 4 petaloid tiny white sepals, no petals, a 4-angled hypanthium and 4 stamens. Not much very rose-like here. The inflorescences can be amazingly showy with just the long, white stamens. They are arranged in either simple or branched spiked crowded with 50 to 100 flowers each that open from below and thus can continue to flower for long periods on robust plants.

Found in a multitude of locations and habitats here, this is an opportunistic plant. On the Alpine Loop Trail it is particularly long-flowered as I took the left phot on September 14, 2009.

Spiraea Linnæus 1753, spirea

spy-REE-uh Greek σπεῖρα *speira*, a coil, spire; from the inflorescence.

Spiraea stevenii (C.K. Schneider) Rydberg 1908, Steven's spirea, Alaska spiraea, Beauvard's spiraea, Steven's meadowsweet

Honorific for an undetermined person named Steven.

Taxonomy: Originally published as *steveni*, a grammatically incorrect form that has been corrected to *stevenii*.
syn = *S. beauverdiana* var. *stevenii* C.K. Schneider 1905

Honorific for Swiss botanist, Gustave Beauverd (1867–1942).

Hultén (p. 94) notes this is "a very common plant" found in "many different habitats" but I have only found it on the Mount Roberts Trail where it is obvious with its flattened corymb of white reflexed flowers. Located just past the last conifers on a clockwise direction just before the Devil's club patch, it takes a close look to spot it as the flowers are not particularly showy as the corymbs are small, not much larger than 2 cm across and the color doesn't stand out from the background well. The whole plant here is small, less than 0.5 m tall. Hultén's map shows a small cluster in the northern Lynn Canal area with the bulk of the range much further north and west.

Luetkea Bongard 1823

lew-et-key-uh. Honorific for "...Fyodor Petrowitsch Litke, Russian naval officer and commander of the corvette Seniavin during the Russian expedition of 1826-1829 to North America." [Algaebase]. Born as Friedrich Benjamin Lütke from Baltic Germans, the genus name is based upon the German spelling. When he became a Russian count, his name was Russified.

Luetkea pectinata (Pursh) Kuntze 1891, partridge foot

peck-tin-aye-tah. Latin *pecten*, a comb; from the leaves divided into comblike segments.

Taxonomy: This diminutive member of the rose family was first named as *Saxifraga pectinata* Pursh in 1813 where he totally misidentified the family! In 1832 it was moved into the correct family as *Eriogynia pectinata* (Pursh) Hooker .In 1840 it became *Spiraea pectinata* (Pursh) Torrey & A. Gray and given its current name in 1891. It appears that *Eriogynia* has priority and may be moved back there.

Notes: Upon first seeing this plant on the Crater Lake Trail in Cordova in 2005 I became entranced by the delicate beauty of both its leaves and flowers. Sadly, I find no photo of it from there in my collection! In a minor defense of Frederick Traugott Pursh, there are some strong resemblances to the saxifrages in both form and habit. It forms dense mats in the alpine zone, above timberline, where the woody stems run along the ground and give rise to numerous short, stiff branches with shiny green 2-3 times dissected (hence the name *pectinata*, teeth like a comb) leaves in tight tufts that look whorled. The flowers adorn the tops of the taller, 15 cm, stems in a tight cluster of pure rose form with five green sepals, five 3 mm long white petals and numerous stamens. As in Cordova, one must climb to the alpine zone to find this plant where it forms dense mats on the Mount Roberts Trail.

Aruncus Linnæus 1758

uh-run-cuss. Greek *arunkos* or *aryngos* to Latin word *aruncus*, a goat's beard, in reference to the hanging fruits.

Aruncus dioicus (Walter) Fernald 1939 var. ***acuminatus*** (Rydberg) Rydberg ex H. Hara 1955, goat's beard




die-oh-EE-cuss. Latin *di-*, two Greek *οικος* oikos, house; hence male and female parts "in separate houses", that is, on separate plants.
uh-cue-mih-nay-tus Late Latin *acuminatus*, sharp, pointed, tapering.

Taxonomy: Here are my notes from 2008 on this ubiquitous plant:

> The goat's beard (PLANTS has it as bride's fathers—a name I've never encountered before) is in peak form and nearly a ground cover along the highway all the way to Amalga Bay. I comment to Annette that it just doesn't look like our (*Aruncus dioicus* (Walter) Fernald var. *dioicus*) in any way. The plants differ in many ways: the leaves are far more coarse and red; the flowers are larger, perhaps twice; and, the plant as a whole is much stiffer. Since *Aruncus* has a near total northern hemisphere distribution, it's taxonomy is complex with either one, three, or six species. PLANTS, ITIS and CalFlora have it as *Aruncus dioicus* (Walter) Fernald var. *acuminatus* (Rydberg) Rydberg ex H. Hara. Older treatments like Hultén (1968) have it as a variety of the Asian species, *A. sylvester* Kosteletzky ex Maximowiczv ssp. *acuminatus* (Rydberg) Jepson. The *Flora of China* (2003) [http://flora.huh.harvard.edu/china/PDF/PDF09/Aruncus.PDF] makes this note on the genus: "Three to six poorly defined species: N temperate zone; two species (one endemic) in China" one of which is *A. sylvester* so they consider it distinct within their circumscription of the genus. Their extended range: "[Bhutan, NW India (Himachal Pradesh), Japan, Korea, Mongolia, Nepal, Russia, Sikkim; SW Asia, Europe, ?NW *North America (Alaska)*]", emphasis mine. Weakley notes that it was attributed to the southeast by Small. If *Aruncus* is broadly circumscribed, the Asian form is *A. dioicus* var. *vulgaris* (Maximowicz) Hara.

FNA 2014 continues to recognize a single species in the temperate regions of North America and Eurasia with ours being var. *acuminatus* and *Aruncus sylvester* synonymized with *Aruncus dioicus* var. *vulgaris* as introduced to northeastern North America. I'm still of the opinion that our Alaskan material is more closely related to the Asian.

Notes: One simply cannot escape this plant here! When in flower—the entire month of July—it is showy to the point of being garish. The long inflorescences are brilliant white, even though they are formed from tiny flowers. Unusual for the rose family, the sexes are borne on separate plants (hence the name *dioicus*), something not easily seen until the male plant's flowers have withered and the female plant develops her dry achenes as fruits.

It is nearly ubiquitous, found in most habitats save for beaches and gravel bars and the deepest of shady forests, but even there, one has the chance of finding a plant! In the switchbacks of the East Glacier Trail one must wade through the wands until the Forest Service maintenance crew comes and whacks them back. In the fall the leaves turn into either a pale yellow with red stems or red-trimmed yellow leaves. The plant seems to put out new roots late in the summer as many bright red 2-3 mm shoots can be seen at ground level near the plants.

Sorbus Linnæus 1753, whitebeam, rowan, service tree, mountain-ash

SOAR-bus Latin *sorbus*, sorb, service tree.

Sorbus sitchensis M. Roemer 1847 var. ***sitchensis*** 1847, Sitka mountain-ash, kalchanéit




sich-EN-sis, Of or pertaining to Sitka, Alaska. GRAY-ee Honorific for American botanist Asa Gray (1810-1888).

Taxonomy: The var. *grayi* (Wenzig) C.L. Hitchcock 1961 applies to trees at higher elevation that may be dwarfed by exposure and have fewer teeth on the leaf margins.

Notes: In places around Juneau it is sometimes hard to determine if the tree at hand is planted or native as this is a common yard tree since it grows so handsome in shape and foliage topped off with beautiful slightly domed white flower clusters followed by bright red fruits. In Evergreen Cemetery, where the bottom left photo was taken, many has been planted and grown to substantial size. The trees on Point Luisa (bottom right photo) are obviously native. Nearly every reference I consult indicates the flowers can sometimes be pink, but in my travels I've never seen any *Sorbus* with pink flowers. The leaves are pinnately compound with 7 to 11 bluish or dull green leaflets, that on our variety, are toothed almost all the way around the leaf. The fruits are so showy and large (6 to 15 mm across) they almost command one to pick them, but upon eating they are extremely bitter and almost immediately get spit out. This is a tree strictly of the Pacific Northwest cordillera that I first learned at Crater Lake National Park in Oregon.

Malus Miller 1754, apples

mal-us. Latin *malus*, apple tree.

Malus fusca (Rafinesque) C.K. Schneider 1906, Pacific crab apple, Western crab apple, Oregon crab apple, lingít x'áax'i


fuss-cuss. Latin *fuscus*, dark, swarthy, dusky, connection to this plant undetermined.

An uncommon tree, Linda Nicklin pointed one out on the Rainforest Trail, one I probably wouldn't have even noticed, as the flowers were hidden by the dense surrounding foliage. This is a species I need to relocate and learn more about its occurrence here. Since writing that in 2009 I have found the small trees on the north slope along the Perseverance Trail and a small group of trees just across from the Point Bridget parking lot near the end-of-the-road where these photos were taken on June 6, 2010.

Amelanchier Medikus 1789, serviceberry

am-eh-lan-key-ur. Probably derived from *amalenquièr*, *amelanchièr*, the Provençal names of the European *Amelanchier ovalis*.

Amelanchier alnifolia (Nuttall) Nuttall ex M. Roemer 1847 var. *semiintegrifolia* (Hooker) C.L. Hitchcock 1961, saskatoon, serviceberry, gaawákh

all-nih-FOE-lee-uh. Late Latin *alnus*, alder + Latin *folia*, leaf; hence leaves that look like alder

According to Wikipedia (not referenced), "The name derives from the Cree inanimate noun misâskwatômina ... The city of Saskatoon, Saskatchewan is named after this plant" [http://en.wikipedia.org/wiki/Amelanchier_alnifolia].

Taxonomy: Hultén (1968) includes as a full species, *A. florida* Lindley, with a very similar range separated mainly by leaf proportions, but I question their difference. Hultén reduced it in rank to *A. alnifolia* ssp. *florida* (Lindley) Hultén in 1973. Tropicos has 20 subordinate taxa! FNA 2014 recognizes three varieties. Our variety is strictly Pacific cordilleran and intergrades with var. *alnifolia* where they meet. Distinguishing the two is easiest by geography, but var. *semiintegrifolia* has inflorescences half the size of var. *alnifolia* and shorter pedicels as well.

Notes: As is true with every serviceberry I know (with the exception of *A. arborea*), this is a most easily overlooked shrub. Small, green and with a small simple leaf it blends into the landscape as if it wanted to be anonymous. When in flower, its petals give it away, white and long and twisted and not very rose-like. When they disappear, the plant disappears until the fruits develop. The fruits are grape-sized, huge for a serviceberry, and juicy like a blueberry and really quite tasty. After our church hike on the Auke Lake Trail, Kirt Harvey drove me to their house to get me to identify a small tree loaded with fruits that was this species. The only other places I found it are on the Steep Creek end of the East Glacier Trail and in the shrubby areas of Auke Village Recreation Area.

Family Urticaceae A.L. Jussieu 1789 **nettles**

Urtica Linnæus 1753, nettle

UR-tih-cuh Latin *urtica*, nettle; derived from Latin *uro*, to burn, from the toxic chemicals in the hair.

Urtica dioica Linnæus 1753 ssp. *gracilis* (Aiton) Selander 1947, stinging nettle, t'óok'

die-o-EE-cah Latin *di-*, two Greek *οικος* oikos, house; hence male and female parts "in separate houses", that is, on separate plants.gruh-SIH-lis Classical Latin *gracilis*, thin; slender, slim.

The only location I've seen this plant is at the entrance to the Rainforest Trail. The plants are all on the slope made by the parking area on the left, just before entering the old growth forest. This is a disturbed area and they typical location for nettles. These plants do have male and female flowers on the same plant (monoecious) and only a few stinging hairs on their stems and only on the underside of the leaves. During our nice weather while wearing shorts I did get some stinging sensation on my legs while showing this plant to my guests. P&M (p. 309) indicates the chemical is formic acid but FNA (vol. 3) has this on the toxicity:

> The compounds producing the stinging sensation caused by contact with some members of Urticaceae have been reported to be histamine, acetylcholine, 5-hydroxytryptamine, and, in extracts from which the other three have been removed, an unknown substance that produces pain (E. L. Thurston and N. R. Lersten 1969). E. L. Thurston (1969) was not able to find these compounds in *Urtica chamaedryoides* using analytic techniques, but J. M. Kingsbury (1964, p. 67) reported that the same species "...contains toxicologically significant amounts of acetylcholine and histamine." The tip of the stinging hair breaks off upon slight contact, leaving a sharp point that readily pierces skin and allows fluid contents of the hair to enter flesh through the body of the hair, which acts as a miniature hypodermic needle.

Order Fagales Engler 1892

Family Betulaceae Gray 1822 **birch**

Alnus Miller, 1754, alder

ALL-nus Late Latin *alnus*, alder.

Alnus rubra Bongard 1832, red alder, shéix̱'w

Latin *ruber*, red, ruddy, painted red.

Red alder is a tree of mature forests, or at least forests that are well on their way to being mature, usually in areas of shade or filtered light here in the Juneau area. The exception to this is that the tree is abundant along "the road" all the way to Point Bridget where it often forms fairly dense stands in the open near the edge of the road. In logged areas, particularly clearcut, the tree does act as a pioneer species and forms tremendous thickets of small trees, but I have not seen this habit in Juneau aside from along "the road". I saw much of this pioneering habit in the clearcuts in the redwood region while I was at Humboldt State College. The tree is common on the Rainforest Trail on Douglas Island and in scattered stands on the Bishop Point Trail.

The bark of any red alder here is nearly pure white, largely because of lichens. It seems the most common is *Thelotrema lepadinum* (Acharius) Acharius, bark barnacle. A close look with a hand lens reveals the fruiting bodies do resemble a barnacle, but on most alders it is a crust very tightly bound to the bark. Another common species is *Graphis scripta* (Linnæus) Acharius, pencil script where the crustose part of the lichen is very white and very tightly embedded in the bark where the fruiting bodies form wiggly lines. Several references show photographs of trees nearly completely white versus those with a very greenish bark and indicate the difference is air quality that prevents the lichens from growing.

Alnus viridis (Chaix) de Candolle 1805 ssp. ***sinuata*** (Regel) A. Löve & D. Löve 1965, Sitka alder, mountain alder, slide alder, green alder, keishísh

vih-RIH-dis Latin *viridis* fresh, green; blooming; for the bright green color of the leaves.Latin sin-YOU-uh-tah, American sin-you-AH-tah Latin *sinuosus*, characterized by bending, winding; sinuous; for the edge of the leaves.

<u>Taxonomy</u>: Green alder *sensu latu* is easily recognized from the rest of the alders by its

> essentially sessile buds with several imbricate scales and in its relatively long, thin, infructescence peduncles. Like the birches, only the staminate catkins are exposed during the winter prior to blooming. [FNA Vol. 3]

Nearly omnipresent as a shrubby tree in disturbed or open areas in circumboreal regions, this has given rise to what are essentially regional names: *Alnus viridis* (Chaix) DC 1805 is European; *Alnus crispa* (Aiton) Pursh 1813 is Northeastern North America; and *Alnus fruticosa* Ruprecht 1845 and *Alnus sinuata* (Regel) Rydberg 1897 ring the north Pacific Ocean.

Recent studies on the three disjunct populations of the odd species *Alnus maritima* using the genome fingerprinting ISSR-PCR [inter-simple sequence repeat-polymerase chain reaction] method produces results that illumine the phylogeny of the entire genus where the entire circumboreal population is best considered a single species with four to six subspecies.

Schrader, J.A. & W.R. Graves. 2002. *Infraspecific systematics of* Alnus maritima *(Betulaceae) from three widely disjunct provenances*. Castanea 67: 380–401.

Schrader, J.A. and W.R. Graves. 2004. *Systematics of* Alnus maritima *(seaside alder) resolved by ISSR polymorphisms and morphological characters*. J. Amer. Soc. Hort. Sci. 129: 231–236.

Our tree has these synomyms: *Alnus viridis* var. *sinuata* Regel 1865; *Alnus sitchensis* (Regel) Sargent 1902; and *Alnus crispa* var. *sinuata* (Regel) Breitung 1957

Notes: When this tree begins flowering, I am astonished at the size of the male catkins. Being more used to the relatively small ones of tag alder (*Alnus serrulata*) in the eastern United States, when I see some of these nearly four inches long with very large yellow anthers it make me think Douglas Maple, as they really look like maples!

When the male catkins are nearly ripe, the female catkins are hard to find. After three years of searching, I found my first erupting on May 19, 2011 solving what had been a total mystery to me. Male catkin buds form in late summer and I've seen them as early as the first week of August. Unlike all the other alders—but like all the birches—the female catkins are completely encased in bud along with leaves for the winter (see photo of sectioned bud with both leaves and female catkin visible) with only the male exposed all winter. For this reason, it has been placed into subgenus *Alnobetula* Petermann 1849. When the male catkins are formed and beginning to produce anthers with ripe pollen, the female cones poke out of the bud and begin to expand, but are not yet receptive to pollen as the scales are tightly closed. It's only when they expand on long stalks that the scales open to expose the stigma to the wind-scattered pollen. Once pollinated, they are long-ripening over a period of almost five months before the fruit is fully developed and the "cone" opens for the wind to scatter the winged samaras. When the female catkin dries, it really does resemble a cone and can remain on the tree for a year or more.

What makes this large shrub or small tree fascinating to me is the fact that it grows very well at low and high elevation and is nearly completely missing from the middle. Why this is so seems to lie with the nature of this plant to a pioneer of disturbed land where light is abundant. Low elevations can be recently deglaciated or in outwash plains and the plant thrives to the point of making nearly impenetrable thickets. Up high, the winter snowpack is the disturbing agent, weighing down all living things to nearly prostrate on the ground. If a tree or shrub is not flexible, they simply break and die. Alder is very tolerant of this abuse and thrives in this environment. The middle elevations are those of developing to nearly mature forests, far to shady and stable for this species to make much of an imprint except for the occasional windthrow. This is particularly obvious on the climb of the East Glacier Trail where we begin in alder and cottonwood in the trim zone of the Little Ice Age glaciation, then rise above it to the Wisconsin period where the spruce-hemlock forest is more developed.

Order Celastrales Link 1829

Family Parnassiaceae Martinov 1820 **grass-of-Parnassus**

Taxonomy: *Parnassia* has long been included in the Saxifragaceae but as they have been found to be only "distantly related" FNA (vol. 8 p. 3) places them in their own family, an idea first proposed by Martinov in 1820. The Angiosperm Phylogeny Group currently includes it in the Celastraceae but notes that it is with "moderate support" and that Zhang and Simmons (2006) found it to be monophyletic [http://www.mobot.org/mobot/research/apweb/orders/celastralesweb.html#Celastraceae]. It's physical distinctiveness argues for maintaining it as a family of two genera and 16 species. For these reasons I'm choosing to keep it in its own family.

Parnassia Linnæus 1753, grass of Parnassus, bog-stars

par-na-see-uh   Greek, Παρνασσός, *Parnassos*, "of Mount Parnassus", a mountain in central Greece.

"*Parnassia* is a reference to Mount Parnassus; Linnæus applied the name to the genus based on an account in *Materia Medica*, a written work by the Greek physician Dioscorides (Dioscorides called it Agrostis En Parnasso)." [Botany Photo of the Day January 13, 2011 http://www.ubcbotanicalgarden.org/potd/2011/01/parnassia_fimbriata.php] Today *Parnassia* is not found on Mount Parnassus but "*Parnassia palustris*… [is found on], Mt Tzena [in] Northern Greece" [http://www.greekmountainflora.info/index.htm]

Parnassia fimbriata K.D. Koenig 1805 var. ***fimbriata***, fringed grass-of-parnassus

fim-bree-ah-tah   Latin *fimbritus*, from *fimbriae*, fringe.

Notes: While on the downside of the East Glacier Trail, once past the kettle pond and the glacier view with the glacier waterfall, it's a steady walk back to the bus parking lot, except when the grass-of-parnassus is flowering. This is a flower with beauty to be savored, and is easy to find as its just above the trailside ditch on a weepy slope just 30 yards from the junction with the Trail of Time. I usually stopped and encouraged my guests to look closely at them through my hand lens. The five petals have gorgeous yellow-green veins and are fringed from on their lower half. The five fertile stamens are held out in between the petals and in between each are infertile stamens (*staminodia*) where each filament is divided into several white segments each gland-tipped where the anther would normally be. Their function is unclear, but in the case of *Parnassia*, the yellow color must serve to attract flies and bees.

Parnassia kotzebuei Chamisso & von Schlechtendal ex Sprengel, Kotzebue's grass-of-Parnassus

cots-eh-boo-ee   Honorific for Russian navigator Otto von Kotzebue (1787–1846)

On an evening hike to Nugget Falls with Annette on June 27, 2011, she spots a small white flower in the well-drained gravel plain on the shore of Mendenhall Lake about a half mile out the trail. Stopping to examine the inconspicuous plant, we both recognize it as something new. When I say it looks like a *Parnassia*, Annette immediately agrees. The spatulate leaves with attenuate bases are in a rosette tight to the ground. The margins have a naked-eye visible hyaline margin. Their color is a dull gray-green and generally three-nerved but some of the more succulent leaves show no veining at all. They are mostly cupped upward as if to catch rain and direct it toward the caudex. The flowering stems are leafless and 10 mm tall, each with a single flower, each with five white petals with green veins. The petals are withering and the fruit developing without a style and with two or three tightly fused carpels. Unlike the other Alaskan Parnassia, this species is in a dry—or area subject to frequent drying—substrate and out in the open. Hultén's map shows in the high northern latitudes with a few discontinuous occurrences south.

Annette and I spot it again on July 3, 2011, on the cliff face where the East Glacier Trail leaves Nugget Creek, a place I've walked by uncounted times and if I've seen this plant before, I surely misidentified it or simply missed it! I now look for the fruiting stalks and basal leaves every time I walk here.

Order Malpighiales A.L. Jussieu ex Berchtold & J. Presl 1820

Family Salicaceae de Mirbel 1815 **willows, ch'áal'**

Populus Linnæus, 1753, poplar

Latin PAH-poo-lus, American POP-you-lus   Latin *populus*, the people, many fanciful allusions supposed but none certain.

Populus trichocarpa Torrey & A. Gray, 1852, black cottonwood, dúk

TRY-co-car-pah Greek τρίχα, *tricha*, hair + carpel; hence hairy fruit

Taxonomy: Most references consider this *Populus balsamifera* subsp. *trichocarpa* (Torrey & A. Gray) Brayshaw 1965.

ball-sah-MIH-fur-uh derived from the Latin word *balsamum*,balsam; balsam tree, gum; derived from the Greek word βάλσαμον *balsamon*, an aromatic herb; derived from the Hebrew word שׂםב basam, spice.

Hultén (p. 32) makes a telling comment "if young capsules are not available, it seems hardly possible that ssp. *trichocarpa* could be recognized" as the primary difference is this subspecies has the ovary and young capsule pubescent, hence the name *trichocarpa*, carpels covered with trichomes (hairs). It apparently forms "a coastal race" well illustrated by Hultén's distribution maps, if they are accurate.

This being the case, the tree has gone from subspecies to species several times. Jepson 2012 recognizes it as a full species.

Notes: black cottonwood (*Populus trichocarpa*), Sitka alder (*Alnus viridis*) and the mess of willows form the majority plants of the recently deglaciated land in our area. Abundant to the point of weedy, all three are the dominant plant form on the glacial outwash plain ahead of the Mendenhall Glacier. This tree is the northernmost hardwood and well adapted as a pioneer species. It produces copious amounts of seed that blows through the Mendenhall Valley in wafts of cotton in late June. As the seeds attached to the cotton lack an endosperm, they are only viable for a few weeks [Burns, R.M., & B.H. Honkala, tech. coords. 1990. *Silvics of North America: 1. Conifers; 2. Hardwoods*. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, de Candolle] yet I see many young sprouts in the sandy soil so they sprout easily and quickly . The tree has an amazing ability to reproduce vegetatively in just about any way imaginable: suckers, root shoots, buried stems, felled beaver stump sprouts as in my photo here. When the buds that escape the bear open and form leaves, the woods on a calm day have a wonderful aroma, obviously the source of the name *balsamifera*. I'm not sure what balsam smells like as my only sensory reference is with balsamic vinegar, but there is a pleasant earthy-sweet smell to the woods when the leaves open.

The tree provides the most important food source for our black bear in the early spring when they climb to the tops of the skinniest trees—as I witnessed in late April after Bob Armstrong's book signing at the Mendenhall Glacier Visitor Center—and strip them of their leaf buds leaving many trees with strangely deformed tops. When the globose capsules form and are green, without any ripening at all, the bears climb the trees again and eat huge amounts. In spring and early summer before the sockeye run begins, bear scat is jet black and almost entirely composed of vegetative matter from the cottonwood trees.

Beaver in the ponds of Dredge Lakes use cottonwood as their primary building material and presumably food as the bark is fairly thin and easily—at least for a beaver!—removed to get at the cambium layer. They don't hesitate to drop even. 12-inch dbh or more trees so the Forest Service has fencing around many of the larger trees to prevent their loss to beaver.

The visible pattern of trees on the mountains above the outwash plain provide plenty of evidence for the Little Ice Age glaciation. There is a very abrupt line between the cottonwood and the evergreens on the slopes of Thunder Mountain where Steep Creek flows over the glacial scarp that clearly defines the maximum thickness of the ice around 250-300 years ago at the end of the last glaciation.

In the fall the tree does change color to a pale yellow. Vermont has nothing to worry about in terms of leaf-lookers coming to see color! Many leaves begin falling the middle of September and by October 1st, most trees lost half of their leaves. The view of the Mendenhall Valley from the East Glacier Trail is about as spectacular as it can be with the changing color. With their yellow color, it is easy to see just how numerous the cottonwoods are in the outwash plain as they stand out so well from the evergreen Sitka spruce (*Picea sitchensis*).

This tree often has galls of *Melampsora medusae*, poplar rust, on the leaves and petiole galls of *Pontania* species undetermined, willow petiole gall, willow bud gall.

Salix Linnæus 1753, willows, ch'áal'

SAY-licks		Late Latin name for willow.

References specific to willows of Alaska:
Argus, G.W. 2004. *A Guide to the identification of* Salix *(willows) in Alaska, the Yukon Territory and adjacent region*s. University of Alaska July 2004 workshop on willow identification.
_____. 2007. Salix *(Willows) in the new world: a guide to the interactive identification of native and naturalized taxa using INTKEY (DELTA)* George W. Argus, R.R. 3 – 310 Haskins Rd., Merrickville, Ont., Canada K0G 1N0.
Collet, D.M. 2002. W*illows of Southcentral Alaska*. Kenai Watershed Forum.
_____. 2004. *Willows of Interior Alaska*. Kenai Watershed Forum.

<u>Taxonomy</u>: This comment by C. K. Schneider from 1919 remains as valid today as it did then: "In determining willows one is only too often entirely misled at first, and even by a slow and careful examination it is not always possible to determine the proper identity of the plant" (Argus, 2004, p.7). All my willow identifications are tentative!

Salix alaxensis (Andersson) Coville 1900 var. ***longistylis*** (Rydberg) C.K. Schneider 1920, Alaska willow, feltleaf willow




uh-lacks-en-sis, Of or relating to Alaska. lon-jih-STY-lis Latin *long*, long + style; referring to the long style of the female flower.

Taxonomy: There are four names used as either subspecies or variety but there seems little justification for the segregation. Even Hultén (p. 56) notes in reference to this variety that it "...is regarded simply as an altitudinal race...". This variety lacks the dense covering of yellowish hairs on the stems that var. *alaxensis* has. Ours has stems that are rather glaucous, covered with a whitish powder.

Notes: With Argus and Collet as my primary source, I'm pretty confident with this identification. This abundant willow is a large shrub or small tree that flowers long before the leaves (the pussy willow photo was taken on April 22, 2009 with nearly continuous snow cover on the ground) with very large and erect female "pussy willow" catkins that are densely white hairy. As the leaves erupt, the female catkins explode with a mass of cotton and tiny, elongated black seeds (visible in my photograph) and the underside of the leaves are completely covered with white "felt" hairs. The last common name's origin should be obvious with the close-up of the underside of the leaf. If ever there was an example of floccose pubescence, this is it. Note the lack of hairs on the midrib. The leaves are incredibly varied in shape, but most are broadly oblanceolate to lanceolate. The veins are prominent on the top side.

Salix arctica von Pallas 1788, Arctic willow



ark-tih-cah Latin *arcticus*, arctic, northern; from the Greek ἄρκτος *arktos*, a bear; from the northern constellation The Bear (the Big Dipper).

Taxonomy: A circumboreal species with a complex nomenclatural history (21 subordinate taxa names in Tropicos), Hultén recognizes three subspecies, as it is understood by Argus (2004) it is probably best considered a single species.

Notes: This is my first experience with a matted, dwarfed willow, one of the things Alaska is famous for! Here the only place I've seen it is on the Mount Roberts Trail, very near the Goldmine Ridge cutoff, so it is high on the mountain in a rocky tundra-like habitat. The whole plant is only 1 dm tall and forms clumps about 1 m across. Even in a single clump, the leaves show a great deal of variability in shape and size, but are mostly roundish and shiny green. The overall look makes it instantly recognizable as a willow. I did not observe any flowers or even developing fruits on these plants. Perhaps the harsh environment here retarded or prevented their flowering this year.

Salix barclayi Andersson 1858, Barclay's willow



bar-clay-ee Honorific for an English botanist who sailed the west coast of America in 1835-1841.

Taxonomy: Hultén (p. 53) notes this is "an extremely variable plant, doubtfully distinct from several other species..." Yet the gall midge here seems to recognize this plant perfectly! It is one of the willows here I can identify at a glance. Tropicos lists 14 subspecific names for this wide-ranging species, and they seem to be largely based on leaf shape, an extremely plastic feature in willows which I find unreliable.

Notes: The easiest way to identify this species on the glacial outwash plain is to find the willow roses as the midge *Rabdophaga rosaria* (Loew, 1850) that lays her eggs in the developing bud seems to choose only Barclay's. When in leaf, they are nearly rugose in texture, quite unlike the other willows here. Their shape is quite variable, but while lanceolate, they tend to be wider below the middle. The underside is pale with a wax-like coating, nothing like feltleaf willow. As the photo shows, they flower with the leaves and the male flowers have very long filaments, extending well beyond the short pussy willow hairs. This is an obvious pioneer species that can form extensive thickets in disturbed areas.

Salix reticulata Linnæus 1753, netleaf willow

reh-tick-you-lah-tah Latin from *reticulum*, little net.

Salix scouleriana Barratt ex Hooker 1838, Scouler's willow

Latin schoo-lur-ee-ah-nah, American skoo-LAIR-ee-ah-nah Honorific for John Scouler, (1804-1871) botanist on the Hudson Bay Company's voyage to the Columbia River 1824-1825.

Taxonomy: Of the willows here, this is the one with the widest range, covering most of western North America. As such, seven different subspecific names have been applied. PLANTS recognizes only the species and even the splitter Hultén simply mentions at the end of his entry "our form is generally var. *coetanea* Ball.". I'm content with that!

Notes: This is the first willow to flower here with short "pussy willow" catkins that stick out from the side of the branches (as opposed to long and erect in feltleaf willow). The photo of the exploding catkin shows how the leaves broader near the tip. The short reddish hairs from the underside of mature leaves appear as an orange-brown hue, yet the overall impression of the leaves when walking by is that they are pale with white hairs. It takes a hand examination to see the hairs. The branches often are attached at right angles to the main stems.

Salix sitchensis Sanson ex Bongard 1832, Sitka willow

sich-EN-sis Of or pertaining to Sitka, Alaska.

Another oblanceolate willow with a pale underside, this one flowers with the leaves. The hairs under the leaf are arranged pointing to the tip of the leaf and this gives it a rather silky look, but it takes handling a leaf and looking closely. The end of the leaf is mostly entire and a bit revolute (rolled under). The catkins are long and narrow and when in flower a good character that is easily seen while walking. This is a lanky shrub on the glacial outwash plain.

Family Violaceae Batsch 1802 **violets**

Viola Linnæus 1753, violets

vie-OH-lah Latin *viola*, violet; several spring flowers, pansy.

Viola adunca J.E. Smith 1817 var. ***adunca***, early blue violet

uh-DUN-cah Latin *aduncus*, bent, curved, hooked; referring to the nectary spur of the flower.

A small (to 15 mm) flowered-violet without a well developed stem. The spur is thin and often hooked giving it the name "hookedspur violet". Telling the blue violets apart by their leaves is futile! However this species can have brown dots on the leaves. Abundant in moist areas, common along the rock cliff areas of the East Glacier Trail.

Viola glabella Nuttall 1838, stream violet

glah-BELL-uh Latin *glaber*, smooth; hairless.

This is the only yellow violet in our area, and is common in many habitats, it is abundant along the Perseverance Trail and the first mile or so of the Point Bishop Trail.

Viola langsdorffii von Fischer ex Gingins 1824, Alaska violet

langs-door-fee-eye Honorific for Russian naturalist Grigorii Ivanovich Langsdorf (1774-1852).

This blue violet has large (15 to 25 mm) flowers with a stout, if short in spring, stem. The spur is short and saccate. Often grows intermingled with early blue violet.

Order Geraniales A.L Jussieu ex Berchtold & J. Presl 1820

Family Geraniaceae A.L Jussieu 1789 **geranium**

Geranium Linnæus, 1753, geranium

jer-aye-nee-um Greek γεράνι *gerani*, ancient name for the flower.

Geranium erianthum de Candolle 1824, northern geranium

air-ee-ann-thum Latin *eri-* soft + Greek ανθώ *anthos*, flower.

Let's just start out that I'm a sucker for native geraniums. The utter simplicity of form and function of the flower is exceptionally appealing. The fact that the timing of ripening of the anthers versus the stigma is nothing short of elegant is enough to enthrall me. Yes, it is, in the natural world simply functional to keep the plant from self-pollinating. I find elegance in its bareness: only the minimum required is necessary; nothing more, nothing less.

This gorgeous plant likes abundant light along with rich soil and is found at all elevations where those conditions prevail. It can sometimes form a large garden of plants as on the Alpine Loop Trail on Mount Roberts. The plant is abundant along the Perseverance Trail in the Silverbow Basin and along the Steep Creek Valley and Granite Creek basin

The flowers have petals more than 1 cm long and pale blue to pinkish-blue, on pedicels that just barely rise above the upper leaves in clusters of 3 to 5 with obvious stamens with anthers that ripen to a rich purple-mauve color. The leaves are palmately divided with many teeth, the basal leaves with long petioles, the stem leaves sessile. Hultén's circumboreal map shows this as a strictly North Pacific plant.

Order Myrtales A.L Jussieu ex Berchtold & J. Presl 1820

Family Onagraceae A.L Jussieu 1789 **evening-primroses**

Chamerion (Rafinesque) Rafinesque ex Holub 1972

kah-MEER-ee-on   Perhaps from the Greek χαμαε *chamae*, lowly + *nerium*, oleander, from the color. The origin of the name died with Rafinesque.

Taxonomy: The genus *Epilobium* Linnæus has been considered *sensu lato*, in the wide sense, for most of its history. What Rafinesque named as subgenus *Chamerion* in 1818 was elevated to full genus status in 1972 by Holub and according to extensive work by Peter Raven at Missouri Botanical Garden (Missouri Botanical Garden) should remain distinct. In *Chamerion* the leaves are alternate and spiral, the flowers are in terminal racemes, the flower buds are reflexed, the flowers are mostly held horizontally, the stigma is 4-lobed, and the plants are tall at 10-30 dm.

Chamerion angustifolium (Linnæus) Holub 1972 ssp. ***angustifolium***, fireweed, great willow-herb, rosebay willowherb, lóol

ann-gus-tih-foal-ee-um Latin *angustum*, small, confined, narrow space; hence narrow + Latin *folia*, leaf for the narrow leaves.

Taxonomy: When considered *sensu lato*, in the wide sense, this plant has a circumboreal distribution and perhaps represents a complex of varying populations that could be considered species. They differ in chromosome number, relatively minor morphologic variations and distribution patterns which has led each of these to be elevated to species level or subsumed into the complex at one time or another. Our form is diploid, arctic and boreal and the type for the species. Populations further south in Colorado the plant reaches the hexaploid level (*C. danielsii*).

Notes: Summer in Juneau is marked by vast stands of fireweed. The Mendenhall Wetlands must have millions of plants. In any place where full sun shows its rays (full sun is a rarity anywhere in southeast Alaska!) the plant will be found. Locally it is considered something of a calendar: it begins to flower at the bottom of the inflorescence with the beginning of summer—I see my first flower on its first day most years—and the flowers open sequentially up the stem and finish about the end of August when the fruits begin ripening from the bottom up while flowers are still opening at the top. The seeds are released from the capsules with their long cottony hairs as summer ends. The phrase goes, "when the fireweed turns to cotton, summer will soon be forgotten". The name "fireweed" here is something of a misnomer, as fire has absolutely no role in our ecology so perhaps rosebay willow-herb that P&M use would be more appropriate. In drier areas of North America the name is appropriate.

Chamerion latifolium (Linnæus) Holub 1972, river beauty, broad-leaved willow-herb, dwarf fireweed

la (as in cat) -tih-FOE-lee-um Vulgar Latin *latus*, side, flank; wide, broad; spacious + Latin *folia*, leaf; hence wide-leaved.

River beauty is an appropriate name for this plant as it often adorns the sandy places along rivers or in glacial outwash plains like the Moraine Ecology Trail that was formerly a river. This photo was taken in the outwash area of the Herbert Glacier not far from the current course of the Herbert River. The decumbent stems mentioned by Hultén here lie under the sand. Often the flower seems completely out of proportion with the plant. It also is common against dark rock where it may be taking advantage of some additional heat. It flowered all summer and into early September on the Mount Roberts Alpine Loop Trail.

The early leaves of both species are still eaten by many, usually raw but natives also boiled them (Hultén p. 87). I have not tried them.

Circaea Linnæus 1753, enchanter's nightshade

sir-SEE-uh Latin *circaea*, ancient name for the plant from the Greek Κίρκη *Kírkē*, falcon for the minor goddess Circe, the daughter of

Helios, the god of the sun, and Perse who was an enchantress who transformed her enemies into animals through various potions.

Circaea alpina Linnæus 1753, enchanter's nightshade

Latin AL-pih-nuh, American al-PIE-nah Latin *Alpinus*, alpine; of the Alps.

Taxonomy: Ours have been named as *C.a.* Linnæus ssp. *pacifica* (Asch. & Magnus) P.H. Raven as being smaller. With Raven as the authority, it may well merit adoption.

Notes: This diminutive plant is abundant and widespread in our area. There are large patches of it just past the Steep Creek Bridge on the Trail of Time. The flowers are tiny, with two petals only 1 to 1.5 mm long that are lobed with a division to the middle, a hand lens observation. It becomes more obvious in the fall when the leaves turn a very distinct pale yellow color that stands out from everything else on the forest floor. The plant gets its name from the Greek goddess Circe who transformed her enemies, or those who offended her, into animals through the use of magical potions and was renowned for her knowledge of drugs and herbs. This is a good example of how I've gained much of my classical education: through science!

Epilobium Linnæus 1753 Willowherbs

eh-pih-LOW-bee-um Byzantine Greek word ἐπί *epi*, upon + Greek λόβος *lobos*, lobe or pod; referring to the perianth being located far atop the long ovary.

Epilobium ciliatum Rafinesque 1808 ssp. *ciliatum*, purple-leaved willowherb

sill-ee-AH-tum Latin *cilium*, eyelash; hence hairs along the edge, cilia.

Taxonomy: This widespread (nearly world wide) species may actually be a cryptic species complex where several species satisfy the biological definition—reproductively isolated—but their morphology is very similar (in some cases virtually identical). Three subspecies are currently recognized: *E.c.* ssp. *ciliatum* (which Hultén separates out as *E. adenocaulon* Hasussk.); *E.c.* ssp. *glandulosum* (Lehm.) Hoch & P.H. Raven (separated as *E. glandulosum* Lehm.); and *E.c.* ssp. *watsonii* (Barbey) Hoch & P.H. Raven that does not occur in our area. Complicated!

Notes: This is essentially a weed in our area, commonly growing along fences, unmaintained property lines and other disturbed places. Right next to the house we had a nice line of the plants grow to 1 m and were covered with small lavender flowers. The leaves were almost immediately attached by powdery mildew. It does grow trailside in many places, usually in the disturbed area of the trail and not in the natural woods away from the trail.

Epilobium hornemannii Reichenbach 1824 ssp. *hornemannii*, Hornemann's willowherb

horn-man-ee-eye Honorific for Danish botanist Jen Wilken Hornemann (1770-1841).

Taxonomy: Another confused complex, Hultén separates out *E. behringianum* Haussk. and *E. lactiflorum* Haussk. as full species but makes the note that *E.l.* is "a much misunderstood species". *E.h.* ssp. behringianum (Hausskn.) Hoch & P.H. Raven is reduced to a subspecies, but *E.l.* remains a full species.

Notes: I first learned this species at Crater Lake National Park in Oregon and wanted to call many of the *E. ciliatum* this species, but it took finding it up on Mount Roberts to recognize what I once knew. The flowers are rose pink and with very obviously notched petals.

Order Sapindales A.L Jussieu ex Berchtold & J. Presl 1820

Family Sapindaceae A.L Jussieu 1789 **soapberry**

Acer Linnæus 1753, maple

Latin AH-kair, American A (as in hay) -sur. Latin *acer*, maple tree; wood of the maple tree; maple; sharp, bitter, pointed.

Acer glabrum Torrey 1827 var. ***douglasii*** (Hooker) Dippel 1892, Douglas maple, x'aalx'éi

GLAY-brum Latin *glaber*, smooth; hairless, smooth. dug-LOSS-ee-eye Honorific for Scottish botanist David Douglas (1799-1834).

An uncommon small tree in southeast Alaska, one has to look hard to find this one except in the fall when their color stands out. There are at least two on the Rainforest Trail, one on the upper loop and one near the beach section. There are several on the East and West Glacier trails but it takes a concerted look to spot them. The typical maple leaves are doubly serrate, a bit unusual for the genus. The stems are noticeably red in color.

Order Brassicales Bromhead 1838

Family Brassicaceae Burnett 1835 **mustard**

Arabis Linnæus 1753, rockcress

air-uh-bis Latinized form of Arabia. The connection to this genus escapes me as he named it from a plant collected from Lapland!

Arabis eschscholtziana Andrzejowski 1831, hairy rockcress

esh-holt-see-ah-nah Honorific for Livonian physician, botanist, zoologist and entomologist of Baltic German lineage, Johann Friedrich Eschscholtz (1793-1831) who sailed the Bering Sea with Otto von Kotezebue.

Taxonomy: Both Pojar & MacKinnon and Hall have it as *Arabis hirsuta* (Linnæus) Scopoli but when I check with FNA find that species does not occur in North America. Once again, the judgements of 18th century botanists prove accurate with G. A. Mulligan recognizing it as a unique species resurrecting the Andrzejowski name in 1996. Even the splitters of the mid 20th century considered it a variety of the European form as *A.h.* subsp. *eschscholtziana* (Andrzejowski) Hultén.

Notes: I've recognized this *Arabis* for some time but only on July 16, 2012, have taken the time to determine the species. This is a particularly handsome specimen, even though its tip is being bent by the rock overhang.

There are four rockcress in SEAK, but this is the only hairy one with white petals. The stems have a dense covering of spreading villous hairs. The edges of the leaves have similar hairs while their surface is covered with far shorter hairs. The auriculate (clasping with earlobe-like appendages) leaves are widely toothed. The white flowers tend to stay in a tube-like form rather than spreading as the inflorescence develops. The fruits, unlike the rest of the plant are hairless, narrow and retain something of the disc of the stigma for some time.

I think of *Arabis* as a plant of rich, circumneutral or limestone soils. It turns out that this mass of weakly foliated low grade slate at "the horn" of the Perseverance Trail is rather limey. Even though there is absolutely no soil here in this rock cut, there must be enough available calcium.

Cardamine Linnæus 1753, cress

Latin car-DA (as in cat) -mih-nee, American car-DAM-in-ee Greek κάρδαμο *kardamo*, name for a cress.

Cardamine occidentalis (S. Watson ex B.L. Rob.) Howell 1897, western bittercress

ox-ih-DEN-tah-lis Latin *occidens*, sunset, west (of the west referring to the Western Hemisphere)

Cardamine oligosperma Nuttall 1838 var. ***kamtschatica*** (Regel) Detling 1938, cress

oh-lih-go-sper-mah Greek prefix ολίγο *oligo*-, having few, having little + Greek σπέρμα sperma, seed; hence few-seeded. kahm-scha-tih-cah Of or pertaining to the Kamchatka Peninsula in Russia.

Taxonomy: This has a confused nomenclatural history with these synonyms: *C. hirsuta* Linnæus var. *kamtschatica* (Regel) O.E. Schulz; *C. kamtschatica* (Regel) Piper; *C. oligosperma* Nuttall ssp. *kamtschatica* (Regel) Cody; and *C. umbellata* Greene. Why PLANTS and ITIS choose the variety instead of the subspecies I cannot determine. Hultén uses *C. umbellata* and makes the comment "very variable".

Notes: During May this cress is abundant in moist spots nearly everywhere I roam and find it a difficult identification. It is common in wet ditches, roadsides and all around the Mendenhall Glacier Visitor Center. When I found it has been considered a variety of the common weedy bittercress (*C. hirsuta*), I was sure of my identification as it simply looks like a very robust form of that plant, often 0.5 m tall!

Cochlearia Linnæus 1753, scurvy grass, scurvygrass, spoonwort

cock-lee-AIR-ee-uh Latin *cochlear*, spoon, alluding to leaf shape of some species.

Cochlearia groenlandica Linnæus 1753, scurvy grass, spoonwort

green-LAN-dih-cuh Of or pertaining to Greenland.

Taxonomy: Another confused nomenclatural history with these synonyms: *C. officinalis* Linnæus ssp. *arctica* (von Schlechtendal) Hultén; *C. officinalis* Linnæus ssp. *groenlandica* (Linnæus) A.E. Porsild; *C. officinalis* Linnæus ssp. *oblongifolia* (de Candolle) Hultén, *C. officinalis* Linnæus var. *arctica* (von Schlechtendal) Gelert; *Cochleariopsis groenlandica* (Linnæus) A. Löve & D. Löve; *C. groenlandica* (Linnæus) A. Löve & D. Löve ssp. *arctica* (von Schlechtendal) A. Löve & D. Löve; *C. groenlandica* (Linnæus) A. Löve & D. Löve ssp. *oblongifolia* (de Candolle) A. Löve & D. Löve. What is clear with the move to *C.g.* is that Hultén's two subspecies have been merged into a single species. This would account for the *arctica* form being reported by CalFora from Del Norte County, California, a highly unlikely event if Hultén's range maps are accurate.

Notes: The only place I found this is off the Airport Dike Trail out on the wetlands. The white flowers are rather showy, if tiny at only 5 mm, they have a rather loose form and twist a bit like propeller blades. The flowers from loose clusters at the top of the stems. The stems, petioles and leaves are fleshy and are both decumbent and erect in nearly every cluster. They have a pleasant taste, quite similar to miner's lettuce but aren't quite as crunchy green.

Draba Linnæus 1753, whitlow grass

DRAY-buh Greek δραβε *drabe*, acrid, for taste of mustard plant.

Hultén includes 34 species of *Draba* and even eliminating those clearly not in this area or in our habitat, I have no idea what species I'm seeing. P&M only include three, and it is none of those and they make the telling comment that "tiny hairs are often the key to the recondite [abstruse: difficult to penetrate; incomprehensible to one of ordinary understanding or knowledge] world of *Draba* taxonomy" (p. 52). The plants are common, but none of them are really in a dry or rocky places characteristic of the genus as we don't have that sort of environment in the rainforest. When Eugene Wofford (director of the University of Tennessee herbarium) saw some on the bank along Thane Road on June 2, 2009, he immediately recognized them as a *Draba* and asked me which one and I simply shrugged my shoulders!

The curious name "whitlow grass" refers to the old English use of infusions of this plant to cure "whitlows" or "felons", infections at the tip of the finger or under the nail.

Erucastrum C. Presl 1826, dog mustard

air-oo-CAS-trum From the genus *Eruca* + Latin *-astrum*, resembling; hence resembling eruca.

****Erucastrum gallicum*** (Willdenow) O.E. Schulz 1916, common dog mustard

GAL-lih-cum Of or pertaining to Gaul; western Europe during the Roman age.

Up until 2014, the only place I've found this is on the rocky beach section of Rainforest Trail on Douglas Island. I pulled flowering plants every time I walked the trail in an attempt to control this potentially invasive weed. In August of 2014 I found three plants on the upper Nugget Falls Trail and pulled them out by the roots. The flowers are an unusual shade of yellow-orange and the inflorescence is rather appressed to the stem giving the whole plant a vertical look.

Order Caryophyllales A.L Jussieu ex Berchtold & J. Presl 1820

Family Polygonaceae A.L Jussieu 1789 **smartweed**

Bistorta (Linnæus) Scopoli 1754, bistort

bis-TORE-tah Latin *bi-*, twice, + *tortus*, twisted; alluding to the rhizomes of some species.

One very major character of the family is the presence of ocrea, where the stipules have fused together into a structure that completely surrounds the buds.

Bistorta vivipara (Linnæus) Delarbre 1800, alpine bistort

vie-VIH-pah-ruh Latin *vivus* alive and *parere* to bear, bring forth, from the bulblets.

Taxonomy: The exact circumscription of *Polygonum*, *Persicaria* and *Bistorta* are still in a great state of flux and the alignment of species is not very well fixed at the moment, so this could also be *Persicaria vivipara* (Linnæus) Ronse Decraene, *Bistorta vivipara* (Linnæus) Delarbre (as FNA vol. 5 accepts on the basis of habit, morphology, and anatomy); *B.v.* ssp. *macounii* (Small ex J.M. Macoun) Soják; or *Polygonum viviparum* var. *macounii* (Small ex J.M. Macoun) Hultén.

Notes: n a rather curious phenomenon, the basal portion of the inflorescence has bulblets (vegetative propagules) rather than flowers. These are apparently apomictic and must be an adaptation for insuring reproduction when pollinators are not present. Each plant has only a few lanceolate leaves, leading to the question if they are adequate for producing enough food for survival. Since the plant is present, the answer is obvious, so they must be efficient at producing food.

I found them first on a Town, Tram & Trek (T^3) on the Alpine Loop Trail as a rather showy little smartweed. It resembles the American bistort that I learned at Crater Lake many years ago but the flowers are arranged in a tight spike rather than a loose raceme. I've found it in scattered locations among the rocks at the high water mark of Mendenhall Lake's west shoreline.

Persicaria Miller 1754, smartweed, pinkweed

pur-sih-CARE-ee-uh Latin, *persica*, peach + *-aria*, pertaining to; alluding to resemblance of leaves of some species.

Taxonomy: This genus is often placed as a subgenus of *Polygonum*, but most recent works elevate the several to full genera as *Aconogonon*, *Bistorta*, *Fagopyrum*, *Fallopia, Persicaria* and *Reynoutria*. In *Persicaria* the ocrea are papery, opaque and not 2-lobed.

Persicaria amphibia (Linnæus) Gray 1821, water smartweed

am-FIH-bee-uh Greek ἀμφί *amphi-*, around, double, on both sides, or of two kinds + βιος *bios*, life; hence two kinds of life, on land and in water.

Taxonomy: This cosmopolitan species with at least 13 subspecific taxa that have been given at least 22 names as a *Polygonum*! Hultén uses *P.a.* ssp. *laevimarginatum* Hultén. Because it is so incredibly variable, FNA (vol. 5) chooses to use no subspecific taxa.

Notes: This plant can be both terrestrial and aquatic, here in the Dredge Lakes area it is obviously aquatic. I have not seen it in flower here where it should be very obvious with numerous crowded spikes of bright pink flowers.

Fallopia Adanson 1763, false buckwheat, knotweed

fah-LOW-pee-ah Honorific for Gabriello Fallopio, a 16th century professor of botany and anatomy and superintendent of the botanical garden at Padua, Italy.

****Fallopia × bohemica*** (J. Chrtek & Chrtková) J. P. Bailey 1989, Bohemian knotweed

bo-HEM-ih-cuh Of or pertaining to Bohemia

Taxonomy: The × indicates that this plant is a hybrid, in this case between *Fallopia cuspidatum* and *Fallopia sachalinense*. With characters intermediate between its parents, it has several unique features: our plants are apparently all male (at least every one I've examined have stamens only); the flower spikes are about the same length as the leaves right below; the spikes are vertical; the leaves are strongly acuminate (tapered to the tip) and neither cordate nor truncate but something in between; and, the hairs on the veins of the underside are broadly triangular. These characters separate it from either parent.

Synonyms:
Reynoutria × bohemica Chrtek & Chrtková 1983
Polygonum × bohemicum (J. Chrtek & Chrtková) Zika & Jacobson 2003

Fallopia are usually climbing or sprawling, herbaceous to somewhat woody, the stems slender; perianth usually not enlarging in fruit; stigma capitate or peltate. *Reynoutria* are usually erect, robust (1-4 m tall), woody, the stems generally over 1 cm in diameter, hollow; perianth enlarging in fruit; stigma fimbriate. While *Fallopia* is becoming more accepted, the close relationship between *Fallopia*, *Reynoutria* and *Polygonum* argue for broadly circumscribing the three as *Polygonum* (A. S. Lamb Frye and K. A. Kron 2003).

Notes: This is one of the major invasive plants in the Juneau area and is common along the road system in the ruderal areas. I've never found it in an undisturbed habitat. Where it does occur, it expands aggressively into the surrounding areas taking over and replacing whatever was there. The State of Alaska considers an 87 on a scale of 0 = no threat to 100 = major threat to native vegetation [Alaska Exotic Plant Information Clearinghouse Database]. It flowers from late summer into fall, just before turning a bright yellow. With winter the above-ground parts wither and die back to the ground, only to freshly arise again in the spring.

Rumex Linnæus 1753, dock, tl'aañ'wách'

ROO-mex Classical Latin name for sorrel, probably derived from *rumo*, to suck, alluding to the practice among Romans of sucking the leaves to allay thirst.

****Rumex acetosella*** Linnæus 1753, sheep sorrel

uh-see-toe-sell-uh Latin *acetosus*, vinegar; referring to its sour taste.

This is native of Europe that has spread to the entire Northern Hemisphere as a weed of disturbed places (which includes areas with natural disturbance) found in all such places here including areas around the Mendenhall Glacier Visitor Center.

****Rumex crispus*** Linnæus 1753 ssp. ***crispus***, curly dock

CRIS-pus Latin *crispus*, curled, curly; trembling; referring to the edge of the leaves.

This is native of Europe and Asia that has spread to the entire Northern Hemisphere as a weed of disturbed places found in all such places here. Curiously, while not really considered much of an aquatic plant, there are large stands of it in the ponds along the bike trail from Mendenhall Loop Road to Fred Meyer's.

Family Droseraceae Salisbury 1808 **sundew**

Drosera Linnæus 1753, sundew

DRAW-seh-ruh Greek δρόσος *drosos*, dew, dewdrops; alluding to the sticky glands at the ends of the hairs on the leaves.

Drosera rotundifolia Linnæus 1753 var. ***gracilis*** Laestadius, roundleaf sundew

row-ton-dih-FOE-lee-uh Classical Latin *rotundus*, round, circular; wheel-like + Latin *folia*, leaf; hence round leaf.grah-SIH-lis Classical Latin *gracilis*, thin; slender, slim.

Sundews are omnipresent in our muskegs, but it takes a careful eye to spot them as they are so small. That ours belong to the small-leaved variety is sure as most leaf blades are less than 5 mm across with many only 3 mm. I was never in the right place at the right time to find a plant with its white flower. The glandular hairs are nearly as long as the leaf blade is wide and always red. The gland produces the sticky mucous in varying amounts as is obvious with their size in this photograph, taken on the Eaglecrest Muskeg Trail.

Family Caryophyllaceae A.L Jussieu 1789 **pinks**

Honckenya Ehrhart 1783, sandwort, sandplant

hon-KEN-yuh, honk-ken-yuh Honorific for German botanist Gerhard August Honckeny (1724-1805).

Honckenya peploides (Linnæus) Ehrhart 1783 ssp. ***major*** (Hooker) Hultén 1937, beach sandwort

peh-PLOY-dees Greek πέπλος *peplos*, a large shawl or scarf worn draped about the body by women in ancient Greece. Greek όιδες *-oides*, resembles, looks like; alluding to the way the leaves wrap around the top of the stems.

Taxonomy: An orthographic variant is *Honkenya*. FNA (vol. 5) notes the species

> is polymorphic. A number of species and infraspecific taxa have been described from various parts of its geographical range. Recently, four subspecies of *H. peploides* have been recognized (A. Kurtto 2001b; V. V. Petrovsky 1971, 2000), as here; ssp. *peploides* occurs along European coasts.

Notes: This rather tasty edible plant is abundant along the seashore and Mendenhall Wetlands. In spring and early summer I'd eat some of the shoots of the plant on each Rainforest Trail and taught six year old Sophia Stage-Harvey to do the same. The flowers are a white or pale yellow that almost hide in the axils of the chartreuse green leaves and stems. The petals are strongly oblanceolate with only a tiny base, usually shorter than the lanceolate sepals.

FNA notes "*Honckenya* is subdioecious [a tendency in some dioecious populations to produce monoecious plants] ... and is pollinated largely by small bees, hover-flies, flies, and ants." *Caryophyllaceae of the Canadian Arctic Archipelago* also notes "The species is andro-gyno-dioic, displaying females, males, and hermaphrodites. The female flower has very small stamens and petals, while the hermaphrodites and males have larger petals and lager stamens. Female plants produce more seeds than hermaphrodites" [http://www.mun.ca/biology/delta/arcticf/car/www/cahope.htm]. Is this a plant that is moving from being monoecious to dioecious or the other way around? Being monoecious may offer the female plant a bit of advantage by not having to expend energy on growing male parts and having to disperse seeds by only half of the plants, but this seems a might thin idea to me.

Vamosi, J.C., & Vamosi, S.M. 2004. *The role of diversification in causing the correlates of dioecy*. Evolution 58: 723-731.

Minuartia Linnæus 1753, sandwort, titchwort

min-you-are-tee-uh		Honorific for Spanish botanist and pharmacist Juan Minuart (1693-1768).

Taxonomy: *Minuartia* has often been included in a wide circumscription of *Arenaria*.

Minuartia rubella (Wahlenberg) Hiern 1899, boreal sandwort

rue-bell-uh		Latin *rubellus*, reddish.

My only experience with this plant is well up Mount Roberts in the rocky alpine zone where it is a tufted perennial where some of the tufts become runners. The color of the plant is quite blue-green and stands out from nearly everything else in the rocks. While the flowers are small, they are rather showy and bright white with an obvious yellow center of stamens. The petals are entire and obtuse, a bit unusual for the pink family where a terminal notch is common.

Sagina Linnæus 1753, pearlwort

suh-GYE-nuh		Latin *sagina*, ancient name for *Spergula* once included in *Sagina*; a feasting, fatten, alluding to early use as forage.

Sagina saginoides (Linnæus) H. Karsten 1882, Arctic pearlwort

sa (as in cat) -gin-oy-dees		*Sagina* + Greek όιδες -*oides*, resembles, looks like; hence "looks like *Sagina*" since has been included in *Spergula* where it would be a *Spergula* that looks like a *Sagina*. Now it literally means a "*Sagina* that looks like a *Sagina*".

The only place I've found this plant, where it is abundant, is along the Trail of Time on the boulder slope between the Steep Creek Bridge and the mossy woods, right where the trail walks between two 8-foot tall glacial erratics. It looks like a chickweed, with the emphasis on the weed part. Thin stems with opposite yellow-green leaves lie prostrate on the ground whether it is flat or sloped. The flowers are tiny, <7 mm across, with the white-edged sepals showier than the smaller green petals. The drawing in Hultén does not look like the plant in this location, yet the line drawing from the Flora of China [http://www.efloras.org/object_p..aspx?object_id=40189&flora_id=2] matches perfectly. As the fall approaches, the stems become more and more yellow and seem to simply melt into the ground.

Silene Linnæus 1753, campion, catchfly

sigh-lee-nee Greek Σειληνός *seilenos*, probably derived from Silenus, tutor to the wine god Dionysus and the intoxicated foster father of the Greek god Bacchus, who was described as covered with foam; perhaps alluding to the viscid secretion covering many species.

Silene acaulis (Linnæus) von Jacquin 1762, moss campion

aye-caul-is Latin *a-*, without + *caulis* the stalk of a plant; hence without a stem, here meaning no vertical or rising stem.

Taxonomy: Hultén's maps (p. 40) show ssp. *acaulis* being arctic and coastal and ssp. *subacaulescens* as interior where ours are the former. FNA vol. 5 notes:

> *Silene acaulis* is a variable species, and most workers have recognized infraspecific taxa in North America: ssp. *acaulis* (ssp. *exscapa* and ssp. *arctica*), which is predominantly arctic; and ssp. *subacaulescens*, which extends down the Rocky Mountains from Alaska to Arizona and New Mexico. In ssp. *acaulis*, the leaves are flat and short and the flowers are subsessile and smaller in size. Subspecies *subacaulescens* is typically a larger, less-compact plant with longer, narrower leaves and larger, pedunculate flowers. However, in many populations, these two variants are poorly differentiated, and in others both occur together, connected by intermediates. *Silene acaulis* is widely distributed in arctic and alpine Europe.

Notes: The only place I've found this is in the glacial outwash plain portion of the bus parking lot entrance to the Moraine Ecology Trail. Several tufts occur at the point where we leave the broad trail and take the small trail across the outwash plain to the main loop of the ME Trail. Before the flowers appeared, I simply walked by these thinking they were a mat of moss, so when the gorgeous pink flowers emerged I was pleasantly surprised. Primarily an alpine mat plant, these must be at home here at ~60 feet above sea level as the recently deglaciated land mimics the sand and gravel scree habitat of the high (Hultén says "to at least 2,200 meters") mountains. For most of the month of June the flowers delighted my guests as we stopped to examine the enormous—at least in relation to the tiny leaves—flowers. Most who knew plants mistook them for phlox, which they do resemble at eye height. Once finished and fruits developed, I ignored them on my walks but on each walk by took note of how the plant looked as the dry capsules developed, then opened and disappeared. As August waned, the bright green tufts of leaves began to take on the gray-brown of the organic crust around it and pretty much melted in with it becoming nearly invisible, save for the mound of leaves.

Stellaria Linnæus 1753, chickweed

stel-air-ee-uh Latin *stella*, star, + *-aria*, pertaining to, alluding to shape of flower.

Stellaria crispa von Chamisso & von Schlechtendal 1826, crisp sandwort

chris-pah Latin *crispus*, curled, curly; trembling; referring to the edge of the leaves.

This looks a great deal like the weedy chickweeds with thin green stems and broadly ovate opposite leaves. A close look at the leaves reveals the name as the edges are wavy or "crisped" and translucent and when eaten—yes I've tried it—is almost as "crisp" as miner's lettuce but not as satisfying as the stems are so thin. The flowers lack petals but have five tiny white sepals that mimic petals in a hand lens view. The plant is often matted on the ground but nearly always has many erect stems. I find it stream side in alder thickets in filtered light.

Family Montiaceae Rafinesque 1820 **miner's lettuce**

Taxonomy: *Claytonia*, *Lewisia, Montia*, *Phemeranthus*, and *Talinum* have always been troublesome as to their closest allies and best circumscription. They have traditionally been included in the Portulacaceae. With the APG III system (2009), they have been segregated out into their own family, something Rafinesque recognized in 1820!

Claytonia Linnæus 1753, spring beauty, miner's lettuce

clay-tone-ee-uh Honorific for physician and plant collector in Virginia John Clayton (1686-1773).

Montia has moved in and out of *Claytonia* numerous times.

Claytonia sibirica Linnæus 1753 var. ***sibirica***, Siberian miner's-lettuce

Latin sih-beer-ih-cah, America sigh-beer-ih-cah Of or pertaining to Siberia.

Taxonomy: As recently as 1993 (Jepson Manual) this was considered *Montia sibirica* (Linnæus) Howell. FNA (2005) and the 2012 Jepson Manual return it to *Claytonia* and Tropicos includes it as the valid name.

Notes: A very long-flowering species, I'm still finding flowers the beginning of October! There is a large and persistent patch right past the Steep Creek Bridge that I keep snapping stems off for my guests to be "adventuresome" on a Guide's Choice Adventure Hike and eat. I eat them on almost every hike and find them not only pleasant but downright delicious. They have a snap or crispness to them quite reminiscent of fresh lettuce leaves so their name is appropriate for this. Since it was named for the miners who ate them after getting of a long ship's journey where scurvy was a real threat, the name is doubly appropriate. They are especially good when the rains are regular as they got a bit bitter during the dry summer. It is common in edges or other areas where direct light shines for a good part of the day. It is abundant along the middle and upper portion of the Perseverance and Mount Roberts Alpine Loop Trail.

Order Cornales Dumortier 1829

Family Cornaceae (Berchtold & J. Presl) Dumortier 1829 **dogwood**

Cornus Linnæus 1753, cornel, dogwood

CORE-nus Classical Latin *cornus*, cornel-cherry-tree; cornel wood; javelin.

The origin of the common name is unfortunately lost to history. It may date back to the 1540's with *dog-tree*. There are two common stories of its origin: either that the white wood was used as skewers and was originally *dag-wood* derived directly from dagger (1630s, perhaps 15c.) or even from arrows; or, that it comes from *dog-berry* in reference to its fruits being fit only for a dog (1550s).

Weakley (2012) notes:

> The generic limits are controversial. Phylogenetic analyses show that *Cornus* is monophyletic, but various clades within it are also monophyletic and have levels of genetic and morphologic divergence often regarded as warranting generic distinction. Zhang et al. (2008) estimate the time of divergences of the various subgenera as having been from the Paleocene to the Oligocene; at very least, the subgenera are well-marked.

The dwarf cornels have long been recognized as distinct. John Hill created *Chamaepericlymenum* for it in 1756 in *The British Herbal*. Arthur Haines' 2011 *Flora Novae Angliae, a Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England* and the Go

Botany website [gobotany.newenglandwild.org] operated by the New England Wildflower Society that sponsored Haines' work follow this nomenclature.

Stephan Friedrich Ladislaus Endlicher created a section within *Cornus* for the dwarf cornels that he named *Arctocrania* in 1839. Takenoshin Nakai elevated it to genus in 1909 without much acceptance. Per Axel Rydberg created the genus *Cornella* in 1906 for the dwarf cornels in his *Rocky Mountain Flora* in which he commented

> Outside the great difference in habit and fruit between the Dwarf Cornels and Flowering Dogwoods, the former have one character not found in any of the groups usually included in *Cornus*. The sepals of the Dwarf Cornels have a small hornlike, at last deciduous, spine on the back near the apex. This, together with the particular habit, make them deserve generic rank.

Complicating this even more, Philipp (Filip) Maximilian Opiz took the European *Cornus sanguinea* and most North American species and placed them in *Swida* in 1838 giving rise to many new synonyms that I'm leaving out here. These are now generally considered as a section of the genus. As I generally follow Weakley, I retain our two species in *Cornus*.

Then there remains the question of how many species of dwarf cornel there are, two or three! Karl Friedrich von Ledebour described and named *Cornus unalaschkensis* in his 1904 *Flora Rossica* as distinct from *C. canadensis* and *C. suecica* yet Hultén and most today do not.

> There are three species of bunchberry in British Columbia: *Cornus canadensis*, *Cornus suecica*, and *Cornus unalaschkensis*. All three species are very similar in appearance, and are not easy to separate, often requiring microscopic work. However there are some distinguishing characteristics that are readily visible. Griffith and Ganders (1983) provides the following description of the three species:
>
> "[*Cornus canadensis*] has four to six leaves at the top of its stem and greenish-white petals (not the showy white bracts, but the tiny petals inside the bracts).....[*Cornus suecica*] has three to six more or less equal pairs of leaves along it's short stem....the petals are purple or at least partially purple......[*Cornus unalaschkensis*] has flowers like those of [*Cornus suecica*], but has whorls of leaves like those of [*Cornus canadensis*]."

In Klinkenberg, Brian. (Editor) 2014. *E-Flora BC: Electronic Atlas of the Plants of British Columbia* [eflora.bc.ca]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver

> Commonly confused with *C. canadensis,* even in the scientific literature, this is a distinct species. It is an allopolyploid, derived by chromosome doubling in a hybrid of *C. canadensis* and *C. suecica*, and apparently originated before the last glaciation. *Cornus canadensis* differs in having white petals, and the pair of stem leaves are bract-like, < 1 cm long.

Ganders, F.R. 2010. *Notes on* Cornus unalaschkensis. Unpublished manuscript.

There is the distinct possibility that the material named *C. unalaschkensis* is a hybrid between *C. canadensis* and *C. suecica* recognized by Ledebour in 1844, Rydberg in 1906 and Nakai in 1909. A detailed study of 4,000 herbarium by my friend Zack Murrell specimens produced:

> ...morphological extremes as *C. canadensis* and *C. suecica*, of *C. unalaschkensis* as a tetraploid product of hybridization between *C. canadensis* and *C. suecica*, and of two intermediate groups, one produced by introgression toward *C. canadensis* and the other produced by introgression toward *C. suecica*.

Murrell, Z.E. 1994. *Dwarf Dogwoods: Intermediacy and the Morphological Landscape*. Systematic Botany. 19(4), 539-556.

The descriptive name "flowering" dogwoods is something of a misnomer as all dogwoods flower. What it refers to are those species with four large and showy white "bracts" that lie directly beneath the inflorescence which in turn is made up of several to many inconspicuous flowers. The bracts are arranged in closely packed whorls of two bracts each. The lower whorl is often slightly smaller than the upper. Thus the "flowers" are not flowers at all! All ***Cornus*** flowers are 4-merous and have four small petals.

Cornus canadensis Linnæus 1753, dwarf dogwood, bunchberry, Jacob berry, crackerberry, cao zhu yu (China), k'eikaxetl'k

can-uh-den-sis Of or pertaining to Canada

Taxonomy: The plants I see in our area with an obvious top crown of four to six leaves with few, if any much smaller leaves on the stem look just like every other *C. canadesnsis* I've seen in other places of North America. For this reason, I'm calling all of these by this name. The messiness apparent in Murrell accounts for some of my confusion where I find "odd" dwarf dogwoods. For now, I consider the intermediates as belonging here if they match this description.

Synonyms:
Chamaepericlymenum canadense (Linnæus) Ascherson & Graebner 1898
Cornus unalaschkensis Ledebour 1844
Cornella unalaschkensis (Ledebour) Rydberg 1906
Cornella × *unalaschkensis* (Ledebour) Rydberg 1906
Arctocrania × *unalaschkensis* (Ledebour) Nakai 1909
Chamaepericlymenum unalaschkense (Ledebour) Rydberg 1917
Chamaepericlymenum × unalaschkense (Ledebour) Rydberg 1917

Notes: Buchberry is, to my way of thinking, the signature plant of the boreal forest floor, found all across northern North America and extending into the Orient in northeastern China and Japan wherever there are evergreen trees of spruce, fir or hemlock or northern birch species. As soon as the snow melts, the persistent leaves of last season appear and are ready to photosynthesize, an adaptation that requires no great expense of energy but yields immediate results. When the rootstock has been fed, these "old" leaves wither rather quickly, and for a week or maybe two, the plant virtually disappears. Then small green stalks, half the diameter of a pencil, erupt *en masse* from the forest floor that have an almost otherworldly look—a forest of wiry asparagus sprouts—and if it were not for the fact that I kept walking the woods during this period, I doubt I would have known what they were until the leaves unfurled. All the leaves are in bud, appressed on this stalk and open over a period of about two weeks resulting in the typical bunchberry look. This is where P&M (p. 20) can describe them as "more or less evergreen". The upper leaves are crowded into an pseudowhorl of most commonly six, but sometimes four or eight leaves. Stem leaves are tiny, 1/10 the size of the upper leaves and often missing entirely.

When the flowers appear, here in late May and early June, the name dwarf dogwood is entirely appropriate, as the showy white bracts immediately identify it as such. The bracts are acuminate like western (*C. nuttallii*) and Kousa or Japanese (*C. kousa*) dogwood and unlike flowering dogwood (*C. florida*). They appear whorled, but are actually opposite, with the lower two being slightly narrower and often just a bit shorter than the upper two, the internodal distance <0.5 mm. As the flowers mature, the pure white bracts often develop gorgeous magenta spots, presumably caused by a virus, making the plant even more beautiful. The actual flowers in an umbel-like inflorescence above the showy bracts are usually simply noted as greenish-purple "things" in the flower. These flowers open with the anthers released in less than 0.5 ms, the fastest known! The pollen grains are hurled at 3.1 $m\text{-}s^{-1}$ for a distance of 2.5 cm which presumably allows it to be picked up by wind and spread to surrounding plants for fertilization.

Edwards J., D. Whitaker, S Klionsky, & M.J. Laskowski. 2005. *Botany: a record-breaking pollen catapult*. Nature 435 (7039): 164.

When the fruits develop, here in late August and September, the name bunchberry is entirely appropriate as the orange red drupes are arranged in bunches held above the upper leaves. The Kayanní say "they're good berries just to eat" and I agree wholeheartedly! While a bit mealy like an ripe pear, there is a delightful sweetness when mashed on the front of the tongue. The single seed seems large, but that makes it easy to spit out.

I find the name "Jacob berry" only in Tlingít references (Kayanní and *Blonde Indian*) and have not been able to determine where this name comes from or who the "Jacob" is. It seems likely a name from the Presbyterian missionary days referring to the Biblical character Jacob. I cannot find a Tlingít cognate for this word.

Cornus suecica Linnæus, 1753, Swedish cornel, Lapland cornel, dwarf northern cornel, Eurasian dwarf cornel, bunchberry



soo-aye-sih-cuh   Latin *suecia*, Lain name for Sweden.

<u>Synonym</u>: *Chamaepericlymenum suecicum* (Linnæus) Ascherson & Graebner 1898

<u>Notes</u>: When I see a plant with a whorl of four leaves below the flowers and two or three more below that of nearly the same size, I think *C. suecicum*. The other thing I look for is a strong deep purple color to the flowers themselves. The flowers often remain cup-shaped even after full opening.

A very close look at each of the 32 flowers sin the top right photo shows that they are in 4-parted buds that are still closed, most with one or two pale horns recurved out from the apex. Each flower has four sepals, four petals, four stamens and an ovary with four locules, characteristic for the

Cornaceae.

The showy white “petals” are actually specialized leaf bracts that subtend the inflorescence. Other characters that separate the species are: nearly stalkless flower; at least two, and usually more, pair of usually opposite (not whorled) leaves; veins on the leaves arising from the lower third or even petiole base, often appearing parallel.

Out in the exposed habitat here, there are no remnant leaves from last year visible anywhere at the base of the clumps of cornel as every one of these leaves is from this spring. On the trail out, the forest is full of dwarf dogwood overwintering leaves, and only a very few plants have the pencil-thin erupting stalk of this season’s leaves and flower. Is the difference the exposure: open and full of light versus a dark forest floor? European references note that is usually is found in “bogs, coasts and river valleys” [Finland’s *NatureGate* http://www.luontoportti.com/suomi/en/kukkakasvit/dwarf-cornel] which are habitats far more open than the spruce forest of this rainforest.

Vastly outnumbered by the nearly ubiquitous *Cornus canadensis*, Point Lena is the only place where I find this mostly Eurasian plant abundant. The only other place I’ve seen it in the Juneau area is on the Auke Nu trail in the flats before it rises up to the John Muir cabin.

Cornus stolonifera Michaux 1803, red osier dogwood

stow-lawn-IH-fur-uh Latin *stolō*, branch; referring to the underground stems, stolons, by which the plant spreads.

Taxonomy: In a word, confusing! Many well-known references use the name *Cornus sericea*. Weakley (2012) notes:

> Attempts to link the name ***C. sericea*** Linnæus to the red-osier dogwood have focused on the Linnaean description of “f*oliis subtus sericeis*” and “*ramis rubicundis*.” The reference to the red branches has been emphasized to rule out any other species, yet *C. amomum* and *C. obliqua* also have reddish-maroon branches. The description of “*fructo nigro-caeruleo*” cannot be dismissed as a reference to individuals of the red-osier dogwood which have pale blue fruit, often considered to be due to hybridization with *C. amomum* or *C. obliqua*. It seems clear that the description fits *C. obliqua* better than it does the red-osier dogwood. Although there is a specimen in the Linnaean herbarium which has been identified as the red-osier dogwood, it is neither dated nor is the label of *C. sericea* in Linnæus’ hand. Also, considering the similarity of the red-osier dogwood and *C. alba* Linnæus, it is doubtful Linnæus would have described the red-osier dogwood without reference to *C. alba*. Therefore, we agree with Rickett’s rejection of *C. sericea* as a *nomen dubium*.

I’m going with Hultén (1968 p. 708) and Weakley (2012) and considering it in a broad sense as the plant that Michaux named from the east and in a form indistinguishable from it here in Alaska even though there are 27 subordinate taxa named!

Synonyms:
Cornus sericea Linnæus 1767 *nomen dubium*
Cornus sericea var. *occidentalis* Torrey & A. Gray 1840
Cornus occidentalis (Torrey & A. Gray) Coville 1893
Cornus alba subsp. *stolonifera* (Michaux) Wangerin 1910
Cornus sericea forma *occidentalis* (Torrey & A. Gray) Fosberg 1942
Cornus sericea subsp. *occidentalis* (Torrey & A. Gray) Fosberg 1942
Cornus sericea forma *stolonifera* (Michaux) Fosberg 1942
Cornus sericea subsp. *stolonifera* (Michaux) Fosberg 1942
Cornus stolonifera var. *occidentalis* (Torrey & A. Gray) C.L. Hitchcock 1961
Cornus alba var. *californica* (C.A. Meyer) B. Boivin 1967
Cornus alba var. *occidentalis* (Torrey & A. Gray) B. Boivin 1967

Notes: The leaves look very much like a dogwood: oppositely arranged, simple, entire leaf with their prominent light midvein and almost chevroned side veins that curve toward the tip of the leaf. The youngest branches and petioles are distinctly red or red-maroon and many of the leaves have a suffused maroon color to them.

Not frequently encountered, this wide-ranging plant seems to have many individuals very widely separated in Juneau. Early in the 2009 season I noted it up the Perseverance Trail. These two photographs I took on the same day, September 8, 2009, at Auke Village Recreation Area where several 2 - 3 meter shrubs are covered with white fruits (right photo) and a few still with fresh flowers (left photo). It is obvious from both photos that the young stems are quite red. It has obviously been planted as a native ornamental at the University of Alaska Southeast's student housing area.

Order Ericales Berchtold & J. Presl *1820*

Family Balsaminaceae A. Richard 1822 **touch-me-not**

Impatiens Linnæus 1753, touch-me-not, jewelweed, impatiens

im-PAY-shens Latin *impatiēns,* impatient or not allowing.

Impatiens noli-tangere Linnæus 1753, western touch-me-not

Latin naw-lee-tawn-jer-ee, American no-lih-tawn-jer-ee Latin *nōlī tangere,* do not touch, literally "be unwilling to touch".

Taxonomy: There is some question about the western plants identification and the 2012 Jepson Manual considers all the California records to now be *Impatiens capensis* Meerbaugh 1775 and notes that this Eastern North America native is invasive in British Columbia. The descriptions I find of the European *I. noli-tangere* lack the orange spots in the corolla tube clearly visible in the flower close up photo, but this is an extremely variable character as many *I. c.* lack the spots as well. It is possible that our Alaska material is more related to that from China and Kamchatka.

Notes: While walking from the tram back to the office, I noticed bright yellow flowers on one of the flowing seeps over the greenstone rock cut on South Franklin and was very surprised to find it touch-me-nots! Come to check it out in P&M, I have it checked off as having been seen here in Juneau before, but I have no recollection of when or where. The flowers have exceptionally long >1 cm spurs that really make a U turn and face the front of the flower. These have only minor coloring of yellow-orange inside the tube and on the flares. The leaves are dark green with a significant amount of lavender-maroon in them. Is this from the strong sunlight they've been getting or the lateness of the season?

Family Primulaceae Ventenant 1799 **primrose**

Things are changing fast in this corner of the Ericales and recent works do not agree. Using APG III and their research, the most parsimonious alignment takes a broad view of the Primulaceae, but Jepson 2012 takes the narrow view. Weakley's summary seems appropriate:

> As broadly circumscribed to include Myrsinaceae and Samolaceae, cosmopolitan in distribution. Following the discovery that various herbaceous and largely temperate genera (*Lysimachia*, *Trientalis*, *Anagallis*, *Samolus*, etc.) traditionally placed in Primulaceae actually were more closely related to the largely tropical and woody Myrsinaceae, various authors, including Källersjö, Bergqvist, & Anderberg (2000) and Martins, Oberprieler, & Hellwig (2003) proposed the transfer of *Lysimachia*, *Anagallis*, and *Trientalis* to Myrsinaceae and of *Samolus* to Theophrastaceae. APG III (2009) alternatively merges Samolaceae and Myrsinaceae into Primulaceae, and recognizes variation at the subfamilial and tribal ranks; this approach is followed here. [Weakley 2012].

Dodecatheon Linnæus 1753, shootingstar

doe-deh-CA (as in cat)-thee-on Greek δώδεκα *dodeka*, twelve + θεός theos, gods; fanciful name given by Pliny to a primrose purportedly protected by the gods.

Dodecatheon pulchellum (Rafinesque) Merrill 1948 var. ***macrocarpum*** (A. Gray) Reveal 2006, pretty shootingstar Alaskan shootingstar

pull-chell-um, Latin *pulchellus,* pretty. mack-roe-car-pum Greek μακρός *makros*, large + Greek καρπός *karpos*, fruit, botanically carpel; hence large carpel.

Taxonomy: FNA (vol. 8, 2009, p. 68), with the red emphasis mine, has this information about the *Dodecatheon* and *Primula* connection:

> Recognition of *Dodecatheon* creates a paraphyletic *Primula* (M. Källersjö et al. 2000; A. R. Mast et al. 2001, 2004; L. Martins et al. 2003). *Dodecatheon* falls within *Primula* subg. *Auriculastrum* Schott (as sect. *Dodecatheon*) and is seemingly allied with the Sierra Nevada endemic *P. suffrutescens* A. Gray. The two share an involute leaf vernation. While *Primula* has a base number of x = 11, *Dodecatheon* has x = 22; H. J. Thompson (1953) has shown that 2n = 66 plants are triploids, not hexaploids. These observations have resulted in the transfer of all species of *Dodecatheon* to *Primula* (A. R. Mast and J. L. Reveal 2007). For those wishing to adopt this concept, the appropriate names are provided here in synonymy. ... Use of the taxonomic rank of variety, rather than subspecies, was discussed by N. H. Holmgren (1994), and those concepts are followed herein.

The FNA treatment illustrates the problems with changes in nomenclature. James Reveal is author of both the FNA treatment and of the work transferring *Dodecatheon* to *Primula* recognizing many won't like this change. If transferred, the name is *Primula pauciflora* (Greene) Mast & Reveal var. *macrocarpa* (A. Gray) Mast & Reveal. There exists an amazing list of synonymies but the name *pauciflorum* was the first used for this as a species and thus has priority in the transfer.

Notes: The name Alaskan shootingstar comes from the new FNA treatment, one I think I'll adopt as all shootingstars are "pretty". In our area this plant has a wide range of habitats from coastal grasslands and rocky beaches to muskegs and even the alpine on Mount Roberts. It is especially abundant in the bowl above the Dan Moeller cabin where this photograph was taken. The beach on the Rainforest Trail on Douglas Island is the only place I found it on Gastineau Guiding hikes. It shows up in large patches in the Mendenhall Wetlands—easily visible from Eagan Drive at full speed—in late June and early July and is often mistaken for fireweed due to its color.

Lysimachia Linnæus 1753, loosestrife

lih-sih-ma-kee-uh from the Greek λύσις, *lusis*, dissolution; loosening; melting + μάχη, *mache,* a battle, controversy, strife; alluding to soothing properties

Taxonomy: This Linnæn genus has expanded greatly to about 180 cosmopolitan species with modern genetic research. The former genera *Anagallis*, *Centunculus*, *Glaux*, and *Trientalis* are embedded within it.

Hao, G. et al. 2004. *Molecular phylogeny of* Lysimachia *(Myrsinaceae) based on chloroplast trnL-F and nuclear ribosomal ITS sequences*. Molec. Phylogen. Evol. 31: 323-339.

Källersjö, M., G. Bergqvist & A. A. Anderberg. 2000. *Generic realignment in primuloid families of the Ericales s. Linnæus: a phylogenetic analysis based on DNA sequences from three chloroplast genes and morphology*. American Journal of Botany 87: 1325–1341.

Lysimachia maritima (Linnæus) Galasso, Banfi, & Soldano 2005, sea milkwort

mah-rih-tih-mah   Latin *maritimus*, maritime; of, near; hence found near the ocean.

Taxonomy: The vast majority of references use the name *Glaux maritima* Linnæus 1753. Being the only plant among its relatives that lacks petals, it was placed in this monotypic genus. Since the older name is so entrenched, I'm including its etymology.

Glaux Linnæus 1753, sea milkwort
glox   Greek Γλαῦκος Glaucus, a Greek sea god; hence blue-green, as the color of the sea.

Notes: The five "petals" are actually sepals since the corolla is absent. Throughout the range of the species the calyx is white or pink or both and 3-5 mm long with lobes obovate-oblong 1.5-2 mm wide and the apex is rounded. All the flowers I've found here have pure white "petals" with a pink disk where the five stamens arise. The single flowers are quite beautiful, if small, and rather crowded in the axils of the very succulent light green leaves. A hand lens look gives a visual reward.

This circumboreal species is an obligate wetland plant, it grows in abundance in the high tidal zone of the Mendenhall Wetlands and in similar places at Eagle Beach. It has to be searched for among the beach grass on the Rainforest Trail, but it is there. Always found in a saline environment, including alkaline lakes in the interior away from the coast, the succulent leaves serve as a reservoir of pure water.

Ethnobotany: I find the fresh shoots to be pleasantly tasty, mild, usually with a bit of salt from the sea, and provide a tactile crunch in the teeth akin to eating celery. They are best early in the season, but even later some new growth can usually be found that is still good. The Tlingít apparently included this as one of the many "beach greens" as they "have a nice, mild flavor, you can eat them fresh, add them to soup, salad or stir fry. Beach greens are also delicious fermented..." [1]

The Salish and Kwakiutl of British Columbia used the roots "to make one very sleepy". [2]

The name milkwort comes from its use in Europe to stimulate lactation. "In his Irish Herbal (1735), K'Eogh stated that, because of its hot and dry nature, 'it encourages the production of milk in nursing mothers.'" [3]

[1] ___. undated. *Southeast Alaska Traditional Food Guide*. Southeast Alaska Regional Health Consortium. http://www.searhc.org/documents/health-promotions/TradFoodGuideFinal_1.pdf
[2] Turner, N.C. & M.A.M. Bell. 1973. *The Ethnobotany of the Southern Kwakiutl Indians of British Columbia*. Economic Botany 27:257-310 (p. 288)
[3] ___. undated. Herbal Encyclopedia, Common Medicinal Herbs for Natural Health. Cloverleaf Farm, LLC. http://www.cloverleaffarmherbs.com/milkwort/

Lysimachia europaea (Linnæus) U. Manns & Anderberg 2009 [1], northern starflower


yoor-oh-pee-uh	of or pertaining to Europe, where the plant was first named

Taxonomy: It turns out *Trientalis* is deeply embedded in *Lysimachia* even though it has flower parts in seven's instead of five. Since the older name is so entrenched, I'm including its etymology.

Trientalis Linnæus 1753, starflower
try-en-tal-is	Latin, one-third of a foot, alluding to height.

Starflowers have been considered as being two, three or four species:
Trientalis europaea Linnæus 1753 narrow or including *T. arctica*
Trientalis borealis Rafinesque 1808 narrow or including *T. latifolia*
Trientalis latifolia Hooker 1838
Trientalis arctica Fischer ex Hooker 1838

Alaskan populations of the circumboreal species *Trientalis europaea* have been segregated out as:
Trientalis arctica Fischer ex Hooker 1838
Trientalis europaea Linnæus ssp. *arctica* (Fischer ex Hooker) Hultén 1930
Trientalis europaea Linnæus var. *aleutica* Tatewaki & Kobayasi 1934

FNA finds strong support for three species with our Juneau plants matching their description of *Trientalis europaea*. The pedicels are longer than the leaves, and the leaves widest past the midpoint. With new genetic information it is moved into *Lysimachia*. As a circumboreal species, the distinction between the more northern starflowers and their various varieties are subtle and now best considered in a single, wide-ranging circumscription.

Notes: This lovely diminutive flower can be found nearly anywhere there is open moist land. Abundant in the muskegs, it also occurs in wet forest edges and open weepy slopes such as those on the East Glacier Trail. It almost forms a ground cover in just past the edges of the mowed areas in the middle parking lot at the Mendenhall Glacier Visitor Center where it is often rather dry. It is common on the trail around Floyd Dryden Middle School, but here it isn't very wet. It is common on the Mount Roberts Trail in the alpine zone. It is occasional—one has to look for it—on the Rainforest Trail.

The flowers seem a rather dull white to me, perhaps due to the thinness of the petals. When very young as in the right photograph, they can have a somewhat crystalline look. I've not seen one with any pink in it as P&M indicate, but Hultén uses pink to separate out *T. borealis.* A very close look at the center of the flower shows that the seven filaments are connate (united) at their very base to form a ring around the tiny ovary. Seven slight ridges are visible on the globose ovary representing the septae that separate the locules. The rich maroon pedicel is usually quite glandular and sticky to the touch. More visually commanding are the obvious whorled leaves right below the (usually) single flower stem. Some plants reach 30 cm tall, always in the muskegs. These have tiny alternate leaves can be found on the stem below the whorl. Plants in the drier areas are barely over 5 cm tall.

[1] Manns, U. & A.A. Anderberg. 2009. *New combinations and names in* Lysimachia *(Myrsinaceae) for species of* Anagallis, Pelletiera *and* Trientalis. Willdenowia 39: 49-54.

Primula Linnæus 1753, primrose, auricula, cowslip, oxlip

prim-you-lah	Latin *primus*, first + *-ulus*, diminutive alluding to early spring blooming.

Primula cuneifolia von Ledebour 1815 ssp. ***saxifragifolia*** (Lehmann) W.W. Smith & G. Forrest 1928, pixie-eyes, wedgeleaf primrose

cue-ney-ih-foal-ee-uh, Latin *cuneatus*, wedge-shaped, cuneiform; tapering + Latin *folia*, leaf. sacks-ih-fray-jih-foal-ee-uh Genus *Saxifraga* + Latin *folia*, leaf; leaves like saxifrages.

Taxonomy: FNA vol. 8 p. 97 notes "In North America, the heterostylous ssp. *cuneifolia* has been found only in the western Aleutian Islands. The homostylous ssp. *saxifragifolia* is found throughout most of Alaska and south to Vancouver Island." Homostylus means the styles are all the same length.

Notes: This is one of the most beautiful of all the flowers I've seen in Alaska. With its split-lobed pink corolla and yellow "eye" it is most pleasing to the eye even though it is a belly plant of the alpine. Curiously, FNA makes no note about the yellow eye. It was pointed out on the Juneau Audubon hike up Mount Roberts first by Mary Willson in the group I was walking with, but she doesn't like the name "pixie-eyes" but to me it sounds far more like a "common" name than wedgeleaf anything!

Primula pauciflora (Greene) Mast & Reveal var. ***macrocarpa*** (A. Gray) Mast & Reveal 2007

See *Dodecatheon pulchellum* (Rafinesque) Merrill 1948 var. *macrocarpum* (A. Gray) Reveal 2006

Family Ericaceae A.L. de Jussieu 1789 **heaths**

Andromeda Linnæus 1753, bog rosemary

ann-draw-meh-duh For the Greek mythological daughter of Cepheus and Cassiope, married to Perseus.

A monotypic genus. "Linnæus wrote that Andromeda 'is always fixed on some turfy hillock in the midst of the swamps, as Andromeda herself was chained to a rock in the sea, which bathed her feet as the fresh water does the roots of the plant'." FNA

Andromeda polifolia Linnæus 1753 var. ***polifolia***, bog rosemary, moorwort

pole-ih-FOE-lee-uh Greek πολλοί, *polloi*, many + Latin *folia*, leaf; hence many leaves.

Notes: The pale pink to white upside down globes can be very showy. The pedicel usually has a very strong shepherd's crook at the point of attachment to the flower. The five sepals are usually deep pink and form a prominent star at the base of the fused petals. The leathery leaves have revolute (rolled inward) edges and white to whitish hairs underneath and are usually pointed upwards.

Common to abundant in shallow muskeg areas and other open yet moist places. It is visible when flowering from the road in the muskeg at mile 37. It is abundant in the muskegs of the Auke Nu and Dan Moeller Trails. I have found it in the perched muskegs on Fish Creek Road, but it is not abundant there.

Toxicity: Care must be used when gathering leaves of bog plants for tea. Labrador tea (*Ledum groenlandicum*) is safe, but this species contains grayanotoxin (also called andromedotoxin) that are common in rhododendrons. Honey produced by bees visiting the plant contains the poison and was used against the armies of Xenophon in 401 BCE. [1] Poisoning is rarely fatal, even though in high doses cardiac problems are common, and the symptoms usually last less than a day. [2]

[1] Demircan, A., A. Keleş, F. Bildik, G. Aygencel, N.O. Doğan & H.F. Gómez. 2009. *Mad honey sex: Therapeutic misadventures from an ancient biological weapon*. Annals of Emergency Medicine 54 (6): 824–829.
[2] Ito, S., Y. Nakazato & A. Ohga. 1981. *Further evidence for the involvement of Na+ channels in the release of adrenal catecholamine: The effect of scorpion venom and grayanotoxin I*. British Journal of Pharmacology 72 (1): 61–67.

Cassiope D. Don 1834, mountain heather

cass-ee-oh-pee Greek mythology: Κασσιόπη *Cassiope*, "she whose words excel"; wife of Cepheus and mother of Andromeda.

Cassiope mertensiana (Bongard) G. Don 1834 var. ***mertensiana***, white mountain heather, western moss heather

Latin mur-ten-see-ah-nah, American mur-ten-see-AYE-nah Honorific for German botanist Franz Carl Mertens (1764-1831)

I like the description P&M (p. 2) give for where this plant grows, "alpine heath and subalpine parkland" as the latter perfectly describes the bowl above the Dan Moeller Cabin on Douglas Island. What a glorious, sun-filled place it was on July 12 when I took this photograph. The heather is everywhere, on the ground, climbing and covering rocks, and in full flower. This is a heather of only the southeast portion of Alaska and adjacent British Columbia but extends south into the Sierra Nevada Mountains. The leaves help identify this heather as they are scale-like, in 4 rows, ~4 mm in diameter, and appressed against the stem giving it a round look. The flowers are numerous and campanulate-urceolate, more or less bell-shaped and wide open as they hang down from the tops of the stems.

Elliottia Muhlenburg ex Elliott 1817

ell-ee-AH-tee-uh Honorific for American botanist and banker Stephen Elliott (1771-1830).

Taxonomy: Weakley (2012, p. 828) notes that "the generic limits of *Elliottia* have been controversial". Two Japanese species usually segregated in the genus *Tripetaleia* Siebold & Zuccarini (1843) along with our Pacific Northwest plant *Cladothamnus pyroliflorus* Bongard (1832) have been merged with the Georgia endemic *Elliottia racemosa* into the single genus, *Elliottia* with four worldwide species. When I compare the floral structure of copperbush with Georgia plume, I find them quite different. The key in Weakley and Hultén hinges upon the fruit being a dry capsule and the petals being separate, characters that describe all four species. Is this enough to combine them? The hooked or shepherd's crook of the style is certainly unique to copperbush which is certainly a fairly narrow endemic to our region.

Despite where I find a very different morphology, there is compelling evidence for merging *Tripetaleia*, *Cladothamnus* and *Elliottia* from "anatomy, chemistry, morphology and palynology and combining this information with what is already know about floral morpology. The evidence presented here suggest that there is only a single genus *Elliottia*...".

Bohm, B.A, S.W. Brim, R.J. Hebda & P.F. Stevens. 1978. *Generic limits in the Cladothamneae (Ericaceae), and its position in the Rhododendroideae*. Journal of the Arnold Arboretum v. 59 n. 4, 311-341.

Elliottia pyroliflora (Bongard) S.W. Brim & P.F. Stevens 1978, copperbush

peer-oh-lih-FOE-lee-uh   Greek πυρο, fire + Latin *Flora*, goddess of flowers; alluding to the flame-like color of the petals.

Notes: I learned this unique plant from the Cordova area in 2005. It takes me a hike up into the Granite Creek basin before I finally found this plant (in fruit)in the Juneau area on August 29, 2010. I found my first Juneau flowers on July 29, 2013 on the Mount Roberts Trail. In 2013 fellow guide Julie Walker posted a photo of this plant from the ridge of Thunder Mountain on Facebook where I recognized it immediately with the simultaneous understanding that I simply haven't been in the right environment for this shrub enough.

This shrub occupies the elevation between the treeline forest and the true alpine growing in shrubby areas with ample subalpine , Sitka alder (*Alnus viridis*). While common around Cordova, I don't find it in the areas I frequent here, so it is a joy to see this unique shrub.

Empetrum Linnæus 1753, crowberry

em-peh-trum   Greek εν- *en-*, in + πετρος *petros*, rock, alluding to habitat.

Taxonomy: formerly considered as part of the small family Empetraceae Hooker & Lindley 1831 along with the southeastern North American *Ceratiola*—both monotypic genera—genetic studies by Kron et al. have found both to be well-embeded within the Ericaceae even though their reduced flowers are dramatically different than most members of that family having two or three sepals and two or three petals.

Empetrum nigrum Linnæus 1753 ssp. ***nigrum***, black crowberry, xéel'i

nigh-grum   Greek νίγερ *niger*, black.

Taxonomy: The two subspecies of crowberry are distinguished by being unisexual (dioecious) for ssp. *nigrum* and bisexual (monoecious) for subsp. *hermaphroditum* (Lange) Böcher. Are the two this distinct? Very curious, to be sure. The drawing in Britton and Brown shows the inconspicuous unisexual flowers that develop in the axils of the leaves in very early spring (April here) with the three petals, three stamens and three pistils of our form.

The maps in Hultén indicate a fairly distinct range for each in Alaska and the rest of Pacific Northwest America, but much overlapping in Siberia and Northern Europe. It apparently occurs in the Malvinas in the Falkland Islands in the Southern Hemisphere as well [http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15127].

Notes: The shrubby plant looks a great deal like a prostrated hemlock and I'm sure it's mistaken for that many times when there are no fruits present. It also resembles heathers but has a much more open look and the leaves have a prominent groove on the underside. It grows in many habitats, and is common in the muskeg. The plant is easily identified when in fruit as the very dark blue fleshy drupes (like a berry but with a single seed) are unlike anything else this close to the ground. On September 23, 2009 I found hundreds of ripe fruits on the Eaglecrest Muskeg Trail and ate many of them, finding them more pleasant that the "tasteless" description of Hultén (p. 16). The flowers are inconspicuous to the point of being invisible and the petals are deciduous and fall off early so many reports of the plant call it apetalous (without petals).

Kalmia Linnæus 1753, sheep-laurel, lamb-kill, calf-kill, kill-kid, sheep-poison

cal-me-uh Honorific for Swedish botanist, pupil of Linnæus, collector in eastern North America, Peter Kalm (1715-1779).

Toxicity: Note that all *Kalmia* are poisonous to mammals and a common problem for stock animals grazing in its range. They contain grayanotoxin (also called andromedotoxin) that are common in rhododendrons.

Kalmia microphylla (Hooker) A. Heller 1898, bog-laurel, western bog-laurel, alpine laurel

Latin my-CRAW-fill-uh, American my-crow-FILL-uh Greek μικρός *mikros*, small + φύλλο *fyllo*, leaf

Taxonomy: The western plants are being segregated from the eastern plants (*K. polifolia* Wangenheim) at the same time that *Loiseleuria* and *Leiophyllum* are being subsumed into *Kalmia*.

Notes: Being a bog plant, one has to get to the muskegs around Juneau to see this, but they are found in every muskeg one enters. It can be found with some searching on the lake shore trail to Nugget Falls in the clayey soil of the eastern outwash plain. *Flowers*: When in flower, there is no mistaking this for anything but a *Kalmia* if one learned the genus from the eastern mountain laurel as the flowers are perfect in synchrony of form. Bog laurel is far more intensely pink when it's pink, but it can be white. Flowers form in loose clusters at the top of rather erect branches. The corolla is fused into an open cup and the anthers form in pockets in the petals so that as the flower opens and expands, the filament is forced into a curve like a bow. With the expanding corolla, the pocket holding the anther finally loses its battle with the filament and the anther is released from its pocket with amazing force as the tension on the filament is relaxed and straightens, pollen goes flying. The pockets of bog laurel are much smaller than on mountain laurel, but they work the same way. *Leaves*: opposite, often with a white strip down the center of the top side, and the edges are resupinate (rolled under) and the underside is covered with white hairs.

Kalmia procumbens (Linnæus) Gift, Kron & P.F. Stevens 2002, alpine azalea

pro-come-bens		Latin *procumbere*, sink down, lie down, lean forward; hence laying on the ground.

Taxonomy: *Azalea procumbens* Linnæus 1753; *Chamaecistus procumbens* (Linnæus) Kuntze 1891; and *Loiseleuria procumbens* (Linnæus) Desvaux 1813, are all synonyms as this circumboreal plant has now been subsumed into a broader *Kalmia*.

Notes: The only place I've seen this in the Juneau area is well above treeline on the Mount Roberts Trail. All plants were well past flowering in July 18, 2009 but no fruits had developed yet. On a very sunny May 29, 2010 dozens of patches of this most beautiful plant are in flower. The plant is well named as it is extremely procumbent, literally lying on the ground. The lanceolate opposite leaves are gray-green here, more so than I remember from other locations, but typically crowded into a near tuft at ground level.

This is the only species of *Kalmia* not endemic (restricted) to North America.

Ledum Linnæus 1753, Labrador tea

lee-dumb		Greek λῆδον *ledon*, ancient name for the plant.

Ledum groenlandicum Oeder 1771, Labrador tea, s'ikshaldéen

green-land-ih-cum		Of or pertaining to Greenland

Taxonomy: *Ledum palustre* Linnæus ssp. *groenlandicum* (Oeder) Hultén 1948; *L. palustre* Linnæus var. *latifolium* (von Jacquin) Michaux; *L. pacificum* Small 1914. *Rhododendron groenlandicum* (Oeder) K.A. Kron & W.S. Judd 1990 is slowly gaining acceptance as their molecular and morphologic evidence shows *Ledum* well included in *Rhododendron*. If this seems extreme, examine the treatment of *Rhododendron menziesii*.

Kron, K. A. & W. S. Judd. 1990. *Phylogenetic Relationships within the Rhodoreae (Ericaceae) with Specific Comments on the Placement of* Ledum. Systematic Botany, 1S(1): S7-68

Notes: For many, this is a confusing plant with bog laurel (*Kalmia microphylla*) and bog rosemary (*Andromeda polifolia*), a potentially serious problem as the latter are poisonous and this one is supposed to make an excellent tea. Two things help to distinguish the two: flowers here are nearly always pure white and have petals that are distinct at least part way down the flower tube; and the leaves, while being revolute (the edges being rolled to be upside down) like bog laurel have tan to brown rather than white hairs underneath. New growth is often covered with downy white hairs.

Rhododendron Linnæus 1753, rhododendron, azalea

row-doe-den-dron Latin *rhododendron*, literally "rose-tree" from ῥόδον *rhódon* rose, + δένδρον *déndron*, tree;from the color of the flowers and the large, shrub form of the plant.

Rhododendron menziesii Craven 2011, fool's huckleberry, false huckleberry, false azalea, mock azalea, rusty menziesia, smooth menziesia, Pacific menziesia, menziesia, skunkbrush, rustyleaf

mens-zee-see-eye Honorific for Scottish physician and naturalist with the Vancouver Expedition of 1790-1795, Archibald Menzies, (1754-1842).

Taxonomy: *Menziesia ferruginea* J.E. Smith 1791 var. *ferruginea* will be the name most commonly encountered. In 2011 the genera *Diplarche* and *Menziesia* were found to be deeply nested into *Rhododendron* based upon DNA data.[1] Two varieties are currently recognized, var. *menziesii* on the Pacific Northwest coast and var. *glabella* (A.Gray) Craven, inland.

The glabrous form has been considered a full species as *Menziesia glabella* (Gray) Peck; a subspecies as *M. f.* J.E. Smith ssp. *glabella* (A. Gray) Calder & Roy Linnæus Taylor; and a variety as *M. f.* J.E. Smith var. *glabella* (A. Gray) M. Peck.

Notes: This plant has many common names that I don't like. It really doesn't look that much like an azalea, so calling it a "false" or "mock" azalea just confuses things and I just hate calling things "false" on general principles. "Fool's huckleberry" I like as the leaves and flowers do look like blueberries (*not* huckleberries) so upon seeing the flowers one could really expect to come back later and find a luscious fruit, but instead find a woody capsule, thus making a "fool" out of you. Calling it a "menziesia" surely is not a "common" name in any sense of the word common so I reject names that include that outright. The "rusty" doesn't really match any part of the plant except the hairs that cover the branches, but they are no more "rusty" than any of our blueberries, although that's what "ferruginea" means. "Skunkbrush" seems to come from the odor of the crushed leaves, but I haven't notice that. I will call it "fool's huckleberry" but would really prefer "fool's blueberry".

What is amazing to me is that we have two decidedly different leaf color forms here, bright green and dull blue, and these have not been given names! They often grow together and seem to be natural morphs, but is there a more significant genetic difference? I have seen no pattern in their occurrence to lead me to any conclusion about this, other than the blue form is *very* easy to spot. P&M make a note of this as well (p

This genus is easily identified by the mucro (a sharp, pointed part or organ, especially a sharp terminal point, as of a leaf or shell) at the tip of every leaf and visible in my photograph. This is an extension of the midvein of the leaf and its function is probably as a drip tip, functioning to let excess water drain off the leaf, since this is a species of the north temperate rain forest. The flowers hang down, as any proper blueberry should, but the dry, woody capsules stand erect. The fall color is quite a sumptuous crimson-orange.

[1] Craven, L.A. 2011. *Diplarche and Menziesia transferred to Rhododendron (Ericaceae).* Blumea 56: 33–35.

Moneses Salisbury ex Gray 1821

moan-ee-sees Greek μόνος *monos*, one, single + ηεσις *hesis*, delight; alluding to attractive, solitary flower.

Taxonomy: a monotypic genus previously placed in its own family, the Pyrolaceae Lindley 1829, along with *Chimaphila*, *Moneses*, *Orthilia*, and sometimes the Monotropaceae which also has been subsumed into the Ericaceae *sensu lato*.

Moneses uniflora (Linnæus) A. Gray 1848, single delight, wax flower, onflowered wintergreen, woodnymph, St. Olaf's candlestick (Norway), shy maidens



you-nih-floor-uh Latin *unus*, one; alone, a single, sole + Latin *Flora*, goddess of flowers; hence a single flower.

Taxonomy: Hultén (p. 14) notes that "specimens described from the coastal region belong to var. *reticulata* (Nuttall) Blake [*M. reticulata* Nuttall; *M. uniflora* ssp. *reticulata* (Nuttall) Calder & Taylor], with somewhat more acute, more denticulated and reticulated leaves." This seems an overly fine distinction to me.

Notes: Being a circumboreal plant, it has many common names. Jessica Smith of Gastineau Guiding has such a wonderful local name for this diminutive flower that it has become my preferred: shy maidens. With the single down-curved flower, it *is* a shy little thing that is easily overlooked and the name is perfect! The flower is gorgeous but requires a down-on-the-knees look to discover. The five waxy-white petals are clearly visible from above, but not the 10 golden anthers atop green filaments and the prominent green pistil with it's long style and crown-shaped stigma as they point downward. As the pistil matures, the pedicel gradually straightens until the mature maiden is no longer shy, her fruit (a dry capsule) held up high for all to see. Abundant on the East Glacier Trail, particularly along the side trail to the lookout and the main trail below it as well as the cut flume, this plant seems to require a well-developed moss bed with humus to thrive. The deep green leaves with abundant chlorophyll seem well-adapted to the shaded environment to collect the limited light that makes it through the dense canopy.

Orthilia Rafinesque 1840

oar-thill-ee-uh Greek ὀρθός *orthos*, straight, and *είλεῖν eilein* to Latin *ileum*, side or flank, possibly alluding to secund inflorescence

Taxonomy: a monotypic genus previously placed in the Pyrolaceae Lindley 1829, along with *Chimaphila*, *Moneses*, and sometimes the Monotropaceae which also has been subsumed into the Ericaceae *sensu lato*.

Orthilia secunda (Linnæus) House 1921, one-sided wintergreen, sidebells wintergreen

seh-kund Latin *secundus*, favorable, fair; next, following; second. The botanical term for one-sided.

Taxonomy: syn = *Pyrola secunda* Linnæus 1853.

Notes: Common to abundant, but always in the thick moss of the shaded forest floor where it is relatively open, or in the moss under the cover of shrubs in outwash plains. It is late-flowering, usually not open until mid-July, and somewhat long-flowering with the bell-shaped corollas lasting several weeks before they fall off. The common name describes the plant perfectly, with the added note that the peduncle is nearly always bent to the side the flowers are bent toward so they appear to droop. The stigma often protrudes from the small opening in the corolla. Reddish-brown dry capsules develop in August in a sphere shape with a distinct depression at the top. The leaves are thick, waxy and deep green. I've never been able to taste any oil of wintergreen in the plant, so the name "wintergreen" is literal; the leaves are evergreen and remain green under the winter snowpack.

A careful look of the highly cropped close up shows five very small very pale green triangular sepals at the base of the flower that have a hyaline (transparent) margin. The five petals are completely separate yet are *urceolate* (urn-like) and almost completely enclose the flower. Exserted from the corolla is a stout style with the stigma expanded into a disc with tiny rounded lobes around the edge and a slight dimple in the center, all the same color as the petals. The stamens of the ripe flowers on the right have their twin ashy anthers exserted, appearing as though as they grow they simply push the corolla open. Each flower has ten and the anthers open with a single pore at the top (since they hang upside down) that is just barely visible. Each flower is subtended by a very pale bract that looks very much like the petals.

Phyllodoce Salisbury 1806, mountainheath, mountain heather

Latin fill-OH-doe-key, American fill-oh-DOE-chee A nereid (sea-nymph) in Greek mythology, allusion obscure.

Phyllodoce glanduliflora (Hooker) Coville 1897, yellow mountain heath, yellow mountain heather, yellow heather

glan-dew-lih-floor-uh Latin *glandula*, gland of the throat, tonsil; hence gland+ Latin *Flora*, goddess of flowers

Taxonomy: *Phyllodoce aleutica* (Spreng.) A. Heller ssp. *glanduliflora* (Hooker) Hultén is a synonym; this is not a plant of the Aleutians but of the Pacific Northwest in general.

Notes: When in *flower*, this heather is easily distinguished from all the others as the pale yellow to pure white down-turned flower is urceolate, nearly closed at its opening, unlike any other heathers in our area. The pedicel and the sepals are all covered with glandular hairs, obvious to the naked eye and elaborate balls on sticks with a 10x hand lens. The corolla is almost crystalline-white, composed of discrete elements that almost form prisms to separate the colors of the sun as they shine through. At the opening, the five petals flare back with tiny points, seemingly to tease any potential pollinator to come in. Three to six flowers arise from a single point on the stem, all with glandular pedicels that make quite a vertical show. The *leaves* appear almost two-ranked, like western hemlock (*Tsuga heterophylla*), but also can wrap around the stem and look like a bottle brush. The *stems* are rather red and almost showy.

Pyrola Linnæus 1753, wintergreen

Latin PEER-oh-lah, American (but not common) pie-ROW-lah Greek πυρο, fire; alluding to the fire red or burnt color of the inflorescence of several species.

Taxonomy: Previously placed in its own family, the Pyrolaceae Lindley 1829, along with *Chimaphila*, *Moneses*, *Orthilia*, and sometimes in the Monotropaceae, all have been subsumed into the Ericaceae *sensu lato*.

Pyrola asarifolia Michaux 1803 ssp. ***bracteata*** (Hooker) Haber 1983, pink wintergreen




ass-are-ih-foal-ee-uh, From the Genus *Asarum* + Latin *folia*, leaf; hence leaves like *Asarum*, wild ginger.brak-tee-a-tah
Latin *bractea*, literally "thin metal plate," of unknown origin; referring to the bracts below the corolla.

Taxonomy: The eastern form of this circumboreal plant has been segregated out as *Pyrola americana* Sweet, yet *P. asarifolia* Michx. ssp. *asarifolia* has a range that extends well east, but is circumboreal and has been given the name "liverleaf wintergreen" by PLANTS, while ssp. *bracteata* is coastal and is our form in Juneau. It is probably part of a variable circumboreal population.

Notes: The leaves are the showiest part of this plant. Big and round and thick and succulent and bright green and almost a ground cover, they command attention, and guests ask about it on nearly every summer walk on the Moraine Ecology Trail where it is abundant. This may well be the most common wildflower in our hiking area here. When in flower, I have to stop and show folks the beautiful flowers, which, because they look at the ground, are not all that showy. Later on, this plant seems almost more showy in fruit than in flower. Since the flowers hang down, hiding most of their delightful pink, they aren't very obvious other than the big, round and showy leaves. When the fruits develop, the dark color contrasts with the green of the ground making them stand more apart from their environment. "Wintergreen" is such a fun name to interpret, as most immediately think of the flavor rather than the more literal meaning of the name as this plant remains green all winter, under the snow, ready to photosynthesize on exposure at first thaw (top left photo). These leaves then wither as this year's growth takes over and by mid-May there is no sign of the old leaves and lots of new, bright green fresh leaves.

See *Chrysomyxa pyrolae* for an account of pyrola leaf rust on this plant.

Vaccinium Linnæus 1753, blueberries

vax-in-ee-um Latin name for blueberry.

Vaccinium alaskaense Howell 1901, Alaskan blueberry, kanat'á

uh-lask-ense Of or pertaining to Alaska.

Taxonomy: *V. alaskense* Howell, is an orthographic variant, which makes matters confusing since this epithet is far more common in use! The Germplasm Resources Information Network (GRIN) as well as the Olympia Forestry Sciences Laboratory of the U.S. Forest Service have *V. ovalifolium* Small as a synonym, so any confusion between these two blueberries is to be expected and the Tlingít make no distinction as well.

The Fire Effects Information System (USFEIS) indicates significant hybridization between *V. alaskaense, V. ovalifolium and V. caespitosum*. Camp, W. H. 1942. *A survey of the American species of* Vaccinium*, subgenus* Euvaccinium. Brittonia. 4: 205-247, an old reference, indicates this may be a polyploid hybrid derived from oval-leaf blueberry (*V. ovalifolium*) and red huckleberry (*V. parvifolium*).

Notes: The characters I use to identify this blueberry in the field are: *flowers* that open after the leaves develop that are wider than long; *fruits* that are mostly shiny blue-purple with the pedicel enlarged just below the berry; *twigs* are yellow-green, turning grey with age; *leaves* larger than early blueberry and has hairs on the underside of the midvein. The berries are generally more tart than early blueberry.

This is an abundant shrub in every forest in the Juneau area, sometimes as dominant as Devil's club and usually growing with the equally abundant oval-leaf blueberry, often forming a thicket like at the summit of the stairs on the East Glacier Trail.

Vaccinium cespitosum Michaux 1803, dwarf blueberry dwarf bilberry, kanat'á or láxh' loowú

sess-pih-toe-sum New Latin *caespitosus* from the Late Latin word *caespes*, grassy ground, grass; earth; from their habit of clumping or growing in tufts. The orthographic variant *caespitosum* is common found.

(Upper photos) Primarily a muskeg plant here, this dwarfed plant forms dense mats on the higher ground of the bogs and rarely grows taller than 3 dm. The leaves are distinctly toothed and bright green on both sides but turns a wonderful shade of red in the fall as this photo from the Eaglecrest Muskeg Trail shows. The flowers are small and borne singly in the axils of the leaves. Longer than wide and constricted at the opening, they are often white at the base and rose-pink at the end. The fruits have an obvious bloom and are exceptionally sweet and delicious.

(Lower photo) On the outwash plain of the Mendenhall Glacier, underneath the small trees, especially black cottonwood (*Populus trichocarpa*), mats of this plant about a half meter square are common yet very easily overlooked. Rarely reaching more than 1 dm high, this really is a dwarf plant here. Growing in the very sandy soil must mimic the nutrient deficient habitat of the muskeg where this plant is more commonly found. The globular flowers are pink when the first open and fade rather rapidly to a very pale pink or nearly pure white. Few flowers are produced in each mat and I've never found a fruit out here. The plant seems to rely on vegetative reproduction with its stolons so each clump of stems is probably a clone with the same exact genetic material.

The name bilberry seems reserved for the lowbush blueberries and is European in origin. I've never heard anyone in North America use this name.

Vaccinium ovalifolium J.E. Smith 1819, early blueberry, kanat'á

oh-vahl-ih-foal-ee-um Classical Latin *ovum*, egg; egg; oval + Latin *folia*, leaf; hence oval-leaved.

The characters I use to identify this blueberry in the field are: *flowers* that open before the leaves develop (or at least before they are half expanded) that are longer than wide; *fruits* that are mostly glaucous (covered with a gray powder) blue-purple with the pedicel curved and not enlarged just below the berry; *twigs* are strongly angled and grooved; *leaves* smaller than Alaska blueberry and the underside is glaucous. The berries are generally sweeter than Alaska blueberry.

Vaccinium oxycoccos Linnæus 1753, bog cranberry, small cranberry, k'eishkaháagu

ox-ee-cock-ose Greek οξ-ι oxy-, sharp, pungent + κοκκος kokkos, red berry.

Taxonomy: Having an interrupted circumboreal distribution, this plant has been given many names. Most commonly it has been segregated in *Oxycoccus* Hill in 1756 just three years after Linnæus placed it in *Vaccinium* in 1753. It has a complex ploidy pattern among the various populations, many have been given names. If we follow Hill, as does P&M, the name is the strange, at least for plants, repeated name *Oxycoccus oxycoccos* (Linnæus) MacMill.

Notes: Here it is common only in the muskegs where it is abundant. When Annette first saw them on the Eaglecrest Muskeg Trail she mistook them for a diminutive shooting star (a fact even pointed out in P&M on p. 9), probably very commonly done as the stems seem nearly buried in the sphagnum of the muskeg so the flowering stalks with their nodding flowers arise seemingly by themselves. FNA point out this fascinating fact: "On most vines, especially north of 50° north latitude, the leafy portion of the fertile shoot fails to develop, giving the illusion that *V. oxycoccos* has an inflorescence comprising a short rachis bearing flowers on a slender pedicel."

Sophia and Hannah Stage-Harvey picked a mess of berries for me from one of their muskeg adventures. They are quite tasty and seem sweeter—though still quite tart— than commercial cranberries. The fall color of the leaves is nearly as red-pink as the petals and, though tiny, rather showy when one gets down on their knees to observe the intricacies of the muskeg at eye level.

Vaccinium parvifolium J.E. Smith, red huckleberry, tleikatánk

par-vih-foal-ee-um Latin *parvus*, small + Latin *folia*, leaf; hence small-leaved.

The difference between "blueberries" and "huckleberries" here is quite different than in the taxonomic world. Huckleberries are in the genus *Gaylussacia*, quite distinct from *Vaccinium* with their glands on both sides of the leaves. In Southeast Alaska the difference is almost as distinct, where the huckleberries are quite different in stem, leaf and berry from blueberries. The entire plant has a strong resemblance to *V. elliottii* of the southeastern United States, which Weakley (2009, p. 23) says "I agree with Godfrey (1988), though, that *V. elliottii* has 'such distinctiveness as to be recognizable in the field at a glance.'" *Vaccinium parvifolium* is analogous here and is, indeed, "recognizable in the field at a glance." The stems are red and rather twisted at the joint like twisted-stalks, the leaves are small and chartreuse-green, but most importantly, the fruits are bright red, so they are "red-berries!" The plants are usually more than 1 m tall, often to my eye level and are abundant on the Rainforest Trail.

Order Gentianales A.L Jussieu ex Berchtold & J. Presl 1820

Familly Rubiaceae A.L. de Jussieu 1789 **madder or coffee**

Galium Linnæus 1753, bedstraw

gal-ee-um Greek γάλα gala, milk; the juice of bedstraw (*Galium verum*) was used to curdle milk.

Galium aparine Linnæus 1753, cleavers, clivers, goosegrass, stickywilly, stickyweed, catchweed, robin-run-the-hedge and coachweed

ap-are-ine Latin *aparine* name for the plant, cleavers.

A plant with a natural (?) range covering nearly all of the northern hemisphere is likely to have many names, and this one does, both common and scientific. Tropicos lists 34 but nearly all treatments, including Hultén, limit their circumscription to one species. Here, the plant is smaller, weaker and far less obvious than in the eastern part of North America. The white to green to green and mauve edged flowers are similarly tiny. To see the four petals and four stamens requires a very close look and a hand lens helps. The fruits are paired nutlets covered on all sides with many crystal clear stiff hairs with a shepherd's crook top.

When I first started looking at our plants and "playing" with them, I figured this was the reason that the plant does not "cleave" as well as I expected, the little "velcro" hooks just aren't large enough to grab onto fleecy clothing. It turns out that there are *no* hairs on the angles of the stems on the bulk of the plant! I have to look at dozens of plants, and usually late in the season, to find any with hairs at all, and when I do they are extremely tiny as the top right photograph illustrates.

Family Gentianaceae A.L. de Jussieu 1789 **gentians**

Gentiana Linnæus 1753, gentian

jen-she-aye-nah   Latin *gentiana*, gentian herb.

Gentiana douglasiana Bongard 1832, swamp gentian

dug-las-ee-aye-nah   Honorific for Scottish botanist David Douglas (1799-1834).

Any cursory look at my plant list and dates will show that I've spent precious little time in muskegs, and that's too bad. Here, muskegs are a treasure-trove of botanical wonders, this being one of the common plants that I've missed entirely until this evening at Auke Nu Trail in the muskeg area. This seems very late for it still to be in flower, but I'm glad to find it in significant number—dozens of plants in flower with perhaps hundreds of individual flowers.

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ordo incertae sedis ***Order placement uncertain***

Family Boraginaceae A.L de Jussieu 1789 **borage**

Here broadly circumscribed to include the Hydrophyllaceae and Heliotropiacae following APGII. The relationship of this group of plants remains uncertain, but the Boraginaceae *sensu strictu* is paraphyletic with regard to the Hydrophyllaceae which required its placement into a more broadly circumscribed family. The Boraginaceae *sensu lato* may well comprise its own order hence the *ordo incertae sedis* with the notion that it may well be divided again later when the relationships are better known. APGIII makes this comment: "All in all, it may be useful to recognize more than one family here, given appropriate phylogenetic support and morphological distinctions, or at least five subfamilies, but the situation is getting complicated."

Mertensia Roth 1797, bluebells

mur-ten-see-uh   Honorific for German botanist Franz Carl Mertens (1764-1831).

Mertensia maritima (Linnæus) Gray 1821, oyster plant

mar-ih-tih-mus Latin *maritimus*, maritime; of, near; hence found near the ocean.

Having discovered this interesting bluebell in 2008 at Kelgaya Point in Haines, I've been looking for it in the Juneau area beaches, but it was Annette who found it first on the beach in Echo Cove while on a fly fishing class with Brad Elfers in 2009. When I went up there to fish for pink salmon the first time, she and I walked over to the west side where she'd taken its photo. It took some serious persuasion to get her to consider this identification. Finding some developing fruit with some flower parts still attached convinced her. I found a well-worn patch on the shore of Admiralty Island due west of Portland Island on September 16, 2010. It is occasional on the coarse sandy beaches of the Shrine of St. Therese on the Juneau mainland and flowers there well into August. My first encounter in Haines was with plants without flowers and they really puzzled me with their unique look that absolutely the common name is good for. When I found the flower, I recognized it immediately as a *Mertensia* and then was able to find the species in P&M.

Myosotis Linnæus 1753, forget-me-not

my-oh-so-tis *Myosotis* Latin word for the forget-me-not.

> In a German legend, God named all the plants when a tiny unnamed one cried out, "Forget-me-not, O Lord!" God replied, "That shall be your name." In another legend, the little flower cried out, "Forget-me-not!" as Adam and Eve left the Garden of Eden.

Sanders, J. 2003. *The Secrets of Wildflowers: A Delightful Feast of Little-Known Facts, Folklore, and History*. Globe Pequot.

Myosotis scorpioides Linnæus 1753, forget-me-not

score-pee-oy-dees Greek σκορπίος *skorpios*; from its curved tail + Greek όιδες *-oides*, resembles, looks like; hence looks like a scorpion's tail.

Taxonomy: syn. = *M. palustris* (Linnæus) Nathhorst 1756. Other invalid variants include *M. palustris* Linnæus (in Hultén); *M. palustris* (Linnæus) Hill (in PLANTS); *M. palustris* (Linnæus) Lamarck (in Welsh).

This weedy species is a common garden escape and a plant of roadside ditches and other disturbed areas. It is abundant along the mountain slope of Glacier Highway in town where I enjoy its pretty colors when I ride my bike into town from the Valley. It is also abundant in the roadside ditches of the recently built areas of "the road" near Eagle Beach where the close-up photo was taken. It is a common weed of dry sandy places in yards, parking lots and other similar disturbed sites. The whole plant photo was taken on July 27, 2007 on the East Glacier Trail, the only time I've seen it there. It does show up along Steep Creek near the lower bridge along the disturbed trail side edges. I have never found this plant in an undisturbed area. While forget-me-not is the Alaska state flower, this is not the one! That honor goes to *Myosotis alpestris* subsp. *asiatica*, a plant of alpine and sub-alpine meadows. The weedy species is often abundant where found as it has strong underground rhizomes with often long decumbent (laying on the ground) stems. The teeth of the calyx of this weedy species are as broad as long which can be seen in the close-up flower picture in the upper left. I have looked for it in the alpine and sub-alpine of Mount Roberts but have not found it there.

Romanzoffia Chamisso 1820, mistmaid

row-man-ZOFF-ee-uh Honorific for the sponsor of Kotezebue's expedition to the Pacific Northwest of North America, Nikolai Rumiantzev, Count Romazoff (1754-1826).

<u>Taxonomy</u>: a genus of five very closely related species of Western North America and one from Asia.

Romanzoffia sitchensis Bongard 1832, Sitka mistmaiden

sich-en-sis Of or pertaining to Sitka, Alaska.

This is a wildflower that "the creator" must have placed here simply to confuse us! Nearly everyone—botanists included—will walk by and call it a saxifrage (or if astute and up-to-date a *Micranthes*). Everything upon first glace says so.

On June 1, 2011, I was wandering about the Trail of Time while shuttling another tour and as soon as I turn the corner past the lower Steep Creek bridge, I spot a small white flower in the rocky weep that I do not recognize. I walk up to it and find it looks like a saxifrage, but it takes close examination and keying in Hultén several times to determine what it is, something that didn't take place until September! This plant was a mystery that required a second, and even third look for what turned out to be obvious. I remembered reading Mary Willson's comments on the plant in the Juneau Empire on June 9:

> On damp, rocky sites we found clumps of a flowering plant that was new to me until very recently. It goes by the utterly silly common name of Sitka mistmaiden (more formally known as *Romanzoffia sitchensis*), and it looks enough like a saxifrage (which it is not) to fool a botanist.

While I don't share her feelings for the common name (it does describe its habitat pretty well and sounds like a name a common person might use) her comment on fooling this botanist were spot on!

The leaves are glabrous of both sides but do have few cilia on the edges, and there are only 6 to 12 teeth, all almost the same size and completely separate. The leaves of this plant are easily confused with the many saxifrages here, but when in flower, all doubt is removed. Members of the former Hydrophyllaceae usually have an exerted style that is split into a "Y" that is very obvious. Obvious only when one takes a close look at the flower, something I didn't due until later when a nagging feeling that I misidentified the plant as *Saxifraga nelsonii carlottae* made me take that second (or fourth!) look. The round to reniform leaves usually have 7 sharply acute lobes that taper back into parallel divisions that separate the lobes and can be as large as 4 cm, but most are half that in our area. The petioles are long, as much as 15 cm and have flared bases that clasp the woody basal stem. The flowers are showy, white with a bright yellow center and ~1 cm across. The name describes it's habitat, weepy cliffs, near waterfalls or rocky streams.

While photographing the plant I hear a low huff and look up to see a large sow with three cubs staring at me from less than 10 feet away! I recognize her immediately, slowly back up to the trail saying in a calm voice "hi mom, how are you? How are the kids?" I'm sure her huff was a simple statement "This idiot doesn't even know I'm here!" and she was quite correct! She unconcerned with me. Not me with her!

In 2012 when many patches of "saxifrage" are in flower on the rock ledges near the Mendenhall Glacier Visitor Center, I continue to call them that. It's only when I find this small, damp patch (right photo), that the fact that the flowers are composed of fused petals (at their base) when I spot a fallen flower that I completely realize they are not a "saxifrage"

Order Lamiales Bromhead 1838

Family Plantaginaceae A.L. de Jussieu 1789 **plantain**

Taxonomy: Molecular phylogenetic studies have shown that the non-parasitic members of the Scrophulariaceae with the exception of the type genus for that family, *Scrophularia,* are nested within the Plantaginacae. APG moves them into that now monophyletic clade, Plantaginacae *sensu lato*. This almost completely dismembers the Scrophulariaceae *sensu lato*, now containing only *Scrophularia*. The nomenclature is complicated as the perhaps more appropriate name for this new circumscription, Veronicaceae, is not available for use when the International Code of Nomenclature for algae, fungi, and plants rules are followed.

Digitalis Linnæus 1753, foxglove

dih-jih-TAL-is   Latin *digitalis*, measuring a finger's breadth; of, belonging to a finger.

****Digitalis purpurea*** Linnæus 1753 ssp. ***purpurea***, common foxglove


Latin pur-PUR-ee-us, American pur-pur-EE-us   Latin *purpureus*, purple, dark red.

This is a very beautiful weed of disturbed places or a garden escape. It grows on the rocky roadside slopes on Thane Road, and is particularly common right above the Rock Dump. This has been the only place I've found the plant until August 16, 2014 when I found four plants on the upper Nugget Falls Trail as it follows the floodplain of the lake at the base of Thunder Mountain. It is growing in a mass of grass in a somewhat disturbed area. I'm puzzled as to how the seeds can find its way here.

Plantago Linnæus 1753, plaintain

plan-tay-go   Latin name for plantain.

Plantago maritima Linnæus 1753 var. ***juncoides*** (Lamarck) A. Gray 1856, sea plantain, goose tongue, suk̲téil’

mah-rih-tih-mus Latin *maritimus*, maritime; of, near; hence found near the ocean. Genus *Juncus* + Greek όιδες *-oides*, resembles, looks like; hence looks like a *Juncus*, a rush.

Taxonomy: This one is particularly arcane. The type specimen for *P. juncoides* Lam., the basionymn, is from Chile, collected in 1767. “Both the ‘*juncoides*’ names should be questioned as the name relates to plants from South America and the correspondence between South American and northern plants has not been sufficiently documented” [Aiken,S.G., et al. 1999 onwards. *Flora of the Canadian Arctic Archipelago: Descriptions, Illustrations, Identification, and Information Retrieval.* Version: 29th April 2003. http://www.mun.ca/biology/delta/arcticf/] and they opt for *P.m*. ssp. *borealis* (Lange) A. Blytt and O. Dahl.

Notes: The plant is obviously a plantain, but it has a very different look to it. The leaves are very succulent and apparently do look like a goose’s tongue (I’ve not seen one to confirm this) and arise from the crown of a thick rootstock. The inflorescence is almost showy. When the stamens are ripe they give it an almost bright yellow color. Common along the beaches, this was an important food source for northwestern native peoples. They ate it raw or steamed, and the Tlingít particularly liked it in May (Kayanní p. 4). I have not tried it, but six-year old Sophia Stage-Harvey has. It is abundant at the high tide mark in the Mendenhall Wetlands.

Veronica Linnæus 1753, speedwell, bird’s eye, gypsyweed

vur-on-ih-kuh Folk etymology has attributed its origin to Latin *vera*, true + Greek εικόνα *eikona,* image from the legend of Veronica offering Jesus her veil to wipe his head on the way to Golgotha for crucifixion; etymology very obscure.

Veronica americana Schweinitz ex Bentham 1846, American brooklime

Of or pertaining to America.

Having read *Steller’s Island*, I’m particularly intrigued by this species as Steller used this plant on his Alaska journey to prevent scurvy. While having *americana* as an epithet, the plant is common in Kamchatka, Khabarovsk, Kurile Islands, Magadan, Sakhalin, and Japan [http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?316860], so it was a plant that he was already acquainted with. How did he learn that it prevented scurvy? On the way back to Kamchatka on Nagai Island he “fed them to anyone who would eat them” (p.90-91) but they didn’t eat them long enough and it was scurvy that claimed the life of Vitus Bering on the island that now bears his name.

The plant is infrequent here, usually in ditches or drainages and most often in full light. Where found, it can be abundant. On the name “brooklime”:

> The brooklime plant possibly got its exact name from the German name Bachbunge bach that denotes a brook and bunge meaning a bunch. Perhaps the name was bestowed on the plant as it is found in abundance along the brooks or streams. However, another section of scientists believe that the plant got its name from the French term beckpunge that denotes ‘mouth smart’. This is possibly because the leaves of the brooklime plant has a pungent flavor and was previously consumed by mixing the leaves in salads. Yet again, the name brooklime is found in references made by earlier writers who referred to the Broklempe or Lympe as the genesis of the plant’s name. According to this theory, the plant has derived its name from the fact that it grows in lime or muddy brooks. The word lime is Anglo-Saxon and derived from the Latin term limus denoting the soil or mud used in the construction of unsophisticated buildings during the Anglo-Saxon period. Presently, the term lime denotes stones composed of calcium carbonate and is used to prepare mortar. In brief, brooklime seems to have actually got its name from the fact that it grows in calcareous or lime conditions. [http://www.herbs2000.com/herbs/herbs_brooklime.htm]

Family Lamiaceae Lindley 1836 **Mint Family**

Prunella Linnæus 1753, self heal

proo-nell-uh Etymolgy obscure, perhaps from the French *prunelle,* literally sloe; probably so called from its color resembling that of prunes.

****Prunella vulgaris*** Linnæus 1753, self-heal

vul-gare-is Latin *vulgaris*, usual, common, commonplace.

A yard and roadside weed common only in the urbanized area of Juneau.

Family Phrymaceae Schauer 1847 **lopseed**

Mimulus Linnæus 1753, monkey flower

mih-mew-lus Classical Latin *mimus*, mime; farce; actor in mimes; alluding to the face-like flower.

Taxonomy: formerly placed in the Scrophulariaceae now moved into the formerly monotypic family Phrymaceae.

Mimulus guttatus von Fischer ex de Candolle 1813, yellow monkey-flower

gut-tah-tus Latin *gutta*, drop, spot, speck; from the guttating leaves, shedding excess water.

Taxonomy: PLANTS lists 68 synonyms for this plant and Tropicos has 26 subspecific names! Complicated, to be sure. Until someone completes a monograph in this wide-ranging mostly western species, it seems wisest to remain with it *sensu lato*, in the broad sense, but make note of location. I've seen this from the Red Rock Canyon in the Mojave Desert through the Sierra Nevada and Cascades here in Alaska.

Notes: Abundant in sunny weeps or rocky shoals and cascades, or on logs on ponds, this is a flower sure to be seen in the summer. Showy and beautiful, the yellow flower with its orange markings on the ridges leading to the throat command attention. It can be counted on both Steep Creek Bridges on the Trail of Time. This is a surprisingly long-flowering species as I'm still finding flowers on Steep Creek in late September. There is a lovely small group of plants in the splash pond at the end of the adit at the south end of the Nugget Creek tunnel that is similarly long-flowered. Here, where it is heavily shaded, I think the extended flowering period is due to the low light level.

Family Orobanchaceae Ventenant 1799 **broomrape**

oar-oh-bank-aye-suh-ee Ancient Greek ὄροβος *orobos*, bitter vetch + ἄγχω *ankhō*, strangle

The common name "broomrape" apparently comes from a 16th Century adaptation and partial translation of Medieval Latin *rāpum genistae* for the tuber or root nodule of *Genista*, a type of broom plant. Brooms get their name from Old High German *brâmo*, bramble or thorny plant. An assortment of plants in the Fabaceae are called "broom" due to their sticky thorniness.

Taxonomy: All of the parasitic and hemi-parasitic (plants that both photosynthesize as well as parasitize) plants formerly included in the Scrophulariacae *sensu lato* when combined with the traditional members of the Orobanchaceae form a monphyletic clade strongly justifying their transfer to this family.

Boschniakia C.A. Meyer ex Bongard 1833, groundcone

bosh-nee-ack-ee-uh Honorific for Russian botanist Alexander Karlovich Boschniak (1786-1831).

Taxonomy: The genus has only three species in North America: *B. strobilacea*, *B. hookeri* (California north to British Columbia) and our *B. rossic*a (native to northwestern Canada, Alaska and temperate northeastern Asia) named in 1910. *B. himalaica*, a native of eastern temperate Asia, is also sometimes considered a species segregated from a broader definition of *B. rossica* as in The Flora of China. All are holoparasitic, deriving all their energy from alders. Ours was originally considered to be *Orobanche rossica* Chamisso & von Schlechtendal in 1828.

Boschniakia rossica (Chamisso & von Schlechtendal) B. Fedtsch. 1910, northern groundcone

ross-ih-kuh Of or pertaining to Russia.

Notes: Most curious plants, they behave more like fungi than flowering plants as the only part above ground is for reproduction. Since light isn't needed, the only reason for an aerial form is cross pollination and seed dispersal. A particularly interesting pair of "cones" formed in 2009 on a boulder on the bus parking lot access trail to the Moraine Ecology Trail. Not on the ground, the two stalks grow out of a 1 dm growth of moss atop the granite. A , Sitka alder (*Alnus viridis*) nearby has a single branch that lay on the boulder then became completely covered with moss, making it invisible so it appears the plant is growing from moss, not an alder.

The plants seemed late in erupting from the ground in 2010. Last year there were in the hundreds of cones visible on the lower reaches of the East Glacier Trail in early July, and even though I found my first flowering "cone" in late June, the "eruption" didn't really take place until late July when large numbers appeared. Puzzling to me, they are nearly absent from the glacial outwash plain, despite the abundance of Sitka alder. I can't come up with an explanation for this as soil type really should have no effect on a fully parasitic plant.

Castilleja Mutis ex Linnæus filius 1781

kas-tih-leh-yah Honorific for Spanish botanist Domingo Castillejo (1744-1793).

Inflorescence spike-like and dense. The bracts (leaf-like structures) below each flower are often brightly colored, at least at the tip, and can be more showy than the flower confusing the casual observer. The calyx generally unequally 4-lobed, generally colored the same as the bract tips. The corolla (petals) upper lip beak-like, tip open, lower lip generally reduced, 3-toothed to -pouched There are four stamens, two unequal anther sacs, and the stigma entire to 2-lobed, generally exserted. Description largely taken from:

Hickman, J.C. 1993. *The Jepson Manual: Higher Plants of California*. University of California Press, Berkeley.

Castilleja miniata Douglas ex Hooker 1838 ssp. ***miniata***, red Indian paintbrush, red paintbrush

mih-nee-ah-tuh Latin *miniatus*, vermilion; scarlet; colored red with cinnabar.

Taxonomy: With nine subspecific names in Tropicos and P&M indicating that the species as they describe includes *C. hyetophila* and *C. chrymactis* "the genus is complex and highly variable (as is this species)" (p. 58) and Hultén notes the three "form a critical group that should be studied in the field" (p. 08).

Notes: This paintbrush is not the most common in the Juneau area (*C. unalaschcensis* is), despite the comment in P&M, but is widely scattered in many habitats, usually where there is plentiful light. The map in Hultén show us north of his range. The most common place I've found it is just outside the shade line of the Sitka spruce (*Picea sitchensis*) on the beach section of the Rainforest Trail where the plants grow up to 0.5 m tall, rather robust. The red is fairly dingy.

Castilleja parviflora Bongard 1832, small-flowered paintbrush, mountain paintbrush

par-vih-floor-uh Latin *parvus*, small, little, insignificant + Latin *Flora*, goddess of flowers.

The only time and place I found this is in the bowl above the Dan Moeller cabin on Douglas Island where it grew in with the abundant deer cabbage. The rose-purple bracts really stood out on this sunny day and drew my attention, where on a close look found the upper portion of the stem villous. Some of the upper leaves are divaricate-laciniate and look almost forked, but most of the stem leaves are lanceolate. The color of the inflorescence apparently can vary from my rose-purple to red to white to green!

With many green leaves and in full sunlight, I wondered if this plant was heterotrophic as most Castilleja's are. This species has been found near Lyman glacier in the North Cascades Mountains of Washington with both mycorrhizal and non-mycorrhizal plants and is considered "facultatively mycorrhizal". Since our region is relatively recently deglaciated, it seems this pattern would apply here as well.

Cazares, E., J.M. Trappe & A. Jumpponen. 2005. *Mycorrhiza-plant colonization patterns on a subalpine glacier forefront as a model system of primary succession*. Mycorrhiza 15 (6): 405-416.

Castilleja unalaschcensis (Chamisso & von Schlechtendal) Malte 1934, Unalaska paintbrush, yellow paintbrush

un-ah-lask-en-sis Of or pertaining to Unalasaka, an Island in the eastern Aleutians.

This is the most common paintbrush in our area and it can be abundant and showy along the seashore, as it is at Eagle Beach and Lena Point. I've found a few plants along the Airport Dike Trail and the beach section of the Rainforest Trail and in the higher areas of the Ninemile Trail in North Douglas. I shows up in the outwash of Steep Creek on the north side of the Glacier Spur Road culverts.I'm curious about the pubescence pattern with this species as I've noticed the most unprotected plants seem to be hairier. It would be interesting to explore this further and see if this is a real pattern or just a conclusion based upon my wishful thinking to make a pattern.

Pedicularis Linnæus 1753, lousewort

Latin peh-dih-CUE-lah-ris, American peh-dih-cue-LAIR-is Classical Latin *pediculus*, a little foot; little foot; a foot-stalk.

While green with cholrophyll, this is a genus of hemiparasites with roots growing into the roots of nearby plants to obtain nutrition. The amazing diversity of plants in the Pacific Northwest (22 taxa in Alaska and 15 in Brtitish Columbia) is dwarfed by the 352 species in the Flora of China. The common name apparently comes from the mistaken belief that livestock eating the plant develop a lice infestation.

Pedicularis ornithorhyncha Bentham 1838, bird's beak lousewort, ducksbill lousewort

Latin Ancient Greek ὄρνις *ornis*, bird + ρυγχός *rynchos*, nose or snout; for the shape of the upper petal.

While walking along the shores of Mendenhall Lake in June, watch for this gorgeous brilliant pink-purple flower hiding just under the short willows in the sand flats that have a thin silt covering. The leaves are almost fern-like, but more like the snout of a sawfish shark. Most of the leaves are a mostly a thickened midvein with short but stout leaflets sticking out. The leaves are curious, being either a basal rosette or a rosette just below the inflorescence making the stem naked. They seem small in proportion to the plant, probably the result of its hemiparsitic habit. The flowers are crowded into a head with 12 to 30. The five petals are fused into a complex shape with the lower petals flaring out like a lip and the upper elongated into a hood that is beaked, giving this species its name. While the stamens are included with in the hood, the stigma sticks out and is visible in the photo on the right.

Pedicularis parviflora J.E. Smith 1813 ssp. ***parviflora***, small-flowered lousewort

par-vih-floor-uh   Latin *parvus*, small, little, insignificant + Latin *Flora*, goddess of flowers.

I first learned this oddly shaped plant in Cordova where it was common. While on a dog play day along the west shore of Mendenhall Lake, I came upon about a dozen of these in full flower and recognized it immediately. But on checking with P&M find the range to be rather north. Hultén's map extends further south, but without collection dots. Along the lake it's in an area of mixed sand and silt and definitely subjected to periodic flooding with the rise and fall of the lake and always near some woody shrubs and tufted grasses. So two things about my identification are at least a bit out of kilter with these references.

Rhinanthus Linnæus 1753, rattle

Latin RYE-nan-thus, American rye-NAN-thus   New Latin prefix *rhino*-, nose + Greek ἄνθος *anthos*, flower.

The genus includes some 80 taxa (species and varieties) of hemiparasites with a geographic center in Europe.

Rhinanthus minor Linnæus 1756 ssp. ***groenlandicus*** Neuman, yellow rattle, rattlebox, cockscomb, Arctic rattle

my-nor,   Latin *minor*, those inferior in rank, grade, age; there are larger species.
green-lan-dih-cuss   Of or pertaining to Greenland.

<u>Taxonomy</u>: I've found myself a bit confused here as the information from Tropicos seems to contradict PLANTS and Hultén. Which do I accept? In this case I'm going with the latter. P&M indicate that *R. crista-galli* Linnæus is another name, one that Tropicos has a collection referenced to Juneau, but PLANTS has that name included within *R. m*. Linnæus ssp. *minor* and not found in our area.

<u>Notes</u>: Regardless of what it's scientific name is, this is one long-flowered abundant plant that grows in disturbed as well as undisturbed areas. It is a common—native—street weed and found in flower from early July through the third week of September on the beach portion of the Rainforest Trail as well as along the roads and lower trails at the Mendenhall Glacier Visitor Center. As soon as the flowers form, the inflated calyx is obvious and persistent through fruiting and senescence. When the fruit dries, it becomes hollow, wrapped in the now inflated calyx that dries out, and the seeds "rattle around" inside giving the plant it's common name. As a hemiparasite, these plants literally erupt from the ground

each spring since they get an added bonus of food by "stealing" it from its neighboring grasses. Try as I might, I can find no reference indicating which species this plant parasitizes. Since its most common associates—be it disturbed or natural—are grasses, I'm presuming they are.

Family Lentibulariaceae Richard 1808 **bladderworts**

Pinguicula Linnæus 1753, butterwort

pin-GWIH-cue-lah Late Latin *pinguis*, fat; rich, fertile.

An insectivorous plant, butterworts have glands on the upper surface of the leaves that exude a very sticky mucous that traps small insects when they walk on the leaves. The insects die and the leaf absorbs nutrients, particularly nitrogen, from the carcasses.

Pinguicula vulgaris Linnæus 1753, common butterwort


vul-gare-is Latin *vulgaris*, usual, common, commonplace.

While the name infers that this plant is common, it is not, at least in the sense of it being commonly found. While circumboreal in distribution and therefore widespread, it is limited to nutrient poor habitats and is an example of an uncommon plant throughout its entire distribution that is common where it is found. Here in southeast Alaska it is strictly a muskeg plant, or places that are nearly a muskeg. It is common in the many muskeg on Douglas Island and this photograph was taken on the Dan Moeller Trail near the cabin in a vast muskeg. There is a perennial patch just past mile 1 on the West Glacier Trail on the left side of the trail just below the shallow berm of land above the trail. The plant produces a "*hibernaculum* (botany), a bud, case, or protective covering that a plant uses to survive the challenging environmental conditions during a dormancy period"[http://en.wikipedia.org/wiki/Hibernaculum]. I've been trying to find out some more about this and have come up empty. While definitely circumboreal in range, this plant does not go particularly far north where temperatures drop to extreme lows. Here in southeast Alaska in the "temperate" rain forest conditions are relatively benign and the need or such a structure is limited at the least. It would be interesting to stake out a location for this plant now and come back in January and examine it.

Order Asterales Lindley 1833

Family Campanulaceae A.L. de Jussieu 1789 **bellflower**

Campanula Linnæus 1753, bellflowers, harebells, Bluebell-of-Scotland

cam-PAN-you-lah Latin *campana*, bell.

Taxonomy: There remains no consensus on the proper circumscription of this circumboreal (centered in Europe) genus, so at the present time the conservative approach is to consider it *sensu lato*, in the wide sense. Two recent studies come to differing conclusions with Park et al. moving most or all of our occidental species into *Rapunculus* and Roquet et al. retaining all in *Campanula*.

Park, J., S.Kovačić, Z. Liber, W.M.M. Eddie, & G.M. Schneeweiss. 2006. *Phylogeny and Biogeography of Isophyllous Species of Campanula (Campanulaceae) in the Mediterranean Area*. Systematic Botany 31(4), 862-880.
Roquet, C., S. Llorenç, J.J. Aldasoro, A. Susanna, M.L. Alarcón, & N. Garcia-Jacas. 2008. *Natural delineation, molecular phylogeny and floral evolution in Campanula*. Systematic Bot. 33: 203-217.

The name Harebell may allude to an association with witches, who were believed able to transform themselves into hares, portents of bad luck when they crossed a persons path. In Scotland, another old name for this plant was Witches Thimble.[Ladybird Johnson Wildflower Center http://www.wildflower.org/plants/result.php?id_plant=CARO2]

Campanula rotundifolia Linnæus 1753, common harebell, harebell, bluebell, Bluebell-of-Scotland.

row-ton-dih-FOE-lee-uh Classical Latin *rotundus*, round, circular; wheel-like + Latin *folia*, leaf.

Taxonomy: With a southern circumboreal distribution and the natural variation that comes with it, there are some 228 named taxa within this single species and no current consensus regarding them. Until a world-wide comparative study is done, it seems wise to consider all as circumscribed within a single species. How Linnæus could name it *rotundifolia* still confounds me as the leaves are linear to very narrowly lanceolate and the only part of them that is round is the cross-section of the petiole, and only the basal leaves have petioles!

Notes: This plant continues to be my favorite Alaskan wildflower. It is common and gorgeous and commands attention with the large, showy flowers. When compared with the rest of the plant, they are way out of proportion as the stems are thin and leaves narrow. Here it usually grows on weepy rock faces where there is plenty of exposure, as on the turn from Nugget Creek to Mendenhall Lake on the East Glacier Trail. It is common in the rocky areas on the West Glacier Trail and in scattered spots in the Silverbow Basin on the Perseverance Trail.

****Campanula rapunculoides*** Linnæus 1753, creeping rampion, rover bellflower

rah-pun-cue-LOY-dees Latin *rāpum*, the name for turnip + Greek όιδες *-oides*, resembles, looks like; hence looks like turnip but folk etymology has the Latin morphed into the French *raiponce* where the old name rampion probably arose as an alliteration with the Latin form *rapunculus* derived from it.

On September 9, 2009 on a Town, Tram and Trek walk on the Mount Roberts trail presented me with an mystery. Right on the path, just above the last mountain hemlock (*Tsuga mertensiana*) is an 18-inch tall stem with gorgeous harebell flowers on it that I utterly do not recognize. I jot some notes about it in my notebook (vol. 13, p. 62) so I can look it up in Hultén, but it is not there! What is the plant. On September 14, ten days later, the plant is still in glorious flower, pleasing all that walk by, but not me. What is it? On this date I do a Google search on "Campanula in Alaska" and find a report on it in "Non-Native Plant Species of Alaska" from the Alaska Natural Heritage Program [http://akweeds.uaa.alaska.edu/pdfs/species_bios_pdfs/Species_bios_CARA.pdf] which indicates it has been collected in Anchorage and Cordova. Here it is now on Mount Roberts. How did it get here? Judging from this publication, this flower needs to be pulled and destroyed immediately! I need to collect it and send it in for a range extension record.

I find this plant for only the second time in full flower in the parking lot of the Shrine of St. Therese on August 12, 2011 where the vertical photograph was taken. While included in the invasive list, so far it is not a problem in the Juneau area.

Family Menyanthaceae Dumortier 1829 **buckbean**

Menyanthes Linnæus 1753, buckbean

meh-nee-ann-thees Greek μενυειν *menyein*, disclosing + Greek ανθώ *anthos*, flower; alluding to the sequential opening of the flowers on the inflorescence.

Taxonomy: A monotypic genus of bogs in Asia, Europe and North America.

Menyanthes trifoliata Linnæus 1753, buckbean


try-foal-ee-ah-ta Latin *tri*-, three Latin *folia*, leaf; for the trifoliate leaves.

Taxonomy: Sometimes the North American plants of the strongly circumboreal species are assigned to var. *minor* Fernald 1929.

Notes: This unique plant can hardly be confused with anything else. Strictly aquatic, it is most easily seen in the shallow pond off the Back Loop Road near Montana Creek Road as well as all of the shallow ponds in the Mendenhall Glacier Campground. It is scattered in the muskegs of the area where there is open standing water a few inches to perhaps a foot deep. The flowers are showy, the petals brilliant white with conspicuous long equally white hairs festooning it, but when I place my nose near them, I recoil at the stench. The fruits are a dry capsule with shiny seeds that float and really do resemble beans, giving the plant it's name.

Nephrophyllidium Gilg 1895

Greek νεφρός *nefros*, kidney + φύλλο *fyllo*, leaf; alluding to the kidney-shaped leaves.

Taxonomy: A monotypic genus of bogs and wetlands in Japan and the Pacific Northwest.

Nephrophyllidium crista-galli (Menzies ex Hooker) Gilg 1895, deer cabbage, k'uwáani


kris-tah-gall-ee   Latin *crista galli*, cockscomb; alluding to the curled edges of the petals.

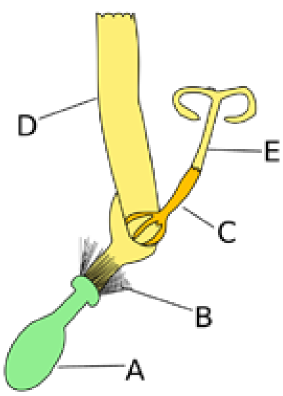
Taxonomy: Variously named as *Menyanthes crista-galli* Menzies; *Villarsia c-g* .(Menzies) Hooker; *Fauria c-g*.(Menzies ex Hooker) Makino, The International Association for Plant Taxonomy (IAPT) determined that the name *Fauria* Franch. (1886) too closely resembled the name *Faurea* (Proteaceae), and conserved *Nephrophyllidium* Gilg (1895) as the accepted genus name. The Japanese material has been named ssp. japoinica (Franch.) Gillett and perhaps represents a relict population from a former circumboreal distribution.

Notes: This is more a muskeg than aquatic plant and can form large patches in open sunlight such as the bowl above the Dan Moeller cabin on Douglas Island. The reniform leaves are all basal, arising from a reddish rhizome that is covered with old leaf bases. The flowers are held above the base in a loose cyme, the uppermost flower opening first. Showy and white, the petals are rotate with a short tube with the lobes undulate (wavy). It is abundant in every muskeg in the area. On the Mount Roberts Trail it is omnipresent in the weepy bowls and slopes above them wherever moisture is always present. In the fall the color is simply stunning as they yellow.

Family Asteraceae Berchtold & J. Presl 1820 **aster or composites**

Taxonomy: The aster family has composite flowers, and in fact was first called the Compositae Giseke 1792, a name that has been "conserved" (*nomina alternum et conservanda*) as an alternate name considered valid even though Asteraceae is the accepted name.

Notes: Identification of composites can be difficult and always requires a very close observation of flower parts, often with a 10 or 20 × hand lens. As many goldenrod colored composites flower with abandon in late summer, they are often called "DYC's": damn yellow composites! Many a late summer wildflower lover will be content with this broad identification.



A composite flower is an inflorescence of many flowers that appears at first sight to be a single flower. The individual flowers, called *florets*, are tightly packed into a *capitulum* that is more often simply called a *head*. The lowest layer of the head is the *involucre*, made up of *phyllaries* or *involucral bracts*. These usually green bracts are analogous to sepals on a regular flower and are often important characters to observe when identifying composites. Inside the involucre is the *receptacle*, the surface where the individual sessile (stalkless) florets are attached. Many composite florets have a bract at the base growing from the receptacle called a *palea*, or all together, *chaff*.

Each floret is made up of the usual parts of a flower:
A. inferior ovary
B. calyx called the *pappus* (not always present)
C. *filaments* and *anthers* (male), usually sheathing the style as a *theca* and fused to the base of the ray
D. *ligule* (five petals merged to appear as one, count the five sharp tips) forming a *ray*

E. *style* and two-parted recurved *stigma* (female)

Florets around the outside of the receptacle often have elongated and highly zygomorphic (asymmetric) ligules that are called *rays*. Florets in the center often have very reduced and actinomorphic (radially symmetrical) rays and are called disc florets. Dandelions are all ligulate, every floret has rays. Daisies have ray and disc florets.

The fruit is a *cypsela* (plural *cypselae*) formed from two fused carpels with one locule that produce only one seed, such as the very familiar sunflower seed. They were formerly called achenes, a term restricted to an ovary with only one carpel (such as corn).

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Achillea Linnæus 1753, yarrow

uh-kill-ee-uh	For Greek god Ἀχιλλεύς, *Achilleus*, Achilles, who is supposed to have used the plants to treat his wounds.

Achillea borealis Bongard 1832, common yarrow, gordaldo, nosebleed plant, old man's pepper, sanguinary, milfoil, soldier's woundwort, thousand-leaf, thousand-seal, kagakl'eedí

mih-leh-foe-lee-um	Latin *mille*, a thousand + Latin *folia*, leaf; alluding to the many finely divided leaves.

Taxonomy: North American yarrow taxonomy is a mess. The plant is instantly recognizable by just about anyone, yet it has a wide range of size, color and degree of leaf incision. I've been identifying our plants as *Achillea millefolium* Linnæus 1753 var. *borealis* (Bongard) Farwell 1929 since arriving in Alaska and previously noted "How this variety is distinguished from the species is, in my view, specious (superficially plausible, but actually wrong). The plants here appear to be the same as everywhere else in North America where I've encountered it".

FNA includes only the species as, *A millefolium* and says the plant "is morphologically variable and has been treated as either a single species with varieties or as multiple distinct species. At least 58 names have been used for North American specimens." [FNA p 483]. TROPICOS includes 54 names for this species. The Jepson eFora (2012) notes that it is "highly variable polyploid complex; leaf size and hairiness especially variable" and only recognizes the species as *A millefolium*. Weakely (2012) notes "The *Achillea millefolium* aggregate is a taxonomically very complex entity, with races of different ploidies, and both introduced and native genotypes in e. North America. Ramsey, Robertson & Husband

(2008) have recommended treating native North American races as *A. borealis*; most eastern North American populations represent native North American races, most closely allied to e. Asian taxa, with only a few collections of European races from near old port cities (Ramsey, pers. comm.; Ramsey 2011; Levin 2011)".

> What species epithet should identify the North American Achillea? In recent floristic treatments North American plants are generally described simply as "*A. millefolium*." This is unsatisfactory given (1) genetic incompatibility between the Eurasian *A. millefolium* sensu strictu (*A. millefolium* var. *millefolium*) and North American *A. millefolium* (Clausen et al. 1940, 1948, 1955); (2) substantial DNA sequence divergence between A. millefolium var. *millefolium* and the North American *A. millefolium* (Guo et al. 2004, 2005; Fig. 2); and (3) recent recognition of "*A. asiatica*" (A. *millefolium* var. *mandshuricum*) and "*A. ceretanica*" (*A. millefolium* var. *ceretanica*) by European botanists as species separate from *A. millefoliumn* (Ehrendorfer and Guo 2006). The North American *A. millefolium* clearly deserve a name that distinguishes them from Eurasian relatives. Of the competing species epithets, precedence is for "borealis," a name ascribed in 1832 by Bongard to plants collected near Sitka, Alaska.

Ramsey, J., A. Robertson & B. Husband. 2008 *Rapid Adaptive Divergence in New World* Achillea*, an Autopolyploid Complex of Ecological Races*. Evolution, 62(3), 639-653.

The Forest Service uses the name "*Achillea borealis*" on one of their interpretive signs at the Mendenhall Glacier Visitor Center. While this may at first glance to be auspicious, it most likely represents someone looking at a single reference without knowledge of this complex species. I currently maintain that our North American yarrow are best included in one large species concept.

Notes: Yarrow is found anywhere there is open light, usually on disturbed land or the open edges of many habitats. It is a nearly ubiquitous common plant in suitable habitats in Juneau. Long-flowered, plants are often in full flower well into September. Many seem almost reluctant to fruit and I often wonder if there is a failure of pollination which would be rather strange for a plant that has very conspicuous open flowers for such a long time. There is a certain weediness to yarrow here, as it shows up in yards and other ruderal areas, yet it never seems to displace other plants but simply grows with them. In the Mendenhall Glacier Visitor Center area it is one member of a triumvirate of similar common species: oxeye daisy (*Leucanthemum vulgare*) and yellow rattle (*Rhinanthus minor*), all equally weedy yet rather pretty in their own unique way.

On September 15, 2013 I found a population on the Airport Dike Trail with galls from the midge *Ozirhincus millefolii*, yarrow flower gall.

Ethnobotany: Yarrow has a long history of use by indigenous people. The Bella Coola of British Columbia have used it for breast abscesses, a burn dressing, for boils, for bronchitis in children, for colds, for sprains, and for sore throats. The Tlingít have no references of it at all, which may be in indication that this plant is of historically recent introduction in our area.

Smith, Harlan I. 1929 *Materia Medica of the Bella Coola and Neighboring Tribes of British Columbia*. National Museum of Canada Bulletin 56:47-68.

Antennaria Gaertner 1791, pussytoes

ann-ten-air-ee-uh Latin *antenna* + *-aria*, connection to or possession of; alluding to similarity of clavate pappus bristles in staminate florets to antennae of some insects

Antennaria alpina (Linnæus) Gaertner 1791, alpine pussytoes

al-pie-nuh Latin *Alpinus*, alpine; of the Alps.

Taxonomy: Like many pussytoes, this is an agamic (not involving the fusion of male and female gametes in reproduction) species, reproducing with only gynoecious (female) flowers. This produces plants with remarkable morphological variety that have been interpreted very differently by workers as "this species complex is composed of innumerable apomictic (seed development without fertilization and meiosis) clones". Here I'm following the broad species concept of FNA [p. 14]

Notes: Truly an alpine plant in this area, the only place I've encountered it is on top of Mount Roberts, about 500 vertical feet above treeline in the low, tundra-like shrub growth in very exposed, rocky areas. Here it forms mats ~0.5 m square with leafy stolons. Leaves are woolly on both sides. Several heads form tight clusters atop peduncles 5-10 cm tall.

Arnica Linnæus 1753, aankanáagu

are-nih-kuh Etymology obscure, Ancient Latin or Greek plant name. It may be derived from Greek αρνί *arni*, lamb, in reference to the soft, hairy leaves.

Arnica latifolia Bongard 1832, mountain arnica, wide-leaved arnica, broad-leaved arnica, daffodil leopardbane

la-tih-foal-ee-uh Vulgar Latin *latus* wide, broad + Latin *folia*, leaf; hence wide-leaved.

This plant is probably called a yellow daisy by most people who see it. The plants are somewhat thin-stalked or spindly and the single flower nearly always droops. The almost clasping opposite stem leaves are obvious while the basal rosette is usually hidden in the cover of other ground plants. The involucre (green bracts beneath the yellow rays) of usually a dozen or more phyllaries (individual bracts), is long (1+ cm) and tubular from bud to full flowering. The hairs on the phyllaries of the involucre and peduncle are pretty striking. Curiously, I don't find reference to these in any of my keys.

The copper-colored beetle on the lower ray appears to be the same species that I find inside the keel petal of *Lupinus nootkatensis* Donn ex Sims 1810 var. *nootkatensis*, Nootka lupine, kantákw. The morning of July 14, 2012 (lower right photo) the light mist created a world of miniature water droplets all over and the arnica is simply gorgeous in the beam of direct sunlight that is landing on it.

A perennial small patch can be found on the bus parking lot access to the Moraine Ecology Trail just below the moraine where the trail drops steeply. Another patch is at what I call my "Appalachian waterfall" on the East Glacier Trail where the small creek slips gently over a flat face of rock and the trail works its way through moss-covered boulders just before the flats.

Arnica lessingii (Torrey & A. Gray) Greene, 1900, nodding arnica

Honorific for German botanist Christian Friedrich Lessing (1809-1862), a student of the Asteraceae, especially of Siberia, where this plant is also found.

Walking with Annette and Nyssa on July 7, 2012 on the Nugget Falls Trail in the flats of the overflow area of the lake we come upon an arnica that has leaves very different from the plants in the forest of the Moraine Ecology Trail. Here they are from a rather stout basal rosette with reduced and clasping stem leaves and they are all very hairy along with the stems. It turns out the hairs are translucent and have purple septa (the enclosing base of the hair on the stem or leaf edge). I didn't check with my hand lens for the purple, but their translucence can be seen along the inflorescence stem in both photos. The dark purple anthers of the disc flowers give a contrasting color to the yellow petals.

Artemisia Linnæus 1753, sagebrush, wormwood

are-teh-mee-zee-ua Greek Ἄρτεμις *Artemis*, goddess of the hunt and namesake of Artemisia, Queen of Anatolia.

Artemisia arctica Lessing 1831 ssp. ***arctica***, mountain sagewort

ark-tih-kuh Latin *arcticus*, arctic, northern; from the Greek ἄρκτος *arktos*, a bear; from the northern constellation The Bear (the Big Dipper).

Taxonomy: Is this best considered a variety of *A. norvegica* Fries 1817, or separated from it? Tropicos, PLANTS, ITIS and EOL separate ours as a western species. FNA conservatively includes it within *A.n.* as its variation "is not well understood". If included, its name is *A. n.* var. *saxatilis* (Besser) Jepson 1925, or *A. n.* ssp. *saxatilis* (Besser) H.M. Hall & Clements 1923, as P&M and FNA treat it. The next confusing thing here is whether the subspecific treatment should be subspecies or variety, and Hultén has names for both! His three subspecies seem now well-accepted with this being the widespread form ranging from Kamchatka down into the Sierra Nevada and Rocky Mountains.

Notes: When I was told this was a wormwood by Mary Willson on the Juneau Audubon Mount Roberts hike on July 17, 2009, you could have blown me over with a feather! I had to look it up in P&M and found it immediately. I've never encountered an herbaceous sagebrush before and have had in my mind countless miles of Great Basin sagebrush (*A. tridentata*) with all its woodiness. This plant is a perennial herb, much branching from a compact base with a few runners. The flowers are a greenish-yellow and distinctly nodding on this heavy overcast and humid day. The leaves are pinnate and deeply divided to an almost fern-like texture but the ultimate sections are linear!

In 2012 I realized I've been seeing this plant in its vegetative form, but not recognizing it, along the East Glacier Trail where it grows between the big boulders at my "Appalachian waterfall" and along the cliff face where the trail leaves Nugget Creek above the falls. These two photos are from August of 2012, The leaves here are very distinct from anything else along the trail and I'm amazed it has not registered with me as something to ponder before!

Erigeron Linnæus 1753, fleabane

uh-ridge-ur-on   Greek ερι *eri*, early, or εριο *erio*, woolly, and γερον *geron*, old man; perhaps alluding to the pappus which becomes gray in some species, or to solitary, woolly heads of some of species.

Erigeron peregrinus (Banks ex Pursh) Greene 1897 ssp. ***peregrinus***, subalpine fleabane, subalpine daisy


pear-ih-gry-nus   Latin *peregrinus*, foreign, strange, alien; foreigner, stranger, alien; pilgrim; hence wandering, wide-ranging.

This common plant of the mountainous west and boreal north is not common here, and almost seems an occasional plant of disturbed places. I found it on the Trail of Time and lower reaches of the East Glacier Trail. It is easily told from asters by its early flowering and two-ranked involucre.

Hieracium Linnæus 1753, hawkweed

hi-ray-see-um   Etymology obscure, perhaps from the Greek ηιεραξ *hierax*, hawk.

Taxonomy: In the sixty plus years from this writing, things really haven't changed much:

> The genus, especially in Europe, broken by technical specialists, with eyesight stimulated beyond that of the ancient hawks, into thousands of so-called species, subspecies, varieties and forms, largely on degree and character of pubescence. These *apomicts* will be found unlucidly elaborated beyond practical utility in the 1700 pages of Zahn, who in our no. 1 alone recognized but does not define 624 "subspecies". Until a rational presentation of European species is available the identification of our adventives from Europe must be tentative.

Fernald, M.L. 1950. *Gray's manual of botany*, 8th. (Centennial) edition. American Book Company, New York, page 1562

Tropicos lists 2,103 taxa names, FNA includes 36 in the flora and we have only one in southeast Alaska.

****Hieracium aurantiacum*** Linnæus 1753, devil's paintbrush, devil's bit, orange hawkweed

our-ann-tih-cum Latin *aurantiacus*, orange-colored.

Taxonomy: syn= *Pilosella aurantiaca* (Linnæus) F. W. Schultz & Schultz-Bipontinus

Planted as a garden ornamental in Vermont in 1875, it is now considered a noxious weed by CO, ID, MT, OR and WA, it should be in all areas where it is found. This alien is abundant along Egan Drive. In 2012 several sections of shoulder with the plant were covered most of the summer with thick, dark plastic in an effort to kill it. In 2014 those sections are still clear of the plant. It is especially common between Mendenhall Loop Road and Fred Meyer along the bike trail. It seems entirely confined to mowed areas along roadsides in the urban environment. In disturbed and ruderal areas "out-the-road" it is less common but easily found such as the roadsides of Eagle Beach picnic area, the Shrine of St. Therese and many of the parking pullouts such as Sunset Cove. In 2014 I found it growing in the rocks of the "freeway onramp" section of the Trail of Time where I pulled out about a dozen plants. I don't find it growing in pristine areas. It has a fairly short flowering period of less than a month which makes is an especially good candidate for mechanical control: mow when it's flowering! The fruits fly like a dandelion, everywhere. Unfortunately, the plant has extensive underground *stolons* (horizontal stems just below the soil surface) and *rhizomes* (underground swollen stem with many nodes) that allow it to colonize extensive areas vegetatively.

Leucanthemum Miller 1754

lew-can-theh-mum Greek λευκος leukos, white + Greek ανθώ *anthos*, flower.

****Leucanthemum vulgare*** Lamarck 1778, oxeye daisy

Latin *vulgaris*, usual, common, commonplace.

Taxonomy: syn = *Chrysanthemum leucanthemum* Linnæus. It is removed from *Chrysanthemum* as it is non-aromatic and the leaves lack gray or white pubescence.

While extremely attractive, this flower is listed as a noxious weed by CO, MT, OH, WA, and WY. It is a problem weed within the heavily used areas of the Mendenhall Glacier Visitor Center, and is often called simply a daisy by the Forest Service folk there. It occurs along the roadside well north to the end of The Road and in scattered places on the shoreline of north Douglas Island.

Matricaria Linnæus 1753, Mayweed

ma-trih-care-ee-uh Greek μήτρα *mitra*, womb, and *-aria*, pertaining to; alluding to reputed medicinal properties.

**Matricaria discoidea* de Candolle 1837, pineappleweed

dis-coy-dee-uh Late Latin *discus*, disk, disc; paten; high table; alluding to the disc-shaped receptacle.

Common yard and street weed in the Mendenhall Valley, I've not encountered this in the wild here at all.

Packera Á. Löve & D. Löve 1976

pak-ur-uh Honorific for Canadian botanist John G. Packer (1929-).

Taxonomy: *Packera* are the "aureoid senecios," an informal group first recognized by Asa Gray now elevated to a genus[FNA].

Packera paupercula (Michaux) A. Löve & D. Löve 1975, Canadian butterweed

paw-pur-cull-us Latin *pauperculus*, poor.

Taxonomy: syn = *Senecio pauperculus* Michaux. FNA notes that "is the most variable species of the genus in North America" and treats it *sensu lato* as there are 16 taxa named as within the broad species.

Notes: Looking like what my wife calls a diminutive "Scott's weed" (*P. aurea*) a plant I've been very familiar with in the southeastern United States, this species is frequent in moist areas with abundant light such as this rocky shoreline of Mendenhall Lake near the West Glacier trailhead. There are several plants growing in crevices of the rock cliff where the East Glacier Trail leaves Nugget Creek that are usually dwarfed. The heads are always showy with their goldenrod yellow flowers with conspicuous discs and rays. The basal leaves are usually very irregularly toothed and diminish in size up the stem. The plant has an Occidental boreal range that includes the Appalachians and an outlier in Bay County, Florida (Weakley, 2011)!

Petasites Miller 1754, butterbur, coltsfoot

peh-tah-sigh-tees Attributed to Dioscorides, Greek πετασίτης *petasos*, broad-brimmed hat; alluding to the large basal leaves.

Petasites frigidus (Linnæus) Fries 1845 var. *frigidus*, coltsfoot, sweet coltsfoot, Arctic sweet coltsfoot, Arctic butterbur




frih-jih-dus Latin *frigidus*, cold, cool, chilly.

Taxonomy: Synonyms include *P. alaskanus* Rydberg; *P. corymbosus* (R. Brown) Rydberg; *P. frigidus* var. *genuinus* Cronquist 1946; *P. frigidus* var. *hyperboreoides* Hultén; *P. frigidus* var. *nivalis* (Greene) Cronquist; *P. gracilis* Britton; *P. hyperboreus* Rydberg; *P. nivalis* Greene; *P. nivalis* subsp. *hyperboreus* (Rydberg) J. Toman; *Tussilago frigida* Linnæus 1753; *Nardosomia frigida* (Linnæus) Hook 1833. Significant morphological, chemical and genetic studies by D. M. Cherniawsky,and R. J. Bayer in 1998 determined there are four loosely grouped polymorphic forms. Technical keys use leaves more than flowers to distinguish between the varieties.

Notes: This plant flowers in May before the leaves appear in June, and to identify the plant to any lower taxa is fraught with difficulty without leaves. (The higher one finds the plants the phenophase timing shifts later.) The heads are usually all composed of male (first photograph with the unidentified bee) or female flowers (second photograph) although a close examination of all the heads on a plant will usually reveal a few bisexual flowers on many plants. The vast majority of those I examine are overwhelmingly either male or female. The leaves are easily spotted as there is nothing like them in the subalpine areas here and they remind me of a cut rhubarb leaf. They are very triangular in outline but often with a deep cleft in the base that can make it look heart-like or cordate. This variety is mostly lobed (as the leaf photo shows) or dentate.

The plant is abundant in the subalpine zones on Mount Roberts, Mount Juneau, Granite Creek Basin, the higher areas of Silverbow Basin and Salmon Creek Basin. I always find it in areas of abundant light out in the open, but it can be streamside where other plants such as salmonberry can overtop it in summer. I have not encountered in on Douglas Island though I expect it is there in the higher bowls.

Prenanthes Linnæus 1753, rattlesnake root

pree-nan-thees Greek πρενες *prenes*, drooping + Greek ανθώ *anthos*, flower; alluding to drooping heads.

Prenanthes alata (Hooker) D. Dietrich 1847, western rattlesnakeroot, wing-leaved rattlesnakeroot, white lettuce, western white lettuce

a-lah-tah Latin *ala*, wing; wing; upper arm, foreleg; alluding to the winged leaf stalks.

Taxonomy: FNA (vol. 19, 20 and 21 P. 263, 265, 266)notes "Molecular ITS studies by S. C. Kim et al. (1996) suggested that *Prenanthes*, as here circumscribed, may be polyphyletic; additional sampling including North American taxa is needed to confirm the relationships of *Prenanthes* and recognition of *Nabalus* Cassini at the genus level". If so, our plant would return to the name *Nabalus alatus* Hooker, a name from 1833!

Notes: FNA notes that "*Prenanthes alata* is recognized by its relatively small size, elongate and winged petioles, triangular-hastate leaf blades, heads in broad corymbiform arrays, and dark green, finely tomentulose phyllaries". While most members of this genus are not very showy and look more like abandoned field weeds, this is one handsome plant that appears in late summer. Even when it erupts from the ground one can recognize what the plant will be with its triangular leaves and winged stems (hence the name *alata*, winged). When the flowers form, they form a group of 10 to 17 heads that mostly hang downward, but usually the uppermost is nearly perpendicular to the stem. The petals look white from eye level, but upon a closer look they are effused with a bit of mauve or purple that must be the same as the color of the base of the flower that definitely looks purple when looking at the heads. It is abundant at Steep Creek on the Trail of Time where this photo was taken.

Senecio Linnæus 1753, ragwort, groundsel

seh-nee-see-oh Etymology obscure, perhaps from Latin *senex*, old man or woman; alluding to the white pappus bristles resembling the white hair of an elderly person.

Senecio triangularis Hooker 1834, arrow-leaved groundsel


try-ang-gue-lair-is Latin *tri*-, three + Latin *angulus*, angle; angle, apex; corner; alluding to the triangular leaves.

Absolutely unmistakable in our flora, the truncate base of the narrowly triangular saw-toothed leaves are obvious in all growth forms of this species. The only similar vegetative form is *Saussurea americana*—which I have not seen—but it's leaves are far less truncate and flowers very different. It is occasional along the East Glacier Trail, with a very nice patch in the rocky glen by what I call the "Appalachian waterfall" just before the bench at the stairs. I've also found it along the Perseverance Trail in several spots, particularly the Red Mill side loop.

Solidago Linnæus 1753, goldenrods

so-lih-day-go Latin *solidus*, whole + Latin *-ago*, resembling or becoming; probably alluding to healing properties.

This is a genus nearly everyone recognizes. With their goldenrod color flowers arranged in many variations of a theme of spires and wands, they are a common sight at the end of summer and beginning of autumn throughout their nearly cosmopolitan range. Commonly—and very mistakenly—they are blamed for hay fever. Their pollen grains are much too large to be allergenic, but they flower at the same time that other, very allergenic, species like ragweed (*Ambrosia* species).

Solidago canadensis Linnæus 1753 var. ***lepida*** (de Candolle) Cronquist 1994, Canada goldenrod

cah-nah-den-sis Of or pertaining to Canada. Greek λεπίς *lepis*, a flake; botanically lepidote, covered with small, scurfy scales.

Taxonomy: Hultén and FNA follow de Candolle and elevate the variety to species level, *S. lepida* de Candolle If accepted at this level, our plant is S.l. var. *l* as the northwestern version (as opposed to eastern Canada and the Cascades and Rocky Mountains. I'm inclined to go with FNA on this one.

Notes: My first encounter with this northwestern form of a familiar goldenrod was in Haines in 2008 where I noted it was more leafy than the plants of the Smokies. Here in the Juneau area it is not common, but occasional along the Back Loop Road on slopes above moist areas and road banks where it definitely looks "bushy".

Solidago multiradiata Aiton 1789 var. ***multiradiata***, northern goldenrod

mull-tea-ray-dee-ah-tah Latin *multus*, many; much, great + Latin *radius*, rod, spoke; ray; alluding to the many ray flowers.

Taxonomy: FNA notes that the varieties are so subtle as to not be recognized there.

Notes: I've only found this on the Mount Roberts Trail as here it's a plant of high rocky ridges where it often is the dominant plant. The range of habits of this species throughout its range is amazing, from the dunes of the Oregon coast to dry forests in the Cascade Mountains and here in the alpine tundra. Being somewhat dwarfed by the environment, the heads follow suite and tend to be almost globose, or at least in short, dense clusters.

Sonchus Linnæus 1753, sow thistle, hare thistle, hare lettuces

sawn-chuss Greek σονχος *sonchos*, ancient name for a kind of thistle.

****Sonchus asper*** (Linnæus) Hill 1769, prickly sow-thistle

ass-pur Latin *asper*, rough, uneven, coarse; alluding to the edges of the leaves.

Symphyotrichum Nees 1832, New World aster

sim-fee-oh-trih-cum Greek συμφυσις symphysis, junction + Greek τρίχα *tricha*, hair, perhaps alluding to a perceived basal connation of bristles in the European cultivar used by Nees as the type.

Taxonomy: Long known to be a mix of many unrelated species, the genus *Aster* Linnæus 1753, has been greatly dismembered and there are no recognized species in that genus native to North America and our sole representative on the continent is the weedy *Aster tataricus*. *Symphyotrichum* contains 90 species, 77 of which are in North America and is the largest of the "new" aster genera *Almutaster*, *Canadanthus*, *Doellingeria*, *Eucephalus*, *Eurybia*, *Ionactis*, *Oligoneuron*, *Oreostemma*, *Sericocarpus*. All are called aster!

Symphyotrichum foliaceum (Lindley ex de Candolle) G. L. Nesom 1994 var. ***foliaceum***, leafy aster

foe-lee-aye-she-um Latin *folia*, leaf; hence leafy.

Taxonomy: FNA notes "The species [*Symphyotrichum subspicatum*] passes into *S. foliaceum* in southeastern Alaska." This little statement saved my brain from endless frustration with the various treatments, photographs and keys and made sense of this somewhat weedy plant. Of course, when there were asters in North America this was *Aster foliaceus* Lindley ex de Candolle.

Notes: This is the common aster of our area, abundant along any sunny trail or open area in the woods. It is particularly common anywhere around and near the Mendenhall Glacier Visitor Center and on all the trails there. It is particularly lush and showy when at the base of a rock cut such as the graphitic schist glacial scour after the second Steep Creek bridge.

Taraxacum F.H. Wiggers 1780, dandelion

tuh-RAX-uh-cum Arabic to Persian *talkh chakok*, a bitter herb.

Taxonomy: While the genus is easily recognized, naming species is incredibly difficult. The number of species named in this genus exceeds 2,000! FNA takes a conservative approach to our native flora by accepting only 15 species. The very common yard dandelion, *Taraxacum officinale*, has been divided into 14 lower taxa. For most, dandelion is sufficient.

****Taraxacum officinale*** F.H. Wiggers 1780, common dandelion

oh-fih-shon-al-ee Latin *officina* derived from *opificina* which originally meant 'workshop' but later came to mean a monastic storeroom, herb-room or pharmacy. Refers to the plant's medicinal value.

The common yard dandelion that everyone knows is characterized by the rosette of basal leaves lying flat to the ground and sending up one or two flowering stalks at a time, this continuing throughout the growing season. It is almost as common a lawn pest in Juneau as in the lower 48.

****Taraxacum ceratophorum*** (Ledebour) de Candolle 1838, dandelion

Latin seh-rah-TAW-for-um, American ser-A-to-for-um Greek κέρας keras, horn + Greek φορυς bearing; hence bearing a horn.

That this is distinct from common dandelion in several ways. This size is large, at least two times garden dandelion. The flower stalks rise 12 to 24 inches and can reach the diameter of a pencil. Most plants produce 3-7 flowering stalks that flower simultaneously. The leaves are 8 to 14 inches long and look a great deal like lettuce. While dentate, the sinuses between the teeth are shallow and don't give the leave a lacy or fern-like appearance. Here in Juneau, almost all plants flower together and produce seeds together.

I'll now always associate this species here with Eugene Wofford. As I drove him around at the peak of flowering on June 2, he exclaimed "they all must be hexaploids!" The flowering heads *are* huge, easily the size of Kennedy half-dollars, and extended ploidy usually leads to larger than normal plants. I'm used to dandelions blooming nearly continuously, but here they do not, with a period of about a month. Absolutely abundant in the median of Egan Drive as well as every road shoulder, the plants are unavoidable and absolutely gorgeous!

Order Dipsacales A.L. Jussieu ex Berchtold & J. Presl 1820

Family Adoxaceae Trautvetter 1853 **moschatel**

Sambucus Linnæus 1753, elder, elderberry

Latin SAM-boo-cuss, American sam-BOO-cuss, sam-bew-cuss

Latin *sambucus*, sambuca-player (a sambuca is an ancient Greek flute reputedly made from this wood).

Taxonomy: Formerly placed in the Caprifoliaceae or honeysuckle family, it was segregated out [Backlund & Bremer 1997 *Plant Syst Evol* 207:225–254] on genetic grounds. APG III (2009 and current) makes this note:

> The circumscription, etc., of families follows Backlund and Bremer (1997) and Backlund and Pyck (1998). Note that the small families recently recognised in Dipsacales are a consequence of maintaining the well known Dipsacaceae and Valerianaceae in their old circumscriptions - the small clades resulting from the break-up of the old, broadly-circumscribed Caprifoliaceae remained unaccounted for. The whole lot might usefully be combined in a Caprifoliaceae s.l. (see also A.P.G. II 2003, esp. III 2009), since similarities between the families are considerable and differences are mostly slight. Furthermore, there is persistent instability in the backbone of the tree.

Sambucus racemosa Linnæus 1753 var. ***racemosa***, red elderberry, yéil'

ra-seh-mow-suh   Latin *racemus*, bunch, cluster; botanically a raceme, a single stalk with flowers attached with stalks off from it.

Taxonomy: Named *S. pubens* by Michaux, the circumboreal distribution means it is best treated as a single species with varieties. Whether this is var. *racemosa* or *pubens* is problematic, but the overall similarity with the European form indicates our variety is indistinguishable.

Notes: Abundant and encountered virtually daily. Early in the summer I'd eat and offer the flowers of the shrubs for the folks along the trail, particularly the East Glacier Trail where only a few would partake. It has a pleasant, if somewhat weedy flavor. The fruits started ripening the second week of August, and while bright red and pulpy with an initial sweetness on the tip of the tongue, there is an aftertaste along the sides of the tongue that is decidedly skunky. The Virginia Tech website says this: "unpalatable when raw (may be toxic to some) but edible when cooked" [http://www.cnr.vt.edu/dendro/dendrology/syllabus/factsheet.cfm?ID=255] while the Bella Coola (and other northwest people) used the berries for wine, sauce and jelly [http://herb.umd.umich.edu/herb/search.pl]. Jack Keller says this species is toxic on his winemaking p. [http://winemaking.jackkeller.net/elderber.asp] and Hultén says "the seeds are poisonous, causing diarrhea vomiting", [p. 41]. The Tlingít used it for jam and jelly, but only after being cooked as "they have a laxative effect" and that the "seeds are like nuts and eating elderberries gives you fiber in your diet and keeps you regular." (Kayanní p.). Heller (p. 2) notes "the fruits ... are considered inedible. There have been reports of digestive upsets from eating them" and includes the plant in her section of other edible plants for emergency use." I fail to find what I consider a definitive reference for any of this.

The Tlingít name yéilʼ, looks very similar to the raven, yéil, but adds the final apostrophe. This indicates that the sound is pinched and cut off in the throat and comes only from the mouth and not the throat. It is a difficult sound to make, yet it gives it a very different meaning.

Viburnum Linnæus 1753, viburnum

vih-burr-num Classical Latin *viburnum*, guelder rose; wayfaring-tree.

All viburnums have opposite leaves, unusual for shrubs and trees (maple, ash and dogwood—MADwoods—are also opposite).

Viburnum edule (Michaux) Rafinesque 1808, highbush cranberry, kaxwéixh

Latin EH-dew-lee, American ed-YOU-lee Latin *edulis*, edible.

Abundant and encountered on most walks, but first in flower on the trail around Floyd Dryden Middle School here in the Mendenhall Valley. The fruits first appeared the last week of July, but nowhere near ripe. In late August they are ripe, but rather tart, hence the common name! Hultén notes “the fruit is edible, and makes a good jam; should be picked not quite ripe”[p. 42] which would make them even more similar to the unrelated cranberries. Sofia Stage-Harvey loves them! On September 14 I find a large number of very ripe fruits on the flume trail above the Trail of Time. The skin is tight but they feel almost like grapes. I pop one in my mouth and wow, is it tart! The texture is more grape-like than cranberry.

Family Valerianaceae Batsch 1802 **Valerian Family**

Valeriana Linnæus 1753, valerian

vah-lair-ee-aye-nah Medieval Latin word for the plant.

Valeriana sitchensis Bongard 1832, Sitka valerian

sich-en-sis Of or pertaining to Sitka, Alaska.

I learned this plant at Crater Lake National Park where it is a common alpine wet meadow wildflower. Here it can be found at nearly any elevation as long as there is moist soil and light. Often a tall plant, some robust ones may reach 1 m, the capitate inflorescence is held high above the other plants and becomes very showy. Note the three stamens sticking out from the floral tube and the hoverflies (Syrphidae)visiting this head as pollinators. Abundant in the open areas all along the Perseverance, Alpine Loop Trail and Mount Roberts trails.

Family Araliaceae A.L. de Jussieu 1789 **ginseng**

Oplopanax (Torrey & A. Gray) Miquel 1863

Latin op-LAH-pah-nox, American op-low-pan-axe Greek όπλο *oplo*, weapon + Greek πάναξ *panax*, all-heal [in reference to its close relationship to the ginseng (*Panax*) of ethobotanical use].

Oplopanax horridus (J.E. Smith) Miquel 1863, devil's club, s'áxt'

Latin *horridus*, wild, frightful, rough.

Taxonomy: the basionymn is from *Panax horridus* J.E. Smith (1813). Why it was moved into *Oplopanax* (1863) then *Echinopanx* (1894) then back into *Oplopanax*, I've not been able to determine. Hultén treats it as *E.h*. [p. 96], which is what I learned it as while at Humboldt State.

Notes: If there is a ubiquitous species of the temperate rainforest of Southeast Alaska, this is it. Encountered everywhere I walk, usually in great abundance, "forming nearly impenetrable thickets in moist woods" [Hultén p. 96], this plant is inescapable! This is certainly the case along the path to the Herbert Glacier where the understory is almost entirely devil's club. On nearly every walk, someone asks about the "big maple leaves" unless I've already talked about the plant. Early in the season I was saying that the plant continues to grow throughout the growing season and that some leaves reach circled arm size. I'm now revising that a bit as only a few plants are that large, most are about the same size they were back in June when they finished leafing out. They probably do continue to grow some when in favorable habitat, but my visual evidence seems to indicate there is a normal maximum size for the leaves just as there is for the spruce and hemlock trees. This year's growth seems to be from four to eight inches of stem elongation, a bit less than I was expecting.

Ethnobotany: Early in the season I'd pop off the inch to inch and a half buds and eat them, offering them to my guests as well. The taste reminds me of Brussels sprouts with a mild horseradish sauce aftertaste, altogether quite pleasant. Not much more growth results in hairy and thorny leaves that aren't the most pleasant sensation to the mouth. This article from the Juneau Empire made my day when I read it:

> Thursday, May 21, 2009, ***Tasty little devil: Amid thorns, devil's club shoots*** By Kate Golden | JUNEAU EMPIRE
>
> Hikers who have suffered the wrath of thorny devil's club may find a poetic pleasure in fighting back with a frying pan and spatula. The shoots are ready to eat. "They're a little weird when you first eat them," said Donald Gregory, an administrative assistant at the Sealaska Heritage Institute whose colleague brought some in one day. "It has a little medicinal something in it. But oh my god it's delicious."
>
> The thrill of foraging one's own food is sometimes the best part. Plenty of edible plants taste generically green or like not much at all. Dandelions and nettles have their charms, but it's easy to see why people who lived on them might switch to something else at the first opportunity. Devil's club, however: "I think it's the best of the wild edibles," said Laurie Helen Constantino, a wild-edibles eater in Anchorage and cookbook author who has blogged about devil's club. Constantino gathers it in huge quantities in the narrow window during which it's available. Where she lives it comes up in early spring, before almost all the other edible plants during a time when she's just starting to get itchy for wild things.
>
> Note the "horrid" in the plant's Latin name *Oplopanax horridus*: This is the scourge of unwitting hikers in the Pacific Northwest, plus Ontario and Michigan. It has both formidable nasty spikes like daggers, and little insidious nasty spikes that become hard-to-remove splinters. But the shoots, once cooked, are tasty. They have a resiny, spruce-like flavor, a firm bite and a texture like asparagus tips with peach fuzz on them. I say tasty not only as the Empire's resident experimental-foods reporters (see, for example, last year's forays with chocolate lilies and sea cucumbers) but as the witness of 10 Empire tasters who smacked their lips, and only one who reported a strange feeling in his belly, as though he had had one too many cups of coffee on an empty stomach. He had in fact already had two cups of coffee. "I don't think it portends bad news," said reporter Jeremy Hsieh. "It just feels active." Another taster said it might have settled his stomach.
>
> Note that local indigenous people have been using devil's club for ages as a medicine. Sitka herbalist and Tlingít cookbook author Pauline Duncan makes skin ointments out of devil's club. The Tlingíts steeped the pith in water to make a medicinal tea, too. But Duncan does not eat the shoots, and - as a serious caveat for culinary experimenters - is cautious about recommending the tea, not knowing how it might affect people chemically.
>
> Constantino has been serving the shoots for years, whether as potato salad, gnocchi, pesto spread on grilled-cheese sandwiches, or simply sautéed with garlic. She has not noticed adverse effects. "I think it makes you feel healthy, if a food can do that," she said. It is not popular. Constantino researched recipes before she blogged about it and couldn't find any. "I don't know why people don't use them," she said. "I think people are afraid to gather them. You do have to get right in the heart of devil's club patches. You have to have a certain amount of fearlessness." In just the sort of thickets that most people would normally avoid, especially on north-facing hillsides and at higher elevations, the shoots are popping out of the woody, thorny stalks. Choose a firm tip that hasn't unfurled at all, and bend it down until it snaps off. Beware, of course, the thorns.

At this point I usually pull out my Devil's Club Soothing Rub and offer for folks to rub their finger in it to try it out. Guide Eric Daun swears by the stuff for the arthritis in his knees and I've used it on my lips for chapping. The modern salve is made with a beeswax base, where a true Tlingít concoction would use seal blubber or some other animal fat. P&M devotes an entire p. [p. 2]to this species, the only one to get that much attention in the book, the bulk of it on its ethnobotany. There is conflicting information about the efficacy of chemicals in devil's club on various maladies. Older references say—or imply—the efficacy of devil's club on the maladies,but the current research shows nothing of the sort. Apparently the plant has nothing to offer.

> ***Devil's Club Uses and Pharmacology*** [http://www.drugs.com/npp/devil-s-club.html]
>
> Hypoglycemic activity*Animal data:* Several animal investigations were conducted in the 1930s and 1940s in an attempt to characterize the pharmacologic activity associated with the traditional uses of devil's club. Following reports that patients with diabetes could be managed successfully using water extracts of the root bark, animal-based investigations suggested that the extract had hypoglycemic activity in the hare and that the plant was not associated with toxicity. Further investigations were unable to verify the hypoglycemic effect in rabbits.*Clinical data:* No pharmacologically active component could be identified in the plant. A report of a case study of two patients given extracts of the plant in conjunction with a glucose tolerance test found no hypoglycemic effects that could be attributed to devil's club.
>
> Inhibition of gonadotropin*Animal data:* The dried roots and stalk have been reported to inhibit the effects of pregnant mare serum on the growth of the ovaries of the white rat. The ovaries of control rats weighed more than 8 times those of test animals that received the serum together with 40 mg of dried plant per dose. *Clinical data:* Research reveals no clinical data regarding the use of devil's root for inhibition of gonadotropin.

Effect of Devil's Club Tea on Blood Glucose Levels in Diabetes Mellitus, H.V. Thommase [http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2280323]

Devil's club (*Oplopanax horridum*) is a popular medicinal plant used by Native Indian tribes in the Pacific Northwest. One reported indication for using this plant is in the treatment of diabetes mellitus. Several physicians have reported patients with diabetes who were able to maintain normal blood glucose levels while taking devil's club preparations. The authors performed a pilot study in which blood glucose levels were carefully monitored in an insulin-dependent diabetic patient, a newly diagnosed non-insulin-dependent diabetic, and two healthy adults while they drank devil's club tea. The limited data do not show any hypoglycemic effect of devil's club tea. n, R.A. Wilson, and R.G. McIlwain

The tips of the leaves late in the season (August) are bitter with nothing pleasant about the experience. The flowers ripen slowly into bright green fruits that slowly turn a very brilliant orange red.

Bear dung in August is simply full of the fruit and seeds of devil's club, many of which seem to traverse the intestinal tract unscathed and emerge complete enough to pull out of the scat and compare to fresh material. What's going on with this? From personal conversations with John {}, manager of Admiralty Island National Monument, he thinks the bear are using the bitter fruits as purgatives, cleaning out their digestive system of the many parasites picked up from eating rotting salmon.

I wonder about it's taste, so on several occasions I taste the drupes and find them mealy and rather bitter. The single seed occupies nearly half of the fruit, so there really isn't a great deal of fruit for the bears to actually ingest and utilize, yet they seem to gobble up the entire inflorescence of the plant. Yuck!

The leaves are still very green the end of August into early September, but turn pale green-light yellow quickly once the change begins. By the first October morn, the leaves have fallen and all that remains are the heavily armed branches that blend enough in the background to become fierce opponents when traversing cross country.

Family Apiaceae Lindley 1836 **parsley or carrot**

This family is almost instantly recognizable with its flower arrangement in umbels and many compound umbels. Think of an umbrella blown out by the wind and stripped of the cloth. What have left is a single umbel. Grouped, they can be flat (like Queen Anne's lace) or domed and anything in between. While the family is easy to learn, the genera and species are not and it often requires a technical key to determine both genus and species. If one wishes to partake of its edible members, careful identification is required as the family contains some of the most poisonous plants known to man.

Angelica Linnaues 1753, angelica

ann-gel-ih-kuh Greek ἄγγελος angelos, angel; perhaps because of it was believed to have healing powers.

Angelica genuflexa Nuttall 1840, kneeling angelica

jen-you-flex-uh Latin *genu*, knee + *flectere* to bend; bending one knee on the ground before a noble as a sign of respect and submission.

This family always gives me trouble! This species is a forest edge or wet opening plant in the Mendenhall Valley, common along the north section of the Back Loop Road and on the old roadbed Steep Creek access to the Trail of Time. The key to most anglelicas is that they have ternately or here, pinnately divided leaves. The "kneeling" nature of the leaves is not always apparent. Flower color on this plant varies from pure white to yellowish white and does not really seem to help as a diagnostic tool; here the leaves are more helpful. Note here that some of the divisions are ternate (in 3's) but most are pinnate.

Conioselinum Fischer ex Hoffmann 1814, hemlock-parsley

co-nigh-oh-SEH-lih-num Greek κώνειο *koneio*, hemlock + Genus *selinum*, marsh-parsley; perhaps from Greek Σελήνη *selēnē*, moon.

Conioselinum gmelinii von Steudel 1840, Pacific hemlock-parsley

guh-MEL-in-ee-eye, guh-MEL-in-ee Honorific for German naturalist Johann Friedrich Gmelin (1748-1804).

<u>Taxonomy</u>: Confused! Hultén has it as *C. chinense* but notes it was "described (erroneously) from China, type probably originated from New York. It has been placed in *Athamantha*, *Ligusticum* and *Selinum*. This name refers to the plants of the North American Pacific area; Hultén's circumboreal map [p. 04] has a northeastern component well separated from the Pacific that is *C. chinense*. To make matters worse, Tropicos considers the (Chamisso & von Schlechtendal) J.M. Coult. & Rose (1900) name as "illegitimate", probably on the principle of priority; includes Chamisso & von Schlechtendal as authority for the basionym *Ligusticum gmelinii* not for *Conioselinum*; and, (Chamisso & von Schlechtendal) Steud. isn't included at all!

<u>Notes</u>: Scattered along the seashore section of the Rainforest Trail on Douglas Island as well as the Airport Dike Trail, it's parsely-like leaves

make it distinctive in this flora. There are a couple of plants along the East Glacier Trail where it leaves Nugget Creek and enters the Mendenhall Valley along the cliff face above Nugget Falls (leaf and flower photo).

Heracleum Linnæus 1753, hogweed, cow parsnip

hair-ACK-lee-um Greek Ἡρακλῆς *Hēraklēs*, the demigod Hercules; probably from the powerful medicinal use of the plant.

Heracleum maximum Bartram 1791, cow parsnip, Indian celery, Indian rhubarb, pushki, yaana.eit

MAX-ih-mum Latin *maximus*, greatest, biggest, largest.

Taxonomy: Our North American plants are very similar to the European *H. sphondylium* Linnæus, so much so that many consider it a variety rather than a full species. If so, it would be *H. s.* Linnæus var. *lanatum* (Michaux) Dorn. As a full species, Bartram's 1791 name antedates Michaux's 1803 and thus has priority. The widespread use of *H. lanatum* Michaux is a mystery to me, yet that is how I learned the plant.

Notes: Ubiquitous in edges, fields and above the littoral shoreline, this coarse and somewhat weedy plant cannot escape notice. Nearly every reference mentions how common it is in Alaska. With very large (blade 20-50 cm wide) roundish leaves with irregular mostly trifoliate cuts, and tall (1-3 m) stem growing almost in stands of the plant, it is quite obvious. Stems can exceed 5cm in diameter. What I remember most about the plant when I first encountered it along the northern California coast is the quite rank aroma that is especially pungent in the sun. When I first found the plant here, that smell put me right back on a seaside cliff just north of Arcata, California! Stomping through stands of it, the stiff hairs become obvious to exposed skin. The tall stems when dried are stiff and strong and hold up the dried inflorescence often throughout the winter.

Ethnobotany: While about every reference I have indicates this is an edible plant ("...used by virtually every group on the Northwest Coast as a green vegetable" in P&M [p. 13]), I've refrained from trying any of the plant. Hultén notes "the marrow is eaten raw and the root boiled by the natives; the plant contains sugar and tastes much like licorice" [p. 07]. Georg Steller recognized it immediately with his first step on Kayak Island in 1741 as pushki, from the Kamchatka plants he was familiar with. "The young spring stalks of *yaana.eit* can be peeled and eaten as a spring green while it is tender ... and it is mostly green, not purple. Indian celery can burn some people's mouths, and you must be very careful" (Kayaaní p. 15).

The Aleut used the leaves used to make a tonic for colds; a oultice of heated leaves applied to minor cuts; a poultice of heated leaves applied to sore muscles; and, leaves used to make a soothing drink for sore throats.

Bank, II, T.P. 1953. *Botanical and Ethnobotanical Studies in the Aleutian Islands II. Health and Medical Lore of the Aleuts*. Botanical and Ethnobotanical Studies Papers, Michigan Academy of Science, Arts and Letters.

Toxicity: The plant contains "Furocoumarins (psoralens) including bergapten, isobergapten, sphondin, isopimpinellin and pimpinellin" [http://dermnetnz.org/dermatitis/plants/hogweed.html], "endogenous photodynamic agents which have the capacity to cause photosensitive keratoconjunctivitis" [http://medical-dictionary.thefreedictionary.com/furocoumarin]. That it can cause large blisters was obvious when Gastineau Guiding's Jennifer Smith wore shorts on a day when walking through cow parsnip one one of our many sunny days. Within a couple of days, she developed inch-long blisters rising a quarter inch from her skin that itched intensely. The running joke is that during a "normal" summer—one with mostly clouds and rain—the photosensitive nature of the chemicals would be moot.

Ligusticum Linnæus 1753, lovage

lih-GUS-tih-cum Honorific of the Italian city Liguria.

Ligusticum scoticum Linnæus 1753 ssp. ***hultenii*** (Fernald) Calder & Roy L. Taylor 1965, beach lovage

SKO-tih-cum Of or pertaining to Scotland. Honorific for Swedish botanist and author of the *Flora of Alaska and Neighboring Territories*, Eric Hultén (1894-1981).

Taxonomy: described from England and Sweden, our plants are usually treated as a distinct subspecies as Calder and Taylor did when demoting Fernald's treatment of it as a full species. The distance between the two is half the top of the world, with distinct Asia-Pacific Northwest and Northeast-Northern European distributions [Hultén, p. 02]

Notes: I've only seen this plant along beaches in the high littoral zone among the salt tolerant grasses, along the beach portion of the Rainforest Trail on Douglas Island the Airport Dike Trail and in the rock outcrops at the Shrine of St. Therese. The flowers in this area have been all white, but P&M mentions they can be pinkish [p. 19] as well as Hultén [p. 02]. The flowers form compound umbels where the outer ring of umbels tends to separate quite a bit from the center umbels giving them something of a cluster of small balls on stalks look. The leaves are what sets this apart from all other Apiaceae here, no finely-divided parsley look but two or three times divided into three egg-shaped lobes that are about an inch long and nearly as wide

Osmorhiza Rafinesque 1823, sweeet Cicely

Latin oz-MO-rih-zuh, American oz-mo-RYE-zah Greek οσμή *osme*, odor + ῥίζα *rhiza*, a root, referring to the fragrance of the crushed root. The common name apparently derives from the obscure Greek name σέσελις, *seselis*, that refers to general members of the carrot family that Linnæus used for the genus *Seseli* + the "sweet" referring to the flavor of anise.

Osmorhiza chilensis Hooker & Arnott 1830, mountain sweet Cicely, sweet Cicely, western sweet Cicely

Latin kigh-LEN-sis, American chi-len-sis Of or referring to Chile (the country).

Taxonomy: This species seems best treated as a single wide-ranging variable species that includes *O. berteroi* DC. and *O. purpurea* (J.M. Coulter & Rose) Suksdorf.

Notes: This is one of those plants that while uncommon, is very common when you find it, often with dozens of plants in a single area. Yet walking just a short distance away there are none. It is occasional on the East Glacier Trail yet absolutely abundant at the Shrine of St. Therese just inside the woods on the island. The white flowers are tiny and easily overlooked but the pinnately compound leaves don't resemble any other plants in the forest. The fruits are unmistakable when combined with the leaves. The only thing they resemble are beggars ticks or Spanish needles in the genus *Bidens*, a plant not found anywhere near SEAK.

Kingdom Animalia Linnæus 1758 Animals

Latin *animale*, living being; being which breathes. Neuter of *animalis,* animate, living; of the air. Derived from *anima*, breath, soul; a current of air.

Here largely used in the traditional sense of "animal, vegetable, mineral" where most people immediately recognize the organism as an "animal". They are highly complex multicellular *eukaryotes*, having cells that contain membrane bound organelles, especially the nucleus where genetic material is stored. Their cells are bound by a plasma membrane and not a semi-rigid wall. Their embryos pass through a unique blastula stage, a hollow sphere of cells. Animals are generally mobile, at least at some stage of their growth, and *heterotrophic*, requiring outside nutrition.

Nomenclator Zoologicus is a major source for taxonomic information. [http://www.ubio.org/NomenclatorZoologicus]

Phylum Cnidaria Hatschek 1888 *anemones, corals and jellyfish, taakw aanási*

Class Anthozoa Ehrenberg 1831

Order Actiniaria anemones, tayataayí

Family Actiniidae Rafinesque 1815

Anthopleura Duchassaing de Fonbressin & Michelotti, 1860

Latin ann-THAW-plure-uh, American ann-tho-PLURE-uh Latin *antho*s, a flower + Greek πλευρά *pleura*, rib; side; by extension, lung, as in the lining of a lung; presumably from its appearance resembling a flower yet pulsating with water like a lung.

Anthopleura artemisia (Pickering in Dana, 1848), burrowing anemone, burrowing green anemone, buried anemone, moonglow anemone, tayataayí

are-teh-MEE-zhee-uh Greek Ἄρτεμις *Artemis*, the Hellenic goddess of the hunt, wild animals, wilderness, childbirth, virginity and young girls, bringing and relieving disease in women; she often was depicted as a huntress carrying a bow and arrows. Connection to this animal undetermined.

Each brilliant chartreuse tentacle is quite stout at the base and rapidly thins to a simple wisp of an end and has a series of concentric bands of lighter chartreuse or yellow up the tentacles. The oral disc is especially large, about two-thirds the diameter of the outermost stalk (not including the spread tentacles)and uniform in the same color of the tentacles. It is also very flat and often collects sand and other detritus making me wonder how the animal keeps that out of its gut. I find it only in areas of sand next to the rocks in the intertidal zone, as can be seen in this photograph. All of the individuals I see are as bright a green as this species yet nearly all the photographs I consult have it far darker or even a pale translucent that resembles nothing like what I see here other than the banding of the tentacles. Perhaps those were from an area that recevies even less direct light than Juneau—a hard thing to comprehend!

Other than the bands on the tentacles, this species strongly resembles *Anthopleura xanthogrammica,* where the epithet means "yellow-banded" even though this species' tentacles are never banded.

These very bright chartreuse green anemones are common in the shallow rocky beaches at Outer Point and False Outer Point on Douglas Island. They are usually solitary, at least a meter or so apart from other individuals. Even on a very dull foggy or low overcast day they brighten my countenance with their brilliance.

The green color intensifies in bright light and is the result of photosynthetic zoochorellae (green algae) or zooxanthellae (dinoflagellates) that live in a mutualistic relationship with the anemone. I have not seen this phenomenon and must return on cloudy and sunny days to observe it.

I took this photograph on October 3, 2010 after a period of very dark gray skies when I would expect to see the photosynthetic components dull in color. [http://www.wallawalla.edu/academics/departments/biology/rosario/inverts/Cnidaria/Class-Anthozoa/Subclass_Zoantharia/Order_Actiniaria/Anthopleura_artemisia.html]

Class Scyphozoa Götte 1887

Order Semaeostomeae L. Agassiz 1862

Family Ulmaridae Haeckel 1880

Phacellophora Brandt, 1835

Latin fah-sell-AWE-for-uh, American fay-cello-FOR-uh

Etymology undetermined, possibly from *cellophora*, with tentacles around the disc, something common to virtually all jellyfish.

Phacellophora camtschatica Brant 1835, fried-egg jellyfish, egg-yolk jellyfish

kahm-cha-tih-kah

of or pertaining to Kamchatka.

Identification tentative and done through the illustrations found in the *Marine Species Identification Portal* [http://species-identification.org/species.php?species_group=zsao&id=2437] and the photographs at *Key to Invertebrates Found At or Near The Rosario Beach Marine Laboratory* [http://www.wallawalla.edu/academics/departments/biology/rosario/inverts/Cnidaria/Class-Scyphozoa/Order-Semaeostomeae/Family-Ulmaridae/Phacellophora_camtschatica.html].

Coming off a Whales and Trails water portion on September 25, 2010, I spotted this jellyfish in the waters of Statter Harbor and pointed it out to my folks as we walked up the docks calling it an "inside out jellyfish". I've been trying to remember where I heard that name and when and where I've seen this jelly before but can't come up with anything. It must have been during my time at Humboldt State in Arcata, California. This individual is upside down with the gut the most prominent visible part. I pay particular attention to the eight lobes of the bell, each of which has a single row of 16 tentacles. My photographs can't resolve close enough to do an accurate count on the tentacles, but each single row does seem to be near that number. The tentacles here are retracted and less than 1.5 cm long but can extend to 6 meters

Phylum Arthropoda Latreille 1829 ***arthropods***

Greek ἄρθρον árthron, joint + ποδός podós foot.

Subphylum Crustacea Brünnich 1772 ***crustaceans***

Class Maxillopoda Dahl 1956 **barnacles and copepods**

This classification is likely polyphyletic and subject to rearrangement as its members are diverse and share no unifying characters.

Subclass Thecostraca Gruvel 1905 barnacles, s'ook

Order Sessilia Lamarck 1818 *acorn barnacles*

Family Chthamalidae Darwin 1854

Chthamalus Ranzani, 1817

k' THA-mah-lus   Etymology undetermined, but the Greek θάλαμος thalamos, means chamber.

Chthamalus dalli Pilsbryi 1916, small acorn barnacle, s'ook

Honorific for William Healey Dall (1845–1927), an American naturalist, a malacologist (student of algae), and one of the earliest scientific explorers of interior Alaska.

Barnacles appear everywhere on every coastline here. These creatures take any fixed object as a home, and it doesn't' seem to take long for them to do so! Every post, pier and boat surface that stays in the water at Statter Harbor are covered with barnacles, some so thick it's hard to see the structure. In some places they have to compete with blue mussels, but that mostly appears to be in deeper water. Along shorelines, there is an narrow band where the two intermingle, but the barnacles take the higher tidal zone. As filter feeders, they must be submerged to feed, so they have to choose a place that is underwater for at least several hours a day. In the splash zone they must be able to withstand the severe crushing of waves and be exposed for hours and subject to predation by surfbirds and glaucous-winged gulls. The organic glue they use to affix themselves is amazingly effective at tightly cementing them to the surface. In a meticulous research project, Dickinson and his colleagues from Duke University's Marine Laboratory in Durham, North Carolina found that the glue of *Amphibalanus amphitrite* works remarkably similar to the clotting action of red blood cells:

> The biochemical mechanisms of cement polymerization remain largely unknown. We hypothesized that this process is biochemically similar to blood clotting, a critical physiological response that is also based on aggregation and cross-linking of proteins. Like key elements of vertebrate and invertebrate blood clotting, barnacle cement polymerization was shown to involve proteolytic activation of enzymes and structural precursors, transglutaminase cross-linking and assembly of fibrous proteins. Proteolytic activation of structural proteins maximizes the potential for bonding interactions with other proteins and with the surface. Transglutaminase cross-linking reinforces cement integrity. Remarkably, epitopes and sequences homologous to bovine trypsin and human transglutaminase were identified in barnacle cement with tandem mass spectrometry and/or western blotting. Akin to blood clotting, the peptides generated during proteolytic activation functioned as signal molecules, linking a molecular level event (protein aggregation) to a behavioral response (barnacle larval settlement).

Dickinson,G.H. et al. 2009. *Barnacle cement: a polymerization model based on evolutionary concepts*. The Journal of Experimental Biology 212: 3499-351.

What I can say from my experience is that try as hard as I might, I've never kicked a live barnacle off a rock! When my son-in-law worked on the U.S. Coast Guard buoy tender Sycamore, they had to use hydraulic shovels, like those used to cut pavement, to scrape the barnacles off the bottom of the buoys.

Family Coronulidae Leach 1817

Coronula Lamarck, 1802

Latin core-oh-new-lah, American core-OWN-you-lah   Scientific Latin *coronula*, ornament on mitre; rim, border on base of basin; apparently considered an "ornament" on the whales!

There are two species commonly seen on humpback whales that can be identified with a close up examination of photographs. The whales move entirely to quickly to be able to determine in real time unless the whale is extremely close—like 10 meters away

Coronula reginae Darwin 1854, Pacific whale barnacle, s’ook

reh-gin-aye Latin *regina*, queen; hence crown

C. reginae has twelve united shell plates of nearly equal size that alternate in a flower-like pattern with one series widest near the top opening and the other widest near the base. This makes it appear to have many small plates and creates a circular in outline. The overall shape is conical and the opening area small when closed.

Coronula diadema (Linnæus, 1767), humpback barnacle, s’ook

Latin dee-A-dem uh, American die-uh-DEM-uh Greek “διάδημα” *diádēma*, band; hence crown.

C. diadema has a similar pattern but the plates widest near the base are 2+ times wider than the intervening plates making the barnacle look decidedly hexagonal. The sides are nearly vertical, much like a crown and probably explains the uses of “diadem” for the epithet. The opening area is broad, even when closed.

Almost every adult and subadult whale I see has abundant barnacles on its epidermis. First year babies arrive clean, free of barnacles. From what I see, barnacles seem confined to the rim of the lower jaw and descending down the center of the ventral side of the throat away from the pleats; on the ends of the pectoral fins; and, the trailing edges of the flukes. The vertically lunging whale has a particularly large load of barnacles almost encrusting the distal end of the lower jaw. Why don’t they seem to attach to the dorsal (upper) surface? Most every gray whale I’ve seen has abundant barnacles on the dorsal side of the upper jaw. There are abundant whales with circular scars on the ventral (under) side of their flukes from locations where barnacles have attached such as whale number 2070 who has been nicknamed “Barnacles” for this reason. The white fluke shot of an unidentified whale and the breaching subabult show some of the barnacles open with tentacles out.

I have a persistent question about how barnacles actually attach to the whale. The cyprid larval stage is short-lived and it seems its whole function is to find a place to live. Attaching to a whale might provide an advantage to feeding as the whale swims through thousands of miles of ocean feeding on krill that are usually associated with huge plankton blooms, the food of the barnacle. So where do the whales pick up the cyprids and just exactly how to the find the whale and attach to its skin? In a very rare experiment with *Coronulus diademata*, Nogata and Matsumura noticed "The cyprids did not settle in normal seawater, but did settle in polystyrene Petri dishes when incubated in seawater with a small piece of skin tissue from the host whale. This strongly suggests the involvement of a chemical cue from the host whale tissue to induce larval settlement." If so, the cyprids swim to the whale and with their many antenules move about to find an appropriate spot where they then dig into the epidermis head first and attache both physically and chemically. It seems to me that for this amazing feat to occur, the whale must have to swim through a literal dense soup of uncountable larvae for the odds of such a tiny creature to accomplish this task. Anderson notes that cyprids have the ability to asses the suitability of the surface for emplanting using texture, chemistry, the color of the skin using and the presence of other similar or identical species in a "complex larval behavior" (p. 219).

From all this, it appears that the whale barnacles have found just a place to call home, but on a host that is an efficient finder of suitable foods. What's in it for the whale? There is no research that I can find that attempts to answer this question, but many speculations are about. When adult male whales enter into sparring contests, or mature females are protecting subadult females, it seems a heavy crust of barnacles about the jaw line and below could do some serious scraping during lunging and bumping, thus providing an advantage to the whales with the largest barnacle coat. It also seems reasonable that this same load would be a very serious impedance to laminar water flow while swimming by dramatically increasing the drag. Among whales, humpbacks are relatively slow swimmers where this might not be of great significance. But in their complex social feeding and mating behavior, the literally "fly" through the water using their massive pectoral fins (their genus name, *Megaptera*, means "big wings".

Anderson, D.T. 1994. *Barnacles: structure, function, development and evolution*. Chapman and Hall, London.
Nogata, Y & K. Matsumura. 2006 *Larval development and settlement of a whale barnacle*. Biology Letters, March 22; 2 (1): 92–93.

Class Malacostraca Latreille 1802**, crabs, lobsters, shrimp, krill, woodlice, scuds**

Order Decapoda Latreille 1802, decapods

Greek δέκα *deca-*, ten + πούς / ποδός, *-pod*, foot.

Family Cancridae Latreille 1802**, crabs**

Metacarcinus A. Milne-Edwards, 1862

Latin meh-tah-CAR-sin-us, American, meh-tah-car-sign-us Greek μετὰ meta, changed + Greek Καρκίνος *Karkinos*, crab; originally placed in *Cancer* (Latin for crab), it was "changed" to this new genus, the Greek name for crab.

Metacarcinus magister (Dana 1852), Dungeness crab, s'áaw

MA-jis-ter Latin *magister*, master or teacher.

A common crab in nearly all the waters here, and an important commercial species. Lacking the ability to swim on the bottom of our waters, I'm limited to seeing crabs in pots or restaurants and the very rare one washed up on the beach or caught in a tidepool.

"Dungies", as they are usually called, are easily identified by their broadly oval creamy tan to brown carapace that lacks spines. Their legs are short in proportion to the body unlike king and snow crab. I find nearly all of the crab pots in areas like Eagle Beach where the water is shallow (less than 100 feet) and has a gently sloping sandy to sandy-muddy bottom. I don't find crab pot buoys in the steep underwater canyons. The account in the Alaska Wildlife Notebook series notes "Dungeness crabs foraging behavior coincides with their habitat. These crabs scavenge along the sea floor for organisms that live partly or completely buried in the sand. They are carnivores, and their diet can include shrimp, mussels, small crabs, clams, and worms".

During the summer of 2009 my son-in-law had two crab pots off Boy Scout Beach in waters that are usually near the mixing point of the glacial silt laden Eagle River and the salt water of the Lynn Canal. About every two weeks we'd go out to pull up the pots and every time we had Dungeness. "Keepers" are males with a bottom carapace 6.5 inches or more wide. The common "rule" of fisherman is to use a dollar bill to measure the carapace. The problem is that a dollar bill is 6.125 inches wide so a crab matching that would be illegal. The number of crabs that can be taken varies with the location and the time, so a close review of the current regulations is required to comply with the law.

As far as for eating, this is my favorite crab as the meat has a distinct nuttiness to it giving in more flavor than the kings or snow crab. What one has to do to enjoy this exceptional flavor comes with a great deal of work as the meat is small and in tucked into tiny places. It generally takes us a couple of hours to pick the meat out of a dozen crabs. It is well worth the effort!

Lithodidae Samouelle, 1819**, stone and king crabs**

Lithodes Latreille, 1806

Greek λίθος *lithos*, stone + suffix *-odes*, like.

Lithodes aequispinus J. E. Benedict, 1895, golden king crab, golden stone crab

Latin *aequus*, equal, even + Latin *spinus*, thorn; hence spines.

The water surface is distorting the view, by the carapace and legs are discernible here. The carapace is about 2 dm across, making it too small for harvest (it's not in season anyway!). The Juneau area's crabs are on a slow recovery after over fishing and the last two years there has been a short opening for personal consumption only in our waters.

Subphylum Chelicerata Heymons 1901*, horseshoe crabs, scorpions, spiders and mites*

Class Arachnida Cuvier 1812**, spiders and mites**

Greek ἀράχνη *aráchnē*, spider.

Order Trombidiformes

Family Eriophyidae Nalepa 1898 **gall mites**

Aculops Keifer 1966

a (as in cat)-cue-lops Latin *acus*, needle + Middle English *lopp*, cut off; derivation unknown

Aculops tetanothrix (Nalepa, 1889), willow pouch gall, gall mite of willow, willow gall mite; species identity tentative

Latin *tetanus*, from Ancient Greek τέτανος,*tétanos*, from τείνω, *teínō*, "I stretch" + Greek τρίχα *thrix*, *trikhos*, hair

Most references I've found simply refer to these as "Eriophyid galls". It took lots of effort to find the genus of mite galls and I'm certain of that level of identification. This gall is common on arctic willows, particularly in Russia. The photographs I've found of the species do not quite match what I see here so the species name is tentative. What fascinates me is that the vast majority of references refer to what I'm seeing, the gall, with precious few giving any information about the actual mite that lives in the gall and causes it to form. Short of sampling some leaves and examining them under a microscope, I'm simply left with yet another puzzle my eye has spotted that my brain can't solve.

At least two species of willow in the outwash plain of the Mendenhall Glacier get this gall, Barclay's (*Salix barclayi*) and Scouler's willow (*Salix scouleri*). They appear in late July but more commonly in August as 3-4 mm long pouches of bright red atop a 0.5 mm white stalk on the upper surface of the willow leaf. In the "sprummer" (spring and summer were the same) of 2013 they appeared on June 27! I've cut into many of them but have never found anything inside with my naked eye or 20 × hand lens. The longer leaves of Scouler's willow seem to attract more of the mites as they have more galls per leaf than Barclay's. On the back loop manway from the beach on the Moraine Ecology Trail, there are dozens of chest-high willows with these galls each summer. While there are dozens (if not more) willows on this rather short (about ¼ mile) trail, only a few have these galls. Like the leaf bean gall, the mites seem to be attracted to the same plants and parasitize them to the near exclusion of nearby plants.

Subphylum Hexapoda Latreille 1825 ***hexapods***

Class Insecta Linnæus 1758 **insects**

With some 100,000 species described and probably at least that many undescribed just in North America, when you couple that daunting number with my sheer ignorance on the group, the only words to pay attention to on these notes is BEWARE! There are surely very serious mistakes in my attempt to identify these creatures. I have had precious little academic study in insects (and all those were wood destroyers) and must be considered an abject amateur with no authority. What I do have is a good eye and persistence in study.

Order Coleoptera Linnæus 1758 ***beetles***

Family Carabidae Latreille, 1802 **ground beetles**

Scaphinotus Dejean, 1826

Latin ska (as in cat)-FIH-no-tuss, American ska (as in cat)-fih-NO-tuss Greek σκάφη, *skaphe*, boat + Latin *notus*, known.

Scaphinotus angusticollis (Mannerheim 1824), narrow-collared snail-eating beetle

Latin ann-gus-TIH-cull-liss, American ann-gus-tih-CALL-is New Latin *angustus*, narrow + *collum*, neck, stem; literally "narrow neck"

While examining the dust lichen (the out-of-focus spheres in this photo) a most spectacular beetle comes wandering about. It's getting late, 7:10 p.m. on August 10, 2012, and I can't get it to slow enough to get a crisp photo at my 1/50 second exposure. The shiny burgundy elytra (wing cover) is like a jewel, and here, rimmed with dozens of tiny "diamonds". The jet black thorax is heart-shaped and the same length as the cylindrical head bearing two orange eyes. The whole thing is about 1 cm long, not counting the almost equal length antennae. Neat bug! I post this image on BugGuide [http://bugguide.net/node/view/718630] and within two hours I get an identification as I had no idea what kind of beetle it is.

Family Chrysomelidae Latreille 1802 **leaf beetles**

Chrysomela Linnæus, 1758

Latin cry-SAW-meh-lah, American, cry-so-MEL-uh Greek χρυσόμηλον *chrusomelon*, "gold-black"

Chrysomela scripta Fabricius, 1801 , cottonwood leaf beetle (?)

SCRIP-tuh Medieval Latin *scripta*, to write; in reference to the cream to yellow variable lines that appear like writing on the carapace.

While crossing what ecologist Mary Willson has dubbed the Dipper Bridge (upper Steep Creek bridge by the CCC visitor center) on August 7, 2011, I spot some black cottonwood (*Populus trichocarpa*) leaves that are being skeletonized. I immediately suspect some sort of insect and when I look closely they really resemble the larval stage of lady bug beetles. I just got a copy of *Insects and Diseases of Alaskan Forests* and use it to identify what I'm seeing as leaf beetles with a photograph that matches my observation perfectly. Unfortunately, the book doesn't describe the three genera and 5+ species of beetles that do this, so I head to the great Google and look them all up. I have trouble naming this to species, but they are most certainly in the genus *Chrysomela*. The very obvious body segments with four white "knobs" near the head are pretty cool and the six legs that can just barely be seen in the upper third of the body. Bob Armstrong tells me the four knobs are actually glands that release poison!

Every time I cross the Dipper Bridge after seeing these larvae, I look closely at the leaves to see what they are doing. They reduce greatly in number into early September but on September 24, 2011 I find a full adult on the leaves. While I have no knowledge that this is the adult of these larvae, the logic of watching these leaves for almost two months several times a week leads me to conclude that the photograph on the right is the adult leaf beetle. What troubles me about my identification is the rather stout form and lack of long antennae. It may be a very young one. The images I find of *Chrysomela scripta*, which may be the closest match, are nowhere near as dark as this individual is, but the larvae are a very close match. The limits of my entomological experience are reached!

There are at least two species called "cottonwood leaf beetle" and this one is certainly not *C. populi* that also feeds on willows and cottonwoods but has larvae that are the exact opposite in color and adults with bright red carapaces.

Staphylinidae Lameere, 1900**, rove beetles**

Pelecomalium Casey, 1886 (orthographic variant *Peelecomalius*)

peh-leh-co-MAY-lee-um Etymology undetermined.

Pelecomalium testaceum (Mannerheim 1843), skunk cabbage beetle

test-A-see-um Latin *testāceum*, covered with a shell.

Since I've not carefully observed these beetles in the past, on May 6, 2012 I stop at a patch right at the end-of-the-road I find one plant just loaded with the beetles. As soon as I pull the spathe aside, most of them drop to the base of the spathe. I'm not sure if they did that because they lost their foot hold on the vertical surface or did it to get out of my way in a defensive move to find a hiding place. I really think its the latter and they just let go of the surface by pulling in their tiny hooks at the end of their legs. I'm relying entirely on the FNA report for my identification as I've no other idea about what the beetle may be.

I find little information beyond the FNA reference which is quoted in many other sources and misspells the genus as *Peelecomalius*. A Google search has my 2009 blog notes as the second entry! They use the FNA misspelling as well. While BugGuide has some photos, they don't have it identified other than as an "ocellate rove beetle" in tribe Anthophagini and possibly in the genus *Pelecomalium*, a new direction to search. My nomenclature sources do not include it but I find it in a reference from a Kenai National Wildlife Refuge entomology collection [http://arctos.database.museum/guid/KNWR:Ento:4207]. With such a widespread plant and presumably common beetle, why is there such a dearth of information?

Order Diptera Linnæus 1758, *Flies*

Family Cecidomyiidae, gall midges

Ozirhincus Rondani, 1840

oz-ih-RING-kus Etymology undetermined. Possibly from the Hebrew עֻזִּי, usually spelled Uzzi or Uzi, the name of several minor characters in Biblical history where the name means "strong, my strength". Through Greek and subsequent Latin it became Ozi. When combined with ρυνχός *rynchos* nose or snout it may mean "large snout". Some midges have long probosci, tubular mouthparts.

Ozirhincus millefolii (Wachtl, 1884), yarrow flower gall

mill-eh-FOE-lee-eye from the epithet of its common host, *Achillea millefolium*.

Taxonomy: First named as *Clinorhyncha millefolii* Wachtl, 1884. The orthographic variants *Clinorrhyncha, Chinorhyncha, Oxyrhynchus, Ozirhyncus, Oziorhincus* are commonly—but incorrectly—used.

Gagné, R.J. 2010. *Update for a catalog of the Cecidomyiidae (Diptera) of the world*. Digital version 1. Systematic Entomology Laboratory, Agricultural Research Service, U.S. Department of Agriculture. U. S. National Museum Washington, DC.

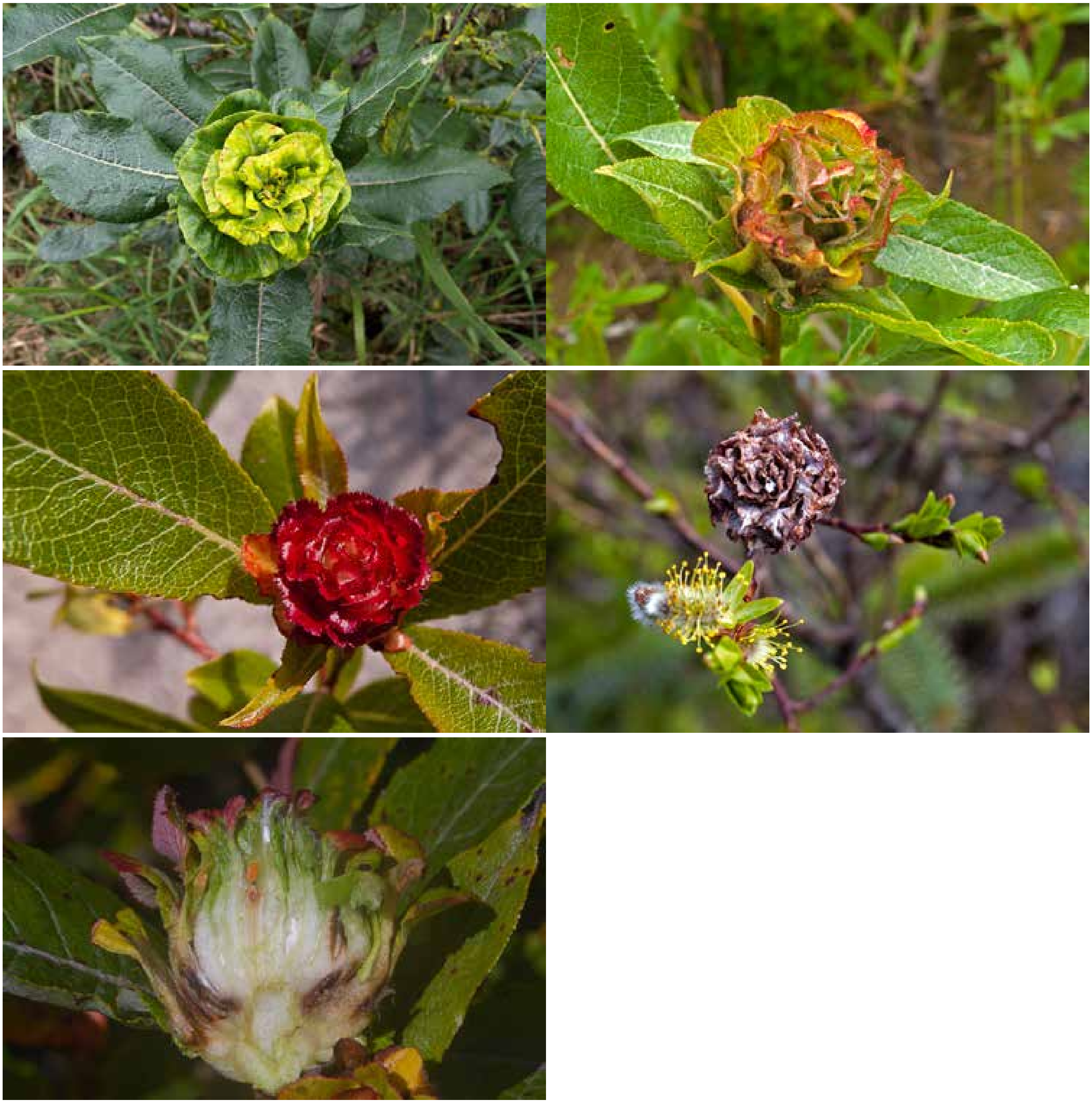
Notes: While on a church hike on the Airport Dike Trail (EVAR or Emergency Vehicle Access Road) on a warm, sunny September 15, 2013 I spot some strange white growths on many of the dried inflorescences of *Achillea millefolium*, common yarrow and have to investigate. It appears that the developing cypsela (achene-like fruit) was injected with an egg by this midge, resulting in a green, fleshy growth covered with fine, soft, white silky hairs on the outside. Most of the body of the gall has ridges, many of which are slightly twisted. The texture is stiff on the outside but rather fleshy inside. Once my fingernail penetrated the outside, it plunged into the interior easily. The pale green color of the outside continues through the inside tissue. Inside several I found a single bright yellow to golden egg (not shown here). This photo is representative of those inflorescences so afflicted, with about a third of the stalks having galls and about a third of the fruits in each inflorescence having at least a single gall. The brilliant sun certainly helped me spot this totally new phenomenon for me. I've known this plant for decades and found it almost everywhere I've been that's not xeric and have never seen this sort of gall.

My research has found no image of the adult midge that ultimately grows from the golden egg and remarkably little about most members of the Cecidomyiidae. I've found no reference to the genus *Clinorhyncha* other than it was moved into *Ozirhincus* which contains four species.

Rhabdophaga Westwood 1847

rab-DAW-fah-guh Ancient Greek ῥάβδος *rhabdos*, rod, wand + φαγος -phagos, to eat; apparently referring to the mouthparts of the adult midge.

Rhabdophaga rosaria (H. Loew, 1850), willow-rose gall midge



Rosaria, of or pertaining to roses; referring to the rose-like gall induced in willows.

Willow roses are abundant wherever Barclay's willow (*Salix barclayi*) is found. Each year as I walk the Moraine Ecology Trail I search for the day that I spot the first gall, and yet they seem to appear each year fully formed before I notice them. I always spot them in July as large (1 cm +) reddish swellings of the terminal buds, then expand into their characteristic rose shape by late July or early August, yet I know they appear earlier than I seen them.

The female midge—just 4-5 mm long—lays her single egg in the terminal bud in spring (when?). Some reports indicate there can be many larvae in the roses, but of the several hundred I've cut open, I've found only one in each. The midge probably injects an enzyme along with the egg that, with the physical disturbance, causes the dozen plus leaves in the bud to stop their elongation. The leaves continue to develop resulting in their crowding with fleshy tissue in the shape of a rose.

I always find the golden larvae where the white tissue turns to green inside the gall, but often find discoloration in the outer whorls of the gall leaves that appear to be from the tunnelling of insects, but they seem unconnected to the golden larvae I see. My references illustrate the larvae at the base of the rose, but my observations have always been near the top of the white tissue of the rose. Are they the feeding tunnels of this insect or of other opportunistic species? I can't tell from my dissections. I find the larvae well into September. The larvae apparently pupate and overwinter in the rose which dries and withers and in spring the adult emerges. I find willow roses only on *Salix barclayi*. The white portions of the gall have a pleasant, almost sweet taste with the texture of a not quite ripe pear.

While common every year, July and August of 2014 seem an especially abundant year for willow rose production as something near half of the mature Barclay willow have roses on them.

Family Culicidae Meigen, 1830**, mosquito**

Culiseta Felt 1904

Culiseta alaskaensis Ludlow, 1906, snow mosquito, táax'aa

Latin coo-LIH-seh-tuh, American coo-lih-SEH-tuh

Latin *culex*, midge or gnat. Of or pertaining to Alaska.

Juneau is blessed with a small number of species and small populations of mosquitoes. This is the only species I've been able to identify as it is large (~1 cm long) , slow moving and slow to bite so as to be easy to observe. I carry a bottle of lemon eucalyptus insect repellent on most of my hikes and offer it to my guests as they usually always become alarmed by the large size of these bugs. I don't often apply it to myself and have never used a single 4 ounce bottle in a single season! When it does bite me, the resulting welt is small (< 5mm) and short-lived (<3 days) and not particularly itchy. I encounter this mosquito just about every time I walk the Moraine Ecology Trail, yet not every time on the East Glacier Trail, in July and August.

Unidentified Flies

Unidentified Fly on *Dryopteris expansa*, August 15, 2012

Unidentified fly on *Geum calthifolium* July 22, 2005


Unidentified flies on leave of *Pinguicula vulgaris* June 19, 2010


Unidentified flies on *Oplopanax horridus* June 6, 2010; and *Solidago canadensis* August 1, 2010


Unidentified—but perhaps *Rhabdophaga rosaria*—on *Salix barclayi* May 19, 2011


Unidentified swarming flies on Steep Creek, September 11, 2011

Order Hemiptera Linnæus, 1758*, true bugs*

Family Aphididae, aphids

Cinara Curtis, 1835, giant conifer aphids

Latin kin-ARE-uh, American sin-are-uh Latin *cinara*, artichoke or similar plant; reference to this species unkown.

Cinara spp. unidentified, aphid on spruce (?)


I spotted this fat and juicy aphid on a young Sitka spruce (*Picea sitchensis*) in the open outwash plain on the bus approach to the Moraine Ecology Trail. The bug is clearly an aphid, but when I go to "Insects and Diseases of Alaskan Forests" find that it is not the Spruce aphid (*Elatobium abientinum*) that can cause severe defoliation like I've seen on Point Louisa.

Off to other sources where I'm in unfamiliar territory. I find an amazing resource on aphids from a biostatistics group in London, InfluentialPoints.com. They indicate there are about 500 genera of aphids worldwide! In the genus *Cinara* they include three species that attack spruce, but none match my aphid. I'm pretty sure I've got the aphid in the right genus here as the general morphology matches well, particularly with the legs, especially the terminal segment that looks a bit like a "foot". The big difference is in the waxy coating of the thorax and especially abdomen. My aphid has a very light, but extensive, coating of what I'd describe more as powder than a wax or meal. The *wax-bordered spruce aphid* looks just like its name indicates, and while the right and legs, the wax is nothing like mine. The *mealy spruce aphid* has globules of wax along its side and stripes along the back. The *green-striped spruce aphid* is a dead ringer for mine except that it has absolutely now wax or power and has green stripes!

I do find a species specific to Alaska, *Cinara alaskana*, but the only images available are of microscopic views of juveniles with no way to compare my aphid. There are also *C. sitchensis, C. piceae*, and *C. piceicola* that are specific to spruce, but the descriptions I find are sketchy and references are to European and Asian populations, not Alaska. I'll have to be content with generic ID only.

Order Hymenoptera Linnæus, 1758*, sawflies, wasps, bees and ants*

Family Ichneumonidae, ichneumon wasps

ick-nee-ooo-mahn Greek ἰχνεύμων *ichneumon*, hunt for, track; used by Aristotle for a wasp that hunts spiders.

With at least 3,000 species in North America, identification of these wasps is often just to family where they are generically called "ichneumon wasps". They are fairly easily identified by their small (<1 cm) size, thin body, and especially the females as their ovipostor can exceed the length of their body. This vast majority of group cannot sting, lacking venom, and simply uses the ovipostor for laying eggs. If one looks very closely, they have antennae with 16 or more segments, more than their relatives.

Scambus Hartig 1838

SCAM-bus Greek σκαμβος *skambos*, bow-legged.

Scambus vesicarius (Ratzeburg, 1844), sawfly

veh-sih-care-ee-us Derived from the Classical Latin *vesica*, bladder, balloon.

While wandering about the Steep Creek platforms on a sunny September 10, 2011 looking for galls on willows, I'm examining the petiole swellings on feltleaf willow. I happen to spot an insect that looks to me like an ichneumon wasp on a vertical stem. It was just about perfect on position for me to prop my elbows on the railing and get some shots with my 100 mm macro lens. I took a dozen or so to yield a couple of useful images.

Mostly black, the red on the legs of this wasp is obvious, as well as the white base of her abdomen, each section with a central black dot. The sections of the black abdomen are marked by pale blue edges. The three section legs arch well out from the body and must be the reason for the Greek genus name. The antennae seem composed of a series of tiny spheres that move ahead of the wasp as it walks. How can they determine if a larvae is in the stem? Is it the sound or vibration of the moving maggot? Can they sense the smell of the larvae and its frass?

The female wasp walked up and down on the stem and periodically inserts her ovipostor into the green portions of the stem and sometimes the galled petioles. She arches her abdomen high and points the ovipostor forward and pushes it in by pushing down with her abdomen. What is it and what's going on with the eggs? It takes just one day of posting these pictures on bugguide.net to get an answer:

> *Scambus vesicarius* (Ratzeburg) is a Holartic species that oviposits in the galls of *Pontania*, *Nematus*, and *Euura* on *Salix*. According to Walley (in Townes & Townes (1960), the females of *Scambus vesicarius* range from 2.75 to 6.5 mm in body length. I measure the length of this wasp to be 1.4 times the diameter of the twig that it is on. If we knew the diameter of the twig, we would have a good idea of the size of the wasp. Bob Carlson

My research confirms this species is a common predator of two common willow gallers here: "Idiobiont ectoparasitoid, predominantly parasitoid of sawflies prepupae in galls of *Pontania* and *Euura*, but only a few records on *Phyllocolpa*".

Kasparyan, D. R. & J.-P. Kopelk. 2009. *Taxonomic Review and Key to European Ichneumon Flies (Hymenoptera, Ichneumonidae), Parasitoids of Gall-forming Sawflies of the Genera* Pontania *Costa,* Phyllocolpa *Benson, and* Euura *Newman (Hymenoptera, Tenthredinidae) on Willows: Part I.* Entomological Review 89 (8): 933-957

So this wasp might be oviposting eggs into either species here, but since she is doing this mostly in the stem, it is probably aiming at the larvae of the willow stem gall sawfly, *Euura atra*.

This serendipitous find was the hit of my day and I had to show my pictures to any of our guides who were back at the office when I returned, even though it took several days of research to identify the insect.

On June 17, 2012 at the cliff face of the East Glacier Trail I find exploring the buds of *Parnassia kotzebuei*, Kotzebue's grass-of-Parnassus, is a critter that I don't recognize other than some sort of fly. I take some photos of it with my 100 mm macro but am obviously paying more attention to getting the photo than observing the insect. My very shallow depth of field, relative low light and lack of tripod make the photography challenging.

It's only when I start writing these notes that I carefully observe my photo and recognize it as the same sawfly I spotted last September at the Steep Creek platform at the middle parking lot. There it was using its long ovipositor to lay eggs in the willow. Today the sawfly is simply exploring the unopened flower in what I interpret as an attempt at getting some nectar for food. This doesn't seem to be the best object for laying eggs as this flower is pretty ephemeral and may not be around long enough for the eggs to hatch and larvae develop and pupate into adults.

Family Tenthredinidae, sawflies

Euura Newman 1837

you-ur-uh *Euura* etymology undetermined.

Euura atra (Jurine 1807), willow stem gall sawfly

AYE-trah Latin *ater*, black, dark, gloomy.

The fall of 2011 is willow gall time and I'm finding thousands of galls all over the willows of the Mendenhall Glacier Recreation Area. With just a little bit of observation, one can find swellings on many willow twigs that are less than pencil thick in diameter. Nearly all are on Alaska or Scouler's willow for this stem gall, and virtually every stem has two or more swellings. The sawfly larvae in the twigs that I've split open and examined have eaten out a hollow area of several inches making the stem hollow like a straw. There are areas of frass, but most of the channel is open and with white wood tissue that seems unaffected by the action of the larvae.

Pontania Costa, 1859, sawflies

pawn-TAN-ee-uh New Latin, probably referring to Giovanni Pontano (1429-1503), 15th century humanist.

Pontania proxima (Lepeletier 1823), willow redgall sawfly, willow leaf bean gall

prox-ih-muh Latin *proximus*, nearest; referring to where an appendage joins the body.

Leaf galls on Barclay's willow start to become obvious in July as yellowish swellings on the upper side of the leaves. As the galls enlarge, they become bright red on the upper side and yellow on the underside and really do look like a bean embedded in the willow leaf. Apparently the female sawfly only deposits one egg per leaf, so when there are multiple galls they represent multiple females who have laid eggs. Some willows seem to be targeted by the sawfly as they can have most of the leaves with galls yet nearby willows have few, if any, galls. I like to think of this as the same phenomenon of fishermen: when one finds a spot, dozens of others join in the same spot hoping for fish!

I've gotten into the habit of cutting open the galls "to see if anyone is home" and nearly always find the larvae as a maggot inside the gall. When young (in late July and August), the larvae are about 5-7 mm long, creamy white with a black head. Six legs in pairs are just behind the head. As the larvae matures it turns dark gray and grows to nearly 10 mm long and 1 mm in diameter. It eats the inside of the gall and fills a good bit of the space with its waste, called frass. At this time the larvae turns a maroon-red color, which I assume is a staining from the frass. When the larvae is mature, it eats a hole just large enough to crawl through and finds its way to the organic layer on the ground, probably by falling. Here it will pupate for the winter and emerge as an adult in the spring. I have only found the leaf bean galls on *Salix barclayi* and both are abundant on the glacial outwash plain of the Mendenhall Glacier. As the season enters September, the larvae enlarge, become grayer. Many holes become apparent in the galls where the larvae have eaten through to fall to the ground and pupate to overwinter.

Pontania species undetermined, willow petiole gall, willow bud gall

Many casual observers of the willows in the glacial outwash plain notice the swollen petioles of the feltleaf and Sitka willows in the fall. They start out as yellow or greenish-yellow swellings right above the point of attachment to the stem but can turn a plum red color with age. It seems to me that in direct light I find the red ones more in the open than the yellow ones. On September 11, 2011 I was walking on the bus parking lot entrance to the Moraine Ecology Trail looking for willow stem galls. I found a particularly fat specimen and pulled it off the tree. I found that when I could see the side of the leaf sheath closest to the branch, that the bud within was also swollen! So this is both a petiole and a bud gall. When I cut open the swollen bud, I found a maggot that looks—to my untrained eye—very similar to the *Pontania proxima* maggot of the willow leaf bean gall. I'm calling this a *Pontania* for that reason and my observation of the ichneumon wasp *Scambus vesicarius* ovipositing on willow stems seems consistent with them parasitizing this creature.

Family Vespidae, yellow jackets

Dolichovespula Rohwer 1916

doe-lick-oh-ves-pew-luh Greek δόλικός *dolikhos*, long + Classical Latin *vespa*, wasp

Dolichovespula arenaria (Fabricius, 1775), aerial yellowjacket, paper wasp (very generic)

air-eh-nair-ee-uh Latin *arenaria*, sand-pit; reason for this descriptive name undetermined.

With my nearly four decades experience in the southeastern United States, I'm very familiar—occasionally painfully—familiar with yellowjackets as they are abundant. In southeast Alaska I wasn't expecting to find any. Coming upon this paper wasp nest on the Perseverance Trail was a surprise, and seeing yellowjackets crawling about its outside compounded it. The yellowjackets I knew were subterranean, so I thought these might be parasitizing the nest of some other wasp. Not so! It turns out the most common yellowjacket in the Juneau area is this aerial species and this is indeed its nest hanging from a stout branch of Sitka alder (*Alnus viridis*). They look—from this safe distance!—very much like my familiar species (*Vespula maculifrons*, Eastern yellowjacket)with their striking black and yellow alternating pattern.

Unidentified Bees

Unidentified bee on *Sanguisorba canadensis* June 3 13, 2010

Unidentified bee on *Petasites frigidus* May 25, 2010

Order Lepidoptera Linnæus, 1758 ***Moths and Butterflies***

Family Nymphalidae Rafinesque, 1815 **butterflies**

Butterflies are not common in the Juneau area (at least by what I see), and when I spot one I usually stop and enjoy the view. While I'm nearly obsessive about the names of most things, it seems I'm pretty content just to look at a butterfly and say "isn't it pretty!".

Vanessa Fabricius, 1807, brush-footed butterflies

vah-NESS-uh Probably taken from the name of a friend of Fabricius

Vanessa cardui (Linnæus, 1758), painted lady

CAR-dew-eye From *Carduus*, the genus of thistles as Linnæus knew they are a major host for the caterpillar stage

While folks are watching salmon in Steep Creek on a sunny, warm August 26, 2015, I spot this rather pretty thing sitting on the leaf of a felt leaf willow (*Salix alaxensis*) and snapped a few shots with my "whale lens".

Three things about this butterfly catch my eye: first, the mottled colors of brown, than and white, but with that vibrant stripe of orange on the larger forewing; second, the rather moth-like thick and woolly body; and, third, the magnificent antennae that look like a string of tiny beads topped off with a matchstick. With these, I'm able to quickly identify the butterfly.

My ignorance is legion with these lovely fliers, but I'm struck by the specific epithet since the only thistles found in our area are very rare introduced weeds. What composite do the larvae eat here? Or, do only the adults appear here with the larval stage eating thistle elsewhere?

Familty Erebidae Leach [1815] **tussock moths and many others**

Lophocampa Harris, 1841, tussock moths

low-foe-cam-pah Greek λόφος *lophos* crest + Latin *Campānia,* a region of Italy in which bronze was produced for the color of the moth

Lophocampa maculata Harris, 1841, spotted tussock moth

On a glorious sunny August 15, 2015, my wife and I head out to "the end of the road", but keep walking on the gated off gravel road that actually ends at the shoreline of Berner's Bay. As the green alder (*Alnus viridis* ssp. *sinuata*) close in on us, we come upon dozens, if not hundreds of these very obvious caterpillars. I immediately call them "woolly bears" as they strongly resemble what I've seen uncountable times before. They however a a different character, the long white tufts coming out of the black ends of the caterpillar. This makes me wonder if they are something different, and, submitting the left photo to BugGuide, I nearly get a reply with the proper identification. This is the first I've seen of this caterpillar in Juneau and it makes me wonder why I've not seen it before. Are they subject to population bursts that makes them abundant this year and far less so in my previous years? Or have I simply just missed them.

Most of the references I check list poplar as a common host (among "deciduous trees" in general) but today they are strictly in the alders. The white hairs give the moth its common name, tussock, for the longer tufts that arise from the black.

I've never seen the adult moth.

Family Sphingidae Latreille, 1802 **hawk moths, sphinx moths, hornworms**

Hyles Hübner, 1819

high-lees Etymology undetermined

Hyles gallii (Rottemburg, 1775), bedstraw hawk-moth or Gallium sphinx

Etymology undetermined, but possibly from *galli*, for cock.

The eight year old boys on a Shepherd of the Valley hike on the Airport Dike Trail (Emergency Vehicle Access Route) on a very sunny and warm September 15, 2013 found this amazing caterpillar. They toyed with it in the dirt, but I picked it up to examine it more closely in hand. Most obvious is the single red horn protruding from the antepenultimate body segment. I asked them which end the head was on and they all got it right, but simply from the direction the caterpillar was moving on my hand. BugGuide [http://bugguide.net/node/view/31976] makes the note that it feeds of various members of the Onagraceae, notably the common fireweed (*Chamerion latifolium*) in addition to bedstraws (*Gallium*).

Each segment of the caterpillar has two distinct sections. Anterior is a smooth carapace with prominent circular tan spots on the flanks. They are surrounded by a dark brown to black region that lightens as it moves across the dorsal side. Posterior the same carapace has five narrow, rounded ridges that continue across the entire "U" shape. The tan "tail" looks remarkably like the head and has three darker short protuberances. The head and the immediate next segment are a similar tan.

The adult, which I've never seen, is a large (5.5 to 8 centimeters) multi-toned tan moth.

Phylum Mollusca Linnæus, 1758 *molluscs*

Class Bivalvia Linnæus, 1758

Order Mytiloida Rafinesque 1815

Family Mytilidae Rafinesque 1815

Mytilus Linnæus 1758

MY-til-us Ancient Greek Μύτιλος *Mytilus*, Illyrian king of the Dardanian Kingdom c. 270 – 231 BC; presumably because these are the "food of kings".

Mytilus trossulus Gould, 1850, Pacific blue mussel, northern bay mussel, edible mussel, foolish mussel, yaak

TROSS-you-lus Latin from *Trossulum*, a town of Etruria, connection undetermined.

Taxonomy: Many guides identify the only mussel of the Pacific coast as *Mytilus edulis* Linnæus 1758. This apparently is the result of considering all the world's blue mussel as this single species. There are now five species of *Mytilus* on the Pacific coast, three in Alaska. *M. edulis* is found along the Pacific, but as an alien, probably from release from commercial aquaculture.

Notes: Wherever one walks on the beach here there will be at least empty shells of the blue mussel. If there are rocks around at just below the high tide line, there will be live mussels. They are ubiquitous. Shells can be found in the woods hundred of yards from the sea in areas well used by people as well as nearly pristine areas. Both people and other animals take these mollusks into the woods to eat. Scoters eat huge amounts of these mollusks: "blue mussels constitute nearly 30 percent of their marine diet—the stomach of one scoter was crammed with 1,100 small blue mussels. Immense rafts congregate in regions supporting extensive mussel beds. Hundreds of thousands winter in the coastal waters off British Columbia alone, and 200,000 scoters could consume about 43 tons of mussel meat daily." [http://www.virtualbirder.com/vbirder/ibis/SUSC/SUSC401.html]. Paralytic shellfish poisoning (PSP) is common here so few people harvest them for food.

> Saxitoxin (STX) is a neurotoxin naturally produced by certain species of marine dinoflagellates (*Alexandrium* sp., *Gymnodinium* sp., *Pyrodinium* sp.) and cyanobacteria (*Anabaena* sp., some *Aphanizomenon* spp., *Cylindrospermopsis* sp., *Lyngbya* sp., *Planktothrix* sp.). Ingestion of saxitoxin (usually through shellfish contaminated by toxic algal blooms) is responsible for the human illness known as paralytic shellfish poisoning (PSP). In fact, the term saxitoxin originates from the species name of the butter clam (*Saxidomus giganteus*) in which it was first recognized. Saxitoxin, one of the most potent natural toxins known, acts on the voltage-gated sodium channels of nerve cells, preventing normal cellular function and leading to paralysis. [http://en.wikipedia.org/wiki/Saxitoxin].

Order Veneroida Veneroida H. & A. Adams 1856

Family Veneridae Rafinesque, 1815

Saxidomus Conrad 1837, butter clam

Latin sax-IH-doe-mus, American sax-ih-do-mus Latin ***saxum***, stone.

Saxidomus gigantea Deshayes, 1839, butter clam, Washington clam, money shell, xéet'

jie-gan-tee-uh Greek γίγας gigas, giant

This is the clam in the photo with the blue mussels, but I don't find it very often. Most clams I'm familiar with like mud, and along our shorelines here that is a rare thing. Is this population a bit more adapted to the rocky shoreline? "It is the commonly harvested clam for food such as chowders in the Pacific Northwest. Aleutian Islands and SE Bering Sea, Alaska to San Francisco Bay, CA (rarely seen S of Humboldt Bay)" [http://www.wallawalla.edu/academics/departments/biology/rosario/inverts/Mollusca/Bivalvia/Veneroida/Veneridae/Saxidomus_gigantea.html]

Phylum Echinodermata Klein, 1734 ***echinoderms***

Class Asteroidea De Blainville, 1830**, sea stars, starfish**

Order Forcipulatida Perrier, 1884***, sea stars, s'áx***

Family Asteriidae Gray, 1840

Pycnopodia Stimpson, 1862

pick-no-POE-dee-uh Greek πυκνός *puknos*, compact; clasped + Greek πούς *pous*, foot, for the many tube feet.

Pycnopodia helianthoides Brandt, 1835, sunflower seastar



Latin hee-lee-AN-thoy-dees, American hee-lee-an-THOY-dees. *Helianthus*, the genus of sunflower + Greek όιδες *-oides*, resembles, looks like.

On a science adventure is with folks from the Disney *Wonder* on July 12, 2012, we pull a crab pot from 50 feet deep along the southern shore of Coghlan Island in our continuing monitoring for the European green crab. Today's pull is exceptionally exciting as this creature almost completely fills the crab pot. As soon as I see it I know what it is, but I've never seen this animal before. As I reach in the pot to pull it out I'm amazed at the texture: the thing is very soft, mushy and almost like wet velvet! I'm so used to ochre stars that are hard and stiff, this one is the exact opposite.

The common name fits when I flip the star over and expose its bright orange network of tubes! These allow the star to move along the lower intertidal zone "at the astonishing speed of one meter per minute using 15,000 tube feet" [http://www.nmfs.noaa.gov/speciesid/fish_page/fish6a.html]. "The sunflower star's skeleton has a few disconnected pieces... [allowing]...the mouth to open wide and its body to enlarge and take in big prey. A sunflower star can swallow an entire sea urchin, digest it internally and then expel the urchin's test—its external shell" [http://www.montereybayaquarium.org/animals/AnimalDetails.aspx?legacyid=497].

Evasterias Verrill, 1914

ev-ass-tare-ee-ass. *ev* Old Turkic for dwelling place + Ancient Greek ἀστήρ *astḗr*, star

Evasterias troschelii (Stimpson, 1862), mottled star, false ochre sea star, Troschell's true star, s'áx

tro-shell-ee-eye. Honorific for German zoologist Franz Hermann Troschel (1810–1882)

When I first pulled a crab pot in Auke Bay and found a "normal" sea star, I called it an "ochre star" based upon my experience with sea stars along the coasts of California and Oregon. It is then no surprise that I find that I learn "this is the most abundant large, intertidal star in the Juneau area" and that it strongly resembles the ochre sea star from further south "but this species has longer rays in proportion to its central disk and the rays narrow before they meet the central disk, and the aboral ossicles are not arranged in a clustering network". [Rosario Beach Marine Laboratory http://www.wallawalla.edu/academics/departments/biology/rosario/inverts/Echinodermata/Class%20Asteroidea/Evasterias_troschelii.html]

Class Echinoidea Leske, 1778 heart urchins

Order Echinoida Claus, 1876 *sea urchins & sand dollars*

Family Strongylocentrotidae Gregory, 1900

Strongylocentrotus Brandt 1835

stron-gee-low-cen-trus (hard 'g') Greek στρογγυλός *strongylos*, round + Greek κέντρον *kentron*, a point; center.

Strongylocentrotus purpuratus (Stimpson, 1857), purple sea urchin, nées', ý'waash

Latin pur-PUR-ah-tus, American pur-pur-ah-tus Latin *purpura*,purple

This individual is alive, but just barely, when I pick it up to examine. Many of the spines fall off even though I'm very careful. They've lost all their brilliant purple color so the only reason I name it purple sea urchin is the strong purple color of the shell areas around the spine attachment point. The more common red sea urchin (*S. franciscanus*) always has areas of clear red this creature lacks. This species apparently thrives in areas of strong wave action, something not all that common here.

Phylum Chordata Bateson 1885

Superlass Osteichthyes Huxley, 1880 bony fish

Class Actinopterygii Klein,1885 ray-finned fish

Order Pleuronectiformes Bleeker, 1859 *flatfishes, flounders*

Family Pleuronectidae G. Cuvier, 1816

Hippoglossus Cuvier 1817

hip-po-gloss-us Greek ιπποπό *hippo*, horse + γλώσσα *glossa*, tongue; presumably from the shape of the tongue.

Hippoglossus stenolepis Schmidt, 1904, Pacific halibut, cháatl

Latin steh-NAW-leh-pis, American sten-all-eh-pis Ancient Greek στενοσις *stenosis*, narrowing + Greek λέπις *lepis*, scale or flake

Note that this report only includes my experience from 2009 and will be substantially edited

On July Annette, Bess Patrick and I went with Erich White on his boat over to St. James Bay on the Chilkat Peninsula fishing for halibut. Dropping lines with 5 pound lead balls over 500 feet takes a while, and then one just jigs with the line, or today, lets the rocking action of the boat do it for you. We didn't get a thing, not even a nibble. But many times in July and August when coming in from a whale watch, people were at the cleaning station in Statter Harbor filleting their halibut, some reached the hundred pound mark or more, but most were 3 to 4 feet long and much lighter. I ate halibut many times in many ways, with my favorite being the halibut baked with cheese at Gastineau Guiding's farewell party at Bob and Dawn's place. The halibut chips at the Sandbar come in a pretty close second (I just wish they'd give the place a thorough cleaning) as well as Bess' halibut lasagne.

Order Scorpaeniformes Greenwood et al., 1966 *scorpionfishes and flatheads*

Family Cottidae Bonaparte, 1832 **sculpins**

Myoxocephalus Tilesius, 1811

mix-oh-SEH-fall-us Greek μυχα *myxa*, mucus, to Classical Latin *mucus*, mucus + κεφάλι *kephalē*, head; hence the very appropriate "slimy head". Fishbase gives this unlikely etymology "Greek, *myos* = muscle, and also, mouse" [http://www.fishbase.org/summary/4121].

Myoxocephalus polyacanthocephalus (Pallas, 1814), great sculpin, spiny sculpin, double-ugly

Greek πολλοί *polloi*, many + Greek ἄκανθα *akantha*, a thorn + κεφάλι *kephalē*, head; hence "many thorns on the head".

Commonly captured in Gastineau Guiding's European green crab monitoring crab pots, this is one amazing fish. Ranging from 20 to 45 cm in length, the body is a dark olive green but most exhibit some striping of yellow and cream to white on the pectoral fins. The head dominates the body and the mouth covers the entire width of the head and can open to mammoth proportions. The eyes are large in proportion to the body and located near the crest of the head but stick out in a bulbous fashion reminiscent of many recent car headlight lenses! What is most remarkable out this fish are the several spines along the trailing edge of the very bony gill plates (preopercular bone) that give the fish is specific epithet. With a fabric mesh net, it is difficult to extricate the fish from the pot as the spines grab and wrap the mesh around them. In a metal mesh pot, they come out very easily. When I reach in to remove them, I place my thumb and middle finger into the gills from the rear so as to avoid the spines (yet they get me at least a third of the time!). As I chase them around the pot with my hand, I'm always amazed at their "drumming", the creation of a vibration including a sound that I can fell and just barely hear. Some sculpin are known to "grunt", but this sound is much more like what I feel and see with the bluestripe grunts I catch in the Gulf of Mexico off Florida's west coast.

Mostly head, I'm often asked if they are edible, to which Captain Annette Smith says, "yes". I've not eaten one as there is just not much there to eat, even on the larger fish.

This fish really lives up to its scientific name as the head is extremely slimy and the gill plates full of spines!

Order Salmoniformes Bleeker, 1859 *salmon, trout, char, freshwater whitefish, grayling*

The order has but one family.

Family Salmonidae G. Cuvier, 1816

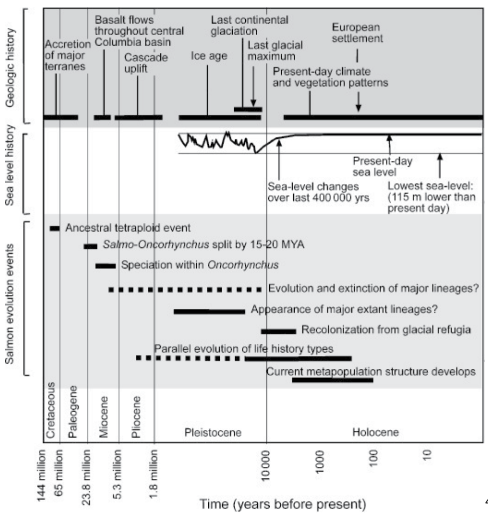
Taxonomy: The family currently contains 11 genera, one extinct. This encompasses the whitefish, graylings, lenoks, huchen, charr, trout and salmon. The common names of this family create confusion as some trout are salmon and some charr are trout!

Linnæus named eight species of salmon in his *Systema Naturæ* in 1758, all in the genus *Salmo* that he also created for them and trout. German naturalist Johann Julius Walbaum (1724 - 1799) revised the genus in 1792 in *Jacobi Theodori Kleinii ichthyologia enodata sive index rerum ad historiam piscium naturalem synomymis recentissimorum systematicorum explicatus* (Index of fish or of things, to the history of James Theodore Klein, made clear to the natural modern systematic explanation) naming 16 species, including all of our Alaskan salmon. He retained them in *Salmo*.

American naturalist George Suckley (1830–1869) in 1853 was appointed naturalist and surgeon for the Pacific Railroad Survey of the 47th and 49th parallels between St. Paul, Minnesota and Puget Sound, Washington accompanying General Isaac I. Stevens. He remained to explore the Washington and Oregon Territories. C.B.R. Kennerly, another railroad surgeon, collected salmon during the Northwest Boundary Survey of 1857-1861. With Kennerly's collections and his own notes, Suckley revised the Pacific Northwest salmon creating a new genus for them, *Oncorhynchus*. Pacific trout, including steelhead, he left in *Salmo*. [1]

After a comprehensive morphologic and genetic study of Pacific trout, [2] all Pacific salmon and trout were combined into the single genus *Oncorhynchus* with 12 to 18 species in 1989. [3] Atlantic and European fish remain in the genus *Salmo* with 45 species. *Salvelinus* includes charr, several of which are called trout, and has 56 species with many in North America. Many members of the salmon family can be highly variable which gave rise to a large number of now obsolete or invalid names and synonymy is difficult.

The evolutionary history of Pacific salmon and trout have been studied for decades but there is little agreement about the particulars other than it separation from *Salmo* in the early Miocene with speciation beginning shortly afterwards.



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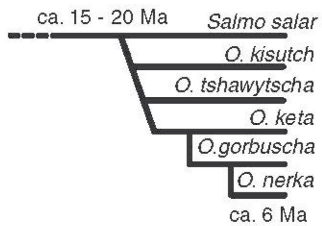


Figure 1. Phylogeny of Pacific salmon proposed by Stearley (1992) showing timing of geologic constraints. [5]

[1] Suckley, G. 1861. *Manuscript of a report by Suckley on the Salmonidae collected on the Northwest Boundary Survey of 1857*. Smithsonian Institution Archives, Washington D.C.
[2] Smith, G.R., R.F. Stearley. 1989. *The classification and scientific names of rainbow and cutthroat trouts*. Fisheries (American Fisheries Society) 14 (1): 4–10. doi:10.1577/1548-8446(1989)014<0004:tcasno>2.0.co;2.
[3] Behnke, R.J. & J.R. Tomelleri. 2002. *Genus* Oncorhynchus *trout and salmon of North America*. The Free Press. 10–21. ISBN 0-7432-2220-2.
[4] Waples,R.S, G.R. & T. Beechie. 2008. *Evolutionary history of Pacific salmon in dynamic environments*. Evolutionary Applications 1(2),189–206.
[5] Montgomery, D.R. 2000. *Coevolution of the Pacific salmon and Pacific Rim topography*. Geology 28(12), 1107–1110.

Oncorhynchus Suckley 1861, Pacific salmon, Pacific trout

on-co-RING-cus Greek όνκός *onkos*, hook + ρυνχός *rynchos* nose or snout

Oncorhynchus clarkii clarkii (J. Richardson, 1836), cutthroat trout, sea run cutthroat, x'éitaa

klar-kee-eye Honorific for William Clark (1770–1838), coleader of the Lewis and Clark Expedition, 1803 to 1806 across the newly acquired Louisiana Purchase from St. Louis, Missouri to Fort Clatsop, Oregon.

"Cuthroat" refers to a common red coloration at the base of the lower jaw.

Taxonomy: Cutthroat trout are native to western North America and have evolved from ancestral stock into 10 to 14 subspecies based upon geographic isolation, each being native to a particular drainage basin that is directly related to the tectonic uplift of the western edge of the North American continent since the Miocene. Being on the saltwater edge, our are the typical anadromous sea run cutthroat.

Notes: Frequently seen in Steep Creek along with the sockeye salmon, it takes several observations to be able to separate this from Dolly Varden, especially when they're only 12 to 14 inches long. The cutthroat has more spots and they're mostly near the rear of the fish and are larger right at the narrow section of the body just before the tail. They usually have some dark vertical oval patches along the lateral line. The dorsal fin is a bit rounder. They are by far the most skittish fish in Steep Creek and lurk in the cover of the bank only darting out when they think one of the salmon might spawn. They seemed particularly abundant in 2013 at the tail end of the sockeye salmon run in late August and early September.

Oncorhynchus kisutch (Walbaum, 1792), coho salmon, silver salmon, l'ook




KIH-such Russian Кижуч *Kizhutch* , Russian name for the fish.

Out in the open salt water of the inland passage coho begin to arrive in August and by mid-month can be caught by trolling at about 35 feet just about anywhere as the 15 pound fish in the photo from August 25, 2013 illustrates. Coho are a fall run in the Juneau area and often show up off the docks at Statter Harbor in early September like the photo of the large school taken on September 1, 2011. They work their way up the Mendenhall River with a significant run up Montana Creek. I've fly fished there, but have never landed a fish. A small number, some 250 to 350, continue up the river and through Mendenhall Lake to Steep Creek when the sockeye run is complete. They gather in the beaver ponds before heading upstream and in late September and early October can often be seen jumping out of the water. Getting a photo of this is extremely difficult, but I managed this shot on October 7, 2010. When they show up at the middle parking lot salmon viewing platform they are well on their way to the completion their semelparous (death after reproduction) life cycle and die. I've fished the run up Peterson Creek at the Amalga salt chuck but never landed a fish there either.

Oncorhynchus tshawytscha (Walbaum in Artedi, 1792), chinook salmon, king salmon, t'á

chah-WIH-chuh Russian Чавыча *Tshawytscha,* Russian name for the fish.

When the DIPAC run came in, people were catching these right off the bank on the Gastineau Channel just a few yards north of the hatchery. The May King Salmon Roundup produced a small winner at only 38 pounds. I never even fished for one with my stamp!

Oncorhynchus keta (Walbaum in Artedi, 1792), chum salmon, dog salmon, keta, téel'

KEY-tah Eastern Siberian Evenki name for the fish, Кета *keta*. The type specimen is from the Kamchatka River in Siberia.

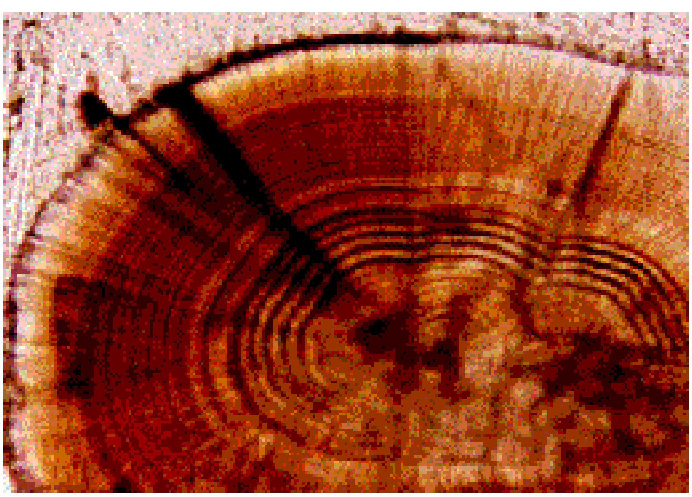
"Chum" derives from the Chinook (a pidgin trade language of the Pacific Northwest) *tzum*, spotted or marked.

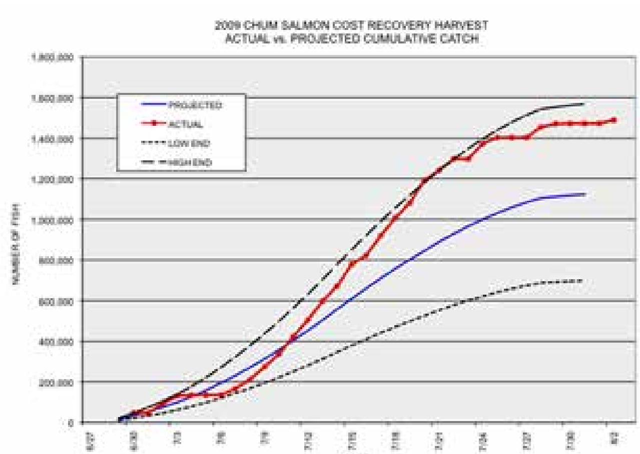
Note that this report only includes my experience from 2009 and will be substantially edited

Chum spend 3 to 5 years in the ocean before heading to their place of birth where they spawn and die. Once they hit fresh water, the blue-green silver turns a tiger stripe of red-purple and green, making them, in my view, the ugliest of all the salmon. The "dog teeth" of the males become grotesque and their heads could be used as a model for a gargoyle. In August the banks of the Gastineau Channel are littered with the carcasses and skeletal remains of the chum salmon.

During their run, every stream entering the channel is lined with Bald Eagles, Raven and our entire assortment of gull species. Salmon and Sheep Creek are sure spots for large numbers of everything. Since Salmon Creek is the major source of water for Juneau, the number of salmon are limited by a weir at the Glacier Highway bridge. This leads to an incredible gathering of fish just the other side as they attempt to enter the river. They get beat up pretty badly and eaten.

Their numbers are nothing short of incredible. Meagan and I stopped at Douglas Island Pink and Chum's (DIPAC) Macaulay Salmon Hatchery in July just to look at the salmon ladder but the swarming masses in the Gastineau Channel were more amazing. It was impossible to see the surface of the water! If they weren't so slippery, I bet I could walk on the water there are so many of them.





DIPAC released 108,989,466 chum from the Macaulay Salmon Hatchery this year: 35,547,045 in the Gastineau Channel and 43,970,489 in Amalga Bay [http://dipac.net/2009_hatchery_releases.htm]. These numbers are simply huge and chum salmon are everywhere. Some of the boats DIPAC contracts with set up a gillnet right across the Gastineau Channel when the chum are running! I saw from the Alpine Loop Trail one do this completely blocking the channel from Juneau Island to the spit at Snowslide Creek. It sat up shop for over an hour before pulling in the net. Their "cost recovery" contract must allow them lots of freedom to catch fish.

Bess spent a couple of Friday's snagging chum at Fish Creek on Douglas Island collecting data on stray chum for Alaska Fish and Game. With the huge number released, and the huge numbers that show up at the hatchery, even with fishing many chum wander. Where will the wander, and will they spawn other places? On each of two days snagging, Bess and Scott collected over a hundred chum. The cut the heads off to take to the otolith lab where they'll be able to identify the origin of the fish as DIPAC uses thermal marking on all their fish. Will the chum displace the native run salmon, or simply coexist with them?

Thermal marking is done by changing the temperature of the water to the otolith with develop distinctive rings.

> This is an otolith from a Brood Year 1992 Chum salmon from Macaulay Salmon Hatchery. It is recognized by the pattern of five dark bands close to the center (they resemble a racetrack). This fish is further recognized by an accessory mark of three thin close spaced bands near the edge of the otolith. [http://dipac.net/otolith_photos.html]

The 2009 chum harvest year was exceptional for DIPAC, 400,000 over forecast for a total of 1,500,000 salmon [http://dipac.net/2009_harvest_season_graphs.htm]! While the actual number harvested was far higher than forecast, the pounds of salmon were right on forecast at 9,500,000 pounds. This obviously means that this year's fish are smaller than projected. What does this mean? I'm not sure at all. DIPAC's mission statement:

> The goal of Douglas Island Pink and Chum, Inc. is to sustain and enhance valuable salmon resources of the State of Alaska for the economic, social, and cultural benefit of all citizens, and to promote public understanding of Alaska's salmon resources and salmon fisheries through research, education, and tourism.

Is what they do really "sustaining" the resource? Tough question to ask.

Oncorhynchus gorbuscha (Walbaum, 1792), pink salmon, humpback, humpbacked salmon, humpie, cháas'

gore-boos-kah Russian горбуша *gorbuša,* Russian name of the fish.

Note that this report only includes my experience from 2009 and will be substantially edited.

Abundant in Echo Cove in July (photo from July 26, 2009) and easily caught. Annette and Meagan took a fly fishing class with Brad Elfers at Echo Cove and Bess and Julie fished there several times, so I had to do the same. I caught several and released them, but this male was the biggest and I decided he would be dinner. So about an hour after catching him, he was on the grill at home!

Pink salmon don't smolt and head to the ocean their first spring and spend the next year and a half in the ocean before heading back to their birth waters in July of the second year. With this two-year cycle, two populations of pinks have developed, the odd and even years, and separated by time in the spawning grounds, the two do not interbreed. The eggs hatch from December through January but don't emerge from the gravel until March when they immediately head to the saline waters of the estuaries and fjords where they are at great risk of being eaten. Since each female lays between 1,000 and 2,000 eggs in her redd (from a Scandinavian word for nest) and this being the most common salmon of the North Pacific, the fish relies strictly on great numbers for survival of the species. Bess remains concerned, as the number of pinks caught by commercial fishermen in her section of Stephen's Passage is not as high as it should be, yet NOAA folks claim there is no over fishing of any stock in Alaska.

Ocorhynchus nerka (Walbaum in Artedi, 1792), sockeye salmon, gaat



Russain Нерка *Nerka*, Russian name for the fish.

“Sockeye” is an anglicization of the Halkomelem sθə́qəy̓ *suk-kegh*, red fish.

This is the salmon of the summer. When the run started up Steep Creek, I saw them every day. The run seemed to start late. With our very dry summer, the water level in the creeks was very low. At times, it was only about 6 inches deep in front of the first bridge on Steep Creek and it made just a shallow riffle over the gravel. Were the fish waiting for higher water? That’s my guess. When they arrived they seemed in smaller number than last year, but there were plenty of them and the bear switched their diets almost immediately as they arrived for feeding.

My observations indicate that the females arrive first and check out the available spots for their redd, and they have to compete with other females for their spot which leads to some serious salmon fights! Once staked out and defended, the males come by, showing off how good they look. It seems to me that it’s all the females choosing here. She picks the one she likes, they do a bit of a dance in a circle around her redd, then she gives some sort of signal and they release their eggs and milt. She quickly swirls the milt around the eggs with her tail, then buries them in the sand. A healthy female can do this several times unless caught and eaten by a bear, and they are very picky, only eating the brains and the bellies (middle photo)!

Salvelinus Richardson 1836, charr

sal-veh-LIE-nus An old European name for char [Rivers, I.L. 1994. *Fishes and fisheries of Nevada.* University of Nevada Press, Reno.].

Salvelinus malma (Walbaum in Artedi, 1792), Dolly Varden, x̲’wáat’

MAL-muh Russain (Kamchatka) name for the fish.

Dolly Varden is a character in Dickens' *Barnaby Rudge* who dressed fancily. There is a story of its naming from Upper Soda Springs, California by a girl, who just having gotten a fancy dress, tells the fisherman looking for "calico trout" to call them "Dolly Varden" [1]. The name was fully established by 1874 [2].

[1] Moyle, P.B. 2002. *Inland Fishes of California*. University of California Press, Berkeley.

[2] Stone, L. 1874. *Report of Operations During 1872 at the United States Salmon-Hatching Establishment on the M'Cloud River, and on the California Salmonidae generally; with a list of Specimens Collected*. Government Printing Office, 1874 at 203-207.

Dolly's are fun to watch. They are small, only about a third the size of the sockeye, yet they are brave and determined to get as many sockeye eggs as they can. Anytime a female sockeye even looks like it's going to spawn, the Dolly's will rush in for the take, then the sockeye will use its hook jaw to thrust at the Dolly and chase it away.

Southeastern Alaska Northern District Saltwater Run Timing																												
	April				May				June				July				August				September				October			
King	available	available	available	available	available	available	peak	peak	peak	peak	peak	peak	peak	peak	available	available	available	available	available	available	available	available	available	available	available	available	available	available
Silver									available	available	available	available	available	available	available	available	peak	peak	peak	peak	peak	peak	available	available				
Sockeye									available	available	available	available	available	available	available	available	available	available	available	available								
Chum									available	available	available	available	peak	peak	peak	peak	available	available	available	available	available	available	available	available				
Pink									available	available	available	available	peak	peak	peak	peak	available	available	available	available								
Cutthroat					available	available	available	available	peak	peak	peak	peak	available	available	available	available	available	available	available	available	available	available	available	available				
Dolly Varden	available	available	available	available	available	available	available	available	peak	peak	peak	peak	available	available	available	available	available	available	available	available								
Halibut	available	available	available	available	available	available	available	available	peak	peak	peak	peak	peak	peak	peak	peak	peak	peak	peak	peak	available	available	available	available	available	available	available	available
	available								peak																			

On Salmon, an essay for my internet blog for August 9, 2009

Rhythms and patterns are as much a part of nature as in a finely composed symphony, and often as difficult to discern as in a work of Carl Ives. The five species of salmon in southeast Alaska have their runs timed as well as a ballet. The kings (Chinook) come first, then the chum (dog), then sockeye, then pink (humpies) and finally the silver (Coho). With this dance, they do not compete with each other for spawning grounds and their fry can develop without worry of predation by the other species. But all is not easy for these incredible creatures.

With brains no larger than a pea or bean, it isn't very likely they have any "higher" thought processing: all is instinct. If we think we have much more, sometimes I think we kid ourselves. Just how does a salmon imprint the chemistry of its birthplace water so as to be able to discern the tiny traces of it out in the open ocean? Just what is going on their brain that tells them "it's time to go home?" Why do some stay in the open ocean for two years, others five and others seven? Why do some head home after only one year in the ocean (we call those "jack" salmon)?

Whatever the answers to these questions are, the salmon do these very things and head home to spawn in the very waters they were born in, then die.

The waters of Steep Creek flow into the Mendenhall Lake and out the Mendenhall River into the Gastineau Channel, and the channel leads through a maze of fjords out into the open Gulf of Alaska. The sockeye have come home, reversing the course they took some five years ago. This year they are late. Our extended dry period has reduced the flow of water in Steep Creek to about half its normal flow and the sockeye seem to have been waiting for the water to rise. One nice rainfall this past week did make the creek rise, and with it the sockeye came in great numbers.

Out in salt water, all five species are bright silver, and this is the prime eating condition for fishing. As soon as they hit fresh water, a huge hormonal change begins and the fish morph into a virtually new creature. The bright silver flanks of the sockeye change into a deep crimson with the section just in front of the tail so bright it seems to need electricity to be so bright. Their heads turn deep green and the males develop a huge overbite with their upper jaw, literally turning into gargoyles of the fish world. These changes occur in as little as 72 hours!

The females seem to come first, and hunt for favored spawning grounds: clear running water with a sand and gravel base. As many come at the same time, there are "girl fights" over the best spots, with the largest and most fit females getting the prime spots. The jacks, being much smaller, get the poorer locations. Once the female has her spot staked and protected, she gets to the business of choosing a male. Many come, most are rejected. What criteria she has for the perfect mate is completely unknown but to her. When she chooses her male, they have a bit of a dance around her spawning spot, and then nearly simultaneously spurt out their eggs and milt. The female quickly buries the freshly fertilized eggs, expertly using her tail to move the sand and gravel. All the while, Dolly Varden Char are lurking, waiting for the moment of expulsion to charge in and devour as many eggs as they can. As this dance has been going on as long as dolly's and salmon have been in these waters, it is a natural process that does not seem to affect the production of salmon. Within about 72 hours, the spawned out salmon die.

The stench is becoming obvious at a distance these days. Dead fish are everywhere. The ones in the water don't emit much odor, it's the fish the bear have caught that smell. With the return of the salmon, the bear have come to enjoy their "second course" of the summer meal. They've been chomping on vegetation, primarily the buds of the black cottonwood (*Populus trichocarpa*) trees, as their "salad course" and now have moved on the "main course" of salmon.

We have a sow with two cubs and several single bears in the Steep Creek spawning grounds. The sow is busy getting her first year youngsters' fat for the winter. Right now she's quite picky as to her salmon and is eating only the brains and belly as her food, leaving the rest for the kids. This means there are many carcasses of only partially consumed salmon littering the grassy banks of the creek. They stink!

The Forest Service has closed the Moraine Ecology Trail to the public and has the Steep Creek viewing area gates closed. This really isn't to keep the bears from the people, but the people from the bears. Really! People do some really stupid things around bears. Our permit with the Forest Service allows us entry into the closed area and we bring our folks back to the visitor center through the viewing area.

I remember bedtime stories my father told my brother and me as kids about "Benny the Beaver" and many included salmon, so I learned the life cycle of salmon at an early age and found it to be very sad. Today I'm no longer sad when I see the dead salmon; instead I marvel at the rhythms and patterns of nature and try to understand them. I tell my folks as we leave Steep Creek that the second half of our adventure—the humpback whales—would not happen without the dead salmon. They form a major part of the food chain for the phytoplankton that feed the krill that feed the herring that feed the humpbacks.

Class Aves Linnæus 1758, **birds**

Latin AH-vehs, American aye-vees   Latin *avēs*, nominative plural of *avis,* bird.

<u>Taxonomy</u>: This classification and nomenclature follows the American Birding Association Checklist 7.3, November 2011 with Orders added. Where two common names occur, the first is the authorized and the second a colloquial or former name of the bird that remains in use.

<u>Notes</u>: Before taking a course in Ornithology at Humboldt State, "if it had feathers and flew it's a bird" was the extent of my need to know birds. I lucked into a field lab instructor who was a U.S. Fish and Wildlife researcher on sabbatical who simply loved birds and was so enthusiastic that it wore off on me. We had to keep a field notebook—something I had begun with my first botany class—where we concentrated not only on the name of the birds we saw, but characters that we used to identify them and their behavior. Good training for now a lifetime of field noting. While some become "tickers" that are content to "tick" off the species they see on a list, some of us (while ticking) find the antics of even the most common birds worth observing and enjoying. Chickadees can provide endless enjoyment wherever they may be found. I always stop, at least for a long moment, to enjoy them. I do keep a "life list", actually two: one for continental North America north of Mexico and another for southern Africa, simply because those are the two areas I've birded.

My first couple years experience in Alaska with birds taught me something I probably knew but the opportunity never presented itself to realize this aspect of knowledge. Long experience provides knowledge one doesn't really "know" until its need presents itself. In the southeastern United States my three decades experience "taught" me when and where I would see birds almost unconsciously so that if someone told me they saw Pine Siskin in July I knew they'd had an exceptional sighting or made an identification mistake. I did the same thing myself in 1979 when I experienced my first Sandhill Crane mass migration flight and identified them as Snow Geese since this was the only thing in thing that I could compare with my experience. It was at least a couple of years before I admitted to my mistake. I've now been in Juneau enough to gain a very small amount of that knowledge that can only be gained by experience and do make mistakes.

Since these notes are based on my experience, they completely omit winter occurrences of all birds since I migrate south.

References:
Alaska Department of Fish & Game. 2008. *Alaska wildlife notebook series*. Division of Wildlife Conservation, Alaska Department of Fish & Game, Juneau.
Alsop III, F.J. 2002. *Birds of North America*. DK Publishing, New York, New York.
American Birding Association. 2011. *American Birding Association Checklist 7.3, 11/2011, 970 species* (taxonomy and names follow this source).
Armstrong, B. & R. Gordon. 2001. *Birds of Southeast Alaska, an annotated list from Yakutat Bay to South Dixon Entrance*. Alaska Natural History Association, Anchorage.
Armstrong, R. H. 2008. *Guide to the birds of Alaska, 5th ed.* Alaska Northwest Books, Anchorage
Armstrong, R.H., R.L. Carstensen, M.F. Willson & M.H. Osborn. 2009. *The Mendenhall wetlands, a globally recognized important bird area.* Nature Alaska Images, Juneau (abbreviated Mendenhall).
Dunn, J.L. & J. Alderfer. 2006. *National Geographic field guide to the birds of North America, fifth edition*. National Geographic, Washington, D.C.
Gibson, D. D., S. C. Heinl, & T. G. Tobish, Jr. 2009. *Checklist of Alaska birds*, 15th ed. University of Alaska Museum, Fairbanks.
Green Mountain Digital. 2012. *Audubon Birds*. https://itunes.apple.com/us/app/audubon-birds/id333227386?mt=8
Jobling, J.A. 2010. *Helm Dictionary of Scientific Bird Names*. Christopher Helm, an imprint of A & C Black Publishers Ltd, London.
Juneau Audubon Society, 2007. *Birds of Juneau, Alaska checklist*. Juneau Audubon Society, Juneau.
Juneau Audubon Society. 2002. *Birds of Mendenhall wetlands checklist*. Juneau Audubon Society, Juneau. Abbreviated Mendenhall.
National Geographic. 2012. *National Geographic Birds for iPhone® and iPod touch®*. http://www.nationalgeographic.com/mobile/apps/handheld-birds/
O'Clair, R.M., R.H. Armstrong & R. Carstensen. 1992. *The nature of Southeast Alaska, a guide to plants, animals and habitats*. Alaska Northwest Books, Anchorage (abbreviated Nature)(
Sibley, D.A. 2003. *The Sibley field guide to birds of western North America*. Alfred A. Knopf, NY.
_____, 2011. *The Sibley eGuide to the Birds of North America*. mydigitalearth.com
Terres, J.K. 1980. *The Audubon Society encyclopedia of North American birds*. Alfred. A. Knopf, New York, New York.
Waite, M. 2012. *iBird Pro Guide to Birds*. The Mitch Waite Group. http://ibird.com/

Order Anseriformes Wagler 1831 ***waterfowl and screamers***

Family Anatidae Vigors, 1825 **Ducks, Geese, and Swans**

Anser Brisson 1760

ANN-ser Latin *anser*, goose.

Anser albifrons (Scopoli, 1769), Greater White-fronted Goose ***Anser albifrons*** (Scopoli, 1769), Greater White-fronted Goose

AL-bih-fronz Latin *albus*, white, pale, fair + Latin *frons*, forehead, brow, face.

I occasionally see these birds in late April and May in the freshwater ponds inside the dike along the Airport Dike Trail, but more often out in the salt water ponds. They regularly stop out in the wetlands along the Mendenhall River. Occasionally I'll spot them at Eagle Beach. Their presence is usually spotty, and only a few to half a dozen birds but occasionally a flock of perhaps a couple of dozen birds. Part of this is surely caused by the heavy construction that has gone on during the summers of 2010 through 2012, dredging out the float plane pond. This goose seems much more skittish than the Vancouver Canada's and won't tolerate this much activity. I most often see them right next to the salt water in the tidal flats which makes me wonder if they prefer this habitat to the more grassy wetlands that the Canada geese frequent. By the middle of May the birds are almost impossible to find as only stragglers on their way to the nesting grounds in the tundra regions north of us. This goose is reliable only for the spring northward migration as they seem to take another route south. They use the Mendenhall Wetlands as a stopover in bad weather or a short feeding stop.

Chen Boie, 1822

Latin ken, American chen Greek χήν *khēn*, goose.

Chen caerulescens (Linnæus, 1758), Snow Goose

Latin say-ROO-leh-sens, American say-roo-LEH-sens Latin *caeruleus*, blue, cerulean, dark.

In 2009 I have on a single sighting of ten geese in full breeding plumage—gorgeous pure white with jet black wingtips—in the largest freshwater pond along the Airport Dike Trail in keeping with its status in Juneau as "occasional" in spring. This pattern seems no set as this bird is regular in small flocks in the spring. I've yet to see one in the fall yet

Branta Scopoli, 1769

BRAN-tuh Old Norse *Brandgás* burnt (-black) goose to the English word *brent-goose* Latinized to *Branta*.

Branta hutchinsii (Richardson, 1832), Cackling Goose

huch-IN-see-eye Honorific for British physician and naturalist Thomas Hutchins (1742?-1790) a surgeon for the Hudson's Bay Company at York Factory, Manitoba.

The first cackler's I've seen here were in the shallow waters off Eagle Beach at the picnic area on August 1, 2010. I don't manage to catch a sight of these small ducks on their way through every year, although they are seen here every year. On April 28, 2013 Nick Hajdukovich counted about 200—probably a record number—in the wetlands near the golf course. I went out the next day and managed to find four.

I first learned this as the smallest race of the Canada Goose observing them in the massive migration gathering at Klamath Lakes, Oregon in the late 1960's and early 1970's. Now they are recognized as being a distinct species with a much more northern nesting area while wintering in the Central Valley of California where I've seen them in the Pixley National Wildlife Refuge. The smaller size isn't really a helpful character when observing the bird without its relatives, but the short neck is a good diagnostic tool. All these birds have very short necks, giving them a quite stocky look. Their bills seem smaller in proportion to their head then the Vancouver geese.

Branta canadensis fulva Delacour, 1951, Vancouver race of the Canada Goose, t'aawák

ca-nuh-den-sis, full-vuh Of or relating to Canada. Latin *fulvus*, tawny, reddish yellow.

On April 26, 2009 I saw 51 in a “V” flying north from the beach on the Rainforest Trail for my first sighting of this resident species. They were regular in the freshwater ponds on the Airport Dike Trail through early summer when they left for breeding down on Admiralty Island. The fall return has been very light, with only one or two in the ponds and no flying “v”s. In late summer, as this photo from August 21, 2010, they are often foraging in the sandy mudflats of Eagle Beach. The often congregate in mid-Apil along Peterson Creek just upstream from the salt chuck.

Unlike the cacklers, these are a resident goose that does not migrate. Well, not far at least. Our local population has a wandering range that takes them away from Juneau during the nesting period when they reproduce on Admiralty Island. A real curiosity of these geese is that their nests are in trees! This seems a good defense against the large population of brown bear there who would certainly prey on eggs or goslings. They leave the area in May and return in August.

Cygnus Garsault, 1764, swan, gúkl’

SIG-nus Greek κύκνος *kuknos*, swan to Latin *cygnus*, swan. Cygnus, the son of Sthenelus king of Liguria, was sorely afflicted by the death of his friend Phaëthon and was metamorphosed into a swan.

Cygnus buccinator Richardson, 1832, Trumpeter Swan

Latin buck-KIN-ah-tor, American BOO (or BEW)-sin-aye-tor Latin *buccinator*, trumpeter; proclaimer.

When one spots a swan in Juneau, the only thing that can be known for sure—without a close look—is that it is a swan. Both Tundra and Trumpeter Swan can be seen here and without either a practiced eye or a handy field guide with a good look, one better just call it a swan. Sibley’s website includes some excellent head illustrations for separating the two. Even with those, it takes study and careful observation to distinguish the difference. Here are some pointers:

- All black bill (orange interior of the moth shows at times).
- Straight upper bill profile that the head crown matches.
- “V” sharp at forehead-bill meeting above the nostrils.
- Mostly straight bill line from the eye to the mouth where the curve is gentle.

My first Juneau swan was in Moose Lake in the Dredge Lakes area on July 29, 2008 where it was being harassed by a hen Common Merganser who was protecting six chicks.

This bird in the top pair of photos is a subadult, based on the dingy feathers, particularly on the neck, and the almost mottled bill with black and red where it has both the "grin line" as well as patches that merger to dirty orange over the nostrils. This makes identification even trickier. There are two features visible in both of these photographs that help with my identification. The slope of the bill (especially visible in the closer photo) is ramp-like smooth and there reasonably clear "V" shape of the forehead.

I spotted it on May 9, 2010 in Twin Lakes while headed north on Egan Drive, so I turned off at Vanderbilt Hill and drove back along Glacier Highway until I got a good spot to get out and take the bird's picture, but at 200 to 250 meters away.

The lower photos are from an adult swan in the Rotary Park pond on April 18, 2012 where it cooperated by slowly swimming and feeding in the northern end of the pond, staying close to the islands. In all my views and photographs the eyes seem very distinct, although connected, to the bill. This bird's bill seems exceptionally long, just under twice the length of the round part of the head. And it is a large swan. I spent about an hour enjoying the bird on a perfectly lovely and warm sunny afternoon.

Aix F. Boie, 1828, Wood Duck, Mandarin Duck

AYE-ks Greek αιξ *aix*, unknown diving bird mentioned by Aristotle, presumed to be a duck or small goose.

Aix sponsa (Linnæus, 1758), Wood Duck

spawn-suh Latin *sponsa*, bride; the "Summer Duck" of Catesby (1731); "Prettily applied to this lovely duck, as if the bird were arrayed for bridal" (Coues 1882).

I have only seen one Wood duck in the Juneau area and it was flying low over Steep Creek by the dike approach trail in 2009. They are unmistakable at medium to close range and I've decades of experience with the common woodland bird of the southeastern United States. The Juneau checklist considers them "accidental" and the Alaska checklist "rare" in all seasons. This is an exceptional sighting as Juneau defines accidental as "one or two historical sightings".

Anas Linnæus, 1758, dabbling ducks

Latin AH-nahs, American a (as in cat)-nas Classical Latin *anas*, duck.

Anas americana J.F. Gmelin 1789, American Wigeon, baldpate

uh-mare-ih-KAY-nuh Of or relating to the Americas.

The origin of the word "wigeon" is lost to obscurity, but its first use in English referring to a duck with a "bald pate" was in 1513.

The old name is very useful for identification as the drakes have a white forehead that continues as a strip across the top of its head making it appear to have a "bald pate" (the crown of the head), but this is usually only clearly visible when the ducks are sitting. Common in spring, absent in summer, occasional in the fall. I've most frequently seen them in the Mendenhall Wetlands off Egan Drive but never south of Salmon Creek. This is probably because of the shallow water in the wetlands that fits their dabbling habits. The congregate in large numbers at the Fish Creek Delta on Douglas in spring where their numbers can match that of the mallards (in the several hundreds). When in flight, the white chest, belly and underwing coverts are conspicuous, even with the females (who are otherwise simply a very plain and virtually unmarked duck). The males have a black "ice cream cone" for a butt that contrasts with the white belly, but this takes good light to see.

Anas platyrhynchos Linnæus 1758, Mallard, kindachooneit



pla-tee-RING-kos Greek πλατύς platus, flat; spread out 'flat'; broad + New Latin suffix -*rhynchus*, nose, beak.

This is the one duck absolutely everyone knows. At least they know the drake with his deep green head. When it comes to females, it can be a challenge to distinguish mallards from many other dabbling ducks. They are abundant and omnipresent in the Mendenhall Wetlands and the pond at Rotary Park on Riverside Drive (where the portrait photos were taken on April 18, 2012). Curiously, they are not that common on Twin Lakes which makes me wonder of all the Bald Eagles are a factor. Even though their numbers decline in mid summer, sure to be seen with any good look. Some stay and nest near the ponds at the Mendenhall Glacier Visitor Center most summers and several females raise ducklings. Here a hen has two in Steep Creek in July of 2011. In mid- to late-August their numbers dramatically increase along the tidal mudflats of the Mendenhall Wetlands.

Anas clypeata Linnæus 1758, Northern Shoveler

Latin cly-PEE-ah-tah, American cly-pee-AYE-tah Ancient Greek ἀσπίς *clipeus*, a large shield, to Latin *clypeatus* shield-bearing (*clypeus* shield); referring to the large beak.

This is a spring and fall duck in the Channel and in many freshwater ponds, but I saw them once in the beaver lodge pond at the Mendenhall Glacier Visitor Center. The only possible confusion might be with Mallards due to the red, green and white feathers, but any look at the bill will quickly lead to an appreciation of the common name.

Anas acuta Linnæus, 1758, Northern Pintail

uh-CUE-tah Latin *acutus*, sharp, pointed

While listed as "common" in spring and fall in Juneau, my first sighting of this beautiful duck is at Eagle Beach on April 14, 2012 where there are at least a dozen out in the water just beyond the large gathering of mallard. Thinner and more pointed at both ends, they are easily identified.

Anas acuta × ***platyrhynchos***, pintail-mallard hybrid

Along with the pintails at Eagle Beach on April 14, 2012, Mark Schwann scans with his spotting scope and comes up with this bird. When I look through, I exclaim "it's a push-me—pull-me!" The tail end is perfectly pintail and the front almost perfectly mallard. The head is green and neck stout, but the white necklace is incomplete and rises up the back of the neck like a pintail. It's body shape is almost a perfect 50:50 mix of the two species.

Anas crecca, Linnæus 1758, Green-winged Teal

CREK-cah Swedish name for this duck, *kricka*, onomatopoetic, referring to the male's characteristic call.

Taxonomy: The circumscription of this teal is complex. The American Ornithological Union and American Birding Association (the authority I follow) consider it in the broad sense with the New and Old World birds in a single species. The International Union for Conservation of Nature (IUCN) and BirdLife International consider them separate.

Anas crecca carolinensis Gmelin, 1789, Green-winged Teal

care-oh-lin-en-sis of or about the Carolinas (North and South Carolina)

I find the white vertical stripe just ahead of the shoulder against the plain gray flanks and easy character to spot for a quick identification. This small flock of teal at Eagle Beach illustrates that even in poor light and long-distance viewing a positive identification can be made. The cinnamon head and mallard green swoosh are not always visible, but the white stripe is visible in just about any light conditions. Teal are small ducks, so size is another important clue. Abundant in spring and fall in the channel and Mendenhall Wetlands, absent in summer, easily spotted from Egan Drive by their small size.

Anas crecca crecca Linnæus, 1758, Eurasian Green-winged Teal

Eagle Beach, April 14, 2012. A birder with a spotting scope comes up with a single bird with a horizontal rather than vertical stripe. This photograph is an extreme crop, enhanced for distinguishing the vertical and horizontal striping of the two teal. This is a "life bird" for me, but it doesn't "count" as it is currently not considered a full species by ABA or AOU.

Aythya F. Boie, 1822, diving ducks

eye-THEE-uh or AYE-thee-uh From the Greek αιθυα *aithuia,* a mythical diving sea bird.

Aythya valisineria (A. Wilson, 1814), Canvasback

val-iz-NAIR-ee-uh Taken from *Vallisneria americana*, wild celery, an aquatic plant favored by the duck.

I have only one sighting of this large duck in May on the Airport Dike Trail with six in Otter Pond near the large log and covered bench. This large duck is most handsome and easily spotted, but is not a common bird anywhere in its range and seems to be declining in number.

Aythya collaris (Donovan, 1809),Ring-necked Duck

coal-AIR-is Latin *collaris*, collar, neckband; chain for neck; of, pertaining to, belonging to neck.

On a blustery last day of September 2009 out on Point Louisa, I spotted two long-necked, round-headed ducks in the surf on the Stephens Passage side. With my binoculars, it was an easy identification to this species, one daughter Bess likes to hunt and eat! They are uncommon in spring and fall and rare other times. On a very wet September 7, 2012 I spot a small raft of ten in north Twin Lake. I'm pretty sure of my identification while travelling at 55+ mph on Egan Drive, but I head to Glacier Highway for a closer look and this photo that confirms I was right.

Aythya spp., Scaup species

Hotspots: bird survey of the Mendenhall wetlands has a separate category for "Scaup spp." (*spp*. is the abbreviation for species), so I do the same thing. I consider it a wise thing, as distinguishing the greater from the lesser is no easy feat. I use the bump or lack of bump on the back of the head as my main field mark, but this is not always present or visible. At Bob Armstrong's book signing of *The Mendenhall Wetlands* in April of 2009, a young boy of about ten or so offered an extremely confident ability to do this and Bob gently responded, "I need you with me when I see them"! It would be foolish to disagree and most gracious to the young man who illustrated an advanced knowledge of birds simply by knowing there are two scaup. Beware!

Aythya marila (Linnæus, 1761), Greater Scaup

mah-rill-uh Latin *marila*, charcoal.

Greater's can be incredibly abundant in spring, absent in summer and common in the fall. I see them more often in salt water than fresh, and often in the Channel near Lemon Creek. They were absent to my eyes the month of April in 2013 with my first sighting of two pair in Auke Lake on May 6.

Aythya affinis (Eyton, 1838), Lesser Scaup

ah-fih-nis Classical Latin *affinis*, neighboring, adjacent, next; relation; neighbor; accomplice.

Occasional in spring, absent in summer and common in the fall. I usually find these walking the Airport Dike Trail.

Somateria Leach, 1819, Eider

so-mah-tare-ee-uh Greek σομα *sōma*, somatos, body + εριον *erion*, wool; presumably from the very thick down.

Somateria mollissima (Linnæus, 1758) Common Eider

mol-lis-sih-mah Latin *mollissimus*, very soft; from the down.

My single sighting of this duck is something of a fluke. While heading out on a whale watching trip with Captain Gary and Manager of the Day Gabe Dunham along for a rare day out of the office, not far around the corner of Sand Point off Shelter Island up Saginaw Channel Gabe and I spot a very chunky and large duck sitting in the water. Gary never sees it, but as we make a broad turn just inside of the duck, it simply stays put and rides the waves. Eider have a very distinctive head profile and for this reason—along with their large size—they are hard to mistake if one knows what an Eider is. As we pass the duck, at about 25 knots, I turn and ask Gabe "Did we just see an Eider?" to which she answers "yes". I'm glad I had a companion as this is a very uncommon bird in Juneau waters. Ebird has only five sightings of the bird in the Juneau area, one from Outer Point, one from the Mendenhall Wetlands and three from Echo Cove. This paucity of observations makes mine suspect, yet it is difficult to mistake an Eider for any other duck. The only question becomes, "which species?"

Histrionicus Lesson 1828, Harlequin Duck

hiss-tree-on-ih-cuss Classical Latin *histrio*, actor; performer in pantomime, for the wildly colored face as in an actor's mask.

A monotypic genus.

Histrionicus histrionicus (Linnæus, 1758), Harlequin Duck, s'ús'


Their common name derives from the zany and wildly red and black dressed character common in Italian *Commedia dell'arte,* Arlecchino. The drake's coloration mimics that of the harlequin.

My first life sighting of this duck is at Amalga Harbor on April 12, 2009 where this photo was taken of a drake and hen. I saw two more on April 26 at Rainforest Trail beach that year. While not common, these ducks are regularly seen in spring but are mostly absent in summer. Only occasionally do I seen any in the ponds at the Mendenhall Glacier Visitor Center, and usually in the pond by the road. In late August of 2009 I spotted a female with six chicks in the beaver pond on the Moraine Ecology Trail, all with the prominent white spot behind their eye. I now count on seeing them several times a week during April, with fewer and fewer as summer approaches. There are several places around that I now make sure I take a look at or visit in spring hoping to get a view. Gold Creek between Egan and the end of the cemented channel at low tide when the rocks are visible is a good spot. Lena Cove when there is a stiff north wind and waves form can be a good spot. Amalga Harbor boat launch is always a good spot to check out. Only occasionally do I find any in Twin Lakes our out in the Gastineau Channel.

Melanitta Boie 1822, Scoters

meh-lah-nih-tuh Late Greek μέλας *melas*, black + νῆττα *netta*, black.

Melanitta perspicillata (Linnæus, 1758), Surf Scoter, lak'eech'wú

pur-spih-sill-ah-tah Old Latin for spectacled, conspicuous or spectacular.

Almost a resident, this is a bird that can almost be a guaranteed sighting on the channel or in Stephens Passage, often in flocks of a dozen to many dozens much of the year. In spring there can be rafts of hundreds of mixed scoters in the Gastineau Channel as they feed in preparation for their breeding journey to the interior when they pretty much disappear in late May. During July they return and there are often rafts of several hundred of the birds in the Gastineau Channel along Thane Road, especially the shallows just south of the sewage treatment plant. In the fall, their numbers can reach thousands in the waters of Favorite Channel, especially near Eagle Beach. When in breeding plumage they are nearly unmistakable (and being the dominant of our three species the first to think of), but the orange and white can dull enough in the late summer and fall to make them look almost dark enough to be Black Scoters when flying, especially on dark, overcast days. It pays to pay attention.

Melanitta fusca (Linnæus, 1758), White-winged Scoter, lak'eech'wú

FUSS-cuh Latin *fuscus*, dark, swarthy, dusky.

A migratory bird here, seen in numbers only in spring and fall. When flying over the water, the white wings flash brilliantly, and with the chunky body, make identification easy. First seen on May 9, 2009 on the Airport Dike Trail, then regularly on boat trips until middle June when they disappear. Our birds apparently head inland into British Columbia and the Yukon Territory for nesting. When in a mixed gathering of scoters in the Gastineau Channel, their white wing patches are the best identification clue, but when next to Surf Scoters their larger size is easily discerned.

Melanitta nigra (Linnæus, 1758), Black Scoter, lak'eech'wú

nigh-gruh Latin *niger*, black, dark; unlucky, hence with the genus name it is black black black!

An uncommon bird in Southeast Alaska, yet they can be seen regularly here in Juneau out on the water in spring and rarely in summer. It takes a good view to identify this species as at a distance it looks just like the common surf scoter. A view of the entirely black head is necessary for sure identification. I have not seen any during the fall migrations. To spot this bird takes effort, meaning one needs to slowly scan an entire flotilla of scoters looking for the smallish birds and then for heads with no markings.

Clangula Leach, 1819

Latin CLAN-goo-lah, American clang-gew-lah Diminutive from Latin *clangere*, to resound.

Clangula hyemalis (Linnæus, 1758), Long-tailed Duck, Oldsquaw

hi-mal-is Latin *hiemalis*, of winter, moving south in the winter; "snowbird".

On May 1, 2012 I spotted two odd-looking ducks near north Shelter Island and two more at south Shelter. They were too far away and moving too fast to get a good view, other than they were chunky with brown tops and lots of white showing. On May 2 in the morning I spot a couple dozen of the birds, and while we get a bit closer, I still can't really figure out what they are other than they remind me a great deal of Common Eider. Back on the water of south Shelter in the afternoon with a load of Dzantik'i Heeni Middle School kids our for a Sea Week adventure, I get my camera out and snap some shots of the birds as they fly away from the boat as we cruise along. It is only the examination of my photos that allows me to identify the ducks. In early May of 2013, during some very winter-like weather, I see several small groups on a circumnavigation of Shelter Island and some rafts of a dozen plus near Point Bridget. I see small groups in the area of south Shelter Island on most of my water trips in May. In earlier years I have no record of this duck. Was I just missing it? It's a duck I've known since college days, but perhaps it just slipped "under my radar".

Chunky; all dark and pointed wings; two white stripes down the top side from the shoulder to tail; black back. Their heads differ, as the three birds in my two photographs illustrate. Some are white-capped with a white neck, some brown. The white-capped have a greenish-tan cheek patch that grades to a black to chestnut neck. The forehead is nearly vertical. The white-capped bills are black at the base with a pinkish ring about ¾ the way out to a lighter black at the front of the bill. There is a distinct white eye ring. The chest is black, the belly and rump white. Others are a blah mix of colors but all have at least some semblance of a teardrop shape cheek-eye patch and all black bill, but some show a very slight blue color at the base of the bill. I learn that this duck undergoes a complex three molt process that produces a wide variety of plumage!

Bucephala Baird 1858, Goldeneye

boo (or bew)-sef-uh-lah Ancient Greek βόδι *bodi*, ox + κεφάλι *kephalē*, head; hence ox-head.

Bucephala albeola (Linnæus, 1758), Bufflehead, hintakx'wás'gi

Latin al-BEE-oh-lah, American al-bee-OH-lah Latin *albus*, white, pale, fair.

The etymology of the common name is somewhat obscure. Fergus (2004, *Wildlife of Virginia and Maryland and Washington*) says "its name derives from 'buffalo-head,' for the male's peculiar puffy head shape." Helm (2010) indicates it derives from "'Buffel's Head Duck' of Catesby (1731); 'these feathers make the head appear bigger than it is, which seems to have given it the name of buffel's head, that animal's head appearing very big by its being covered with very thick long hair." It is not clear that Catesby was referring to buffalo.

While this is a common duck in the lower 48, it doesn't seem to be here as I've only seen them a few times each year. My first on April 14, 2009 at Amalga Harbor where three bobbed and dove around the small boats coming in and out of this protected body of water. On May 9 I saw one—yes, only one—in a pond on the Airport Dike Trail. They pretty much disappear in June but return in late September.

Bucephala clangula (Linnæus, 1758), Common Goldeneye

Latin CLAN-goo-lah, American clang-gew-lah Diminutive from Latin *clangere*, to resound.

On April 11, 2011 from the high wall at Statter Harbor I could compare both goldeneyes as a single drake Common was swimming with two drake and three hen Barrow's. This species has a roundish or oval white patch in the lores and extensive white above the flanks on the secondaries with narrow black barring (almost crescents) that can be completely covered with the white feathers at times. This gives the bird a very white look from the water surface to the back.

Bucephala islandica (J.F. Gmelin, 1789), Barrow's Goldeneye, hinyik gáaxu

eye-lan-dih-cah Of or pertaining to islands.

My first observation is on May 7, 2009 in the Gastineau Channel while hiking the Bishop Point Trail with only a few more until mid-May, usually in fresh water ponds, then they disappeared. Two drakes and three hens swimming in Statter Harbor on April 11, 2011 along with a single drake Common provided a clear difference with these drakes having an extended crescent of white in the lores and white barring on black secondaries above the white flanks. The cold spring of 2013 seems to have encouraged the birds to hang around Juneau and delighted me in just about every water I spied from April through much of May. The hens have a yellow-orange bill. This hen on the rock is from June 12, 2011 at the reflection pond on the Herbert Glacier Trail and the drake and hen are in Mendenhall Lake on May 8, 2013.

Lophodytes Reichenbach 1852, Hooded Merganser

Latin law-PHO-dih-tees, American law-pho-DIE-tees Greek λοφος *lophos*, crest + δύτης *dutēs*, diver (*duō*, to plunge).

A ditypic species, the only other is *Lophodytes floridanus*, only known from Late Pleistocene fossils in Florida.

Lophodytes cucullatus (Linnæus, 1758), Hooded Merganser


Latin coo-COO-luh-tus, American coo-coo-lay-tus Late Latin *cucullatus*, hooded.

A drake and hen pair frequented Twin Lakes in mid-April 2011, often swimming and diving with scaup. The pond by Glacier Gardens at Mendenhall Loop Road and Mall Boulevard occasionally sports a pair in April. Every time I pass this pond I take a good look.

Mergus Linnæus 1758, Merganser

MUR-gus Latin *mergere*, to submerge; dip, plunge, immerse and applied by the Romans to a waterfowl as *mergus.*

Mergus merganser Linnæus, 1758, Common Merganser, kaax



mue-gan-zur *Mergus* + Latin *anser*, goose.

Moose Lake in the Dredge Lakes area had a female with six chicks in 2008 (photo). A pair of mergansers had 15 chicks someplace near the

Glacier in 2009 and all 15 survived! During August and September I observed mom and the chicks regularly in the beaver pond on the Moraine Ecology Trail as well as the beaver lodge pond on the Mendenhall Glacier Spur Road just before the visitor center. During September, the number of birds diminished with each sighting as the young ones—presumably—headed off for a life of their own. In 2010 one female raised 15 chicks in the same area. I saw her frequently in the beaver pond on the Moraine Ecology Trail and less frequently in the pond by the road. Several times they flew past the beach on the Moraine Ecology Trail as we enjoyed the glacier view. Once the chicks were "emancipated", the female stayed around and I often found her swimming underwater along Steep Creek right at the fish weir (photo). The female on the rock is in the flooded dead tree forest pond along Glacier Spur Road.

Mergus serrator Linnæus, 1758, Red-breasted Merganser, kaax

sare-rah-tore   Latin *serratus*, coin with notched edges; serrated, toothed like a saw; for the serrated edges of the bill

An uncommon bird of the Juneau area, I've only seen one female near Amalga Harbor in salt water in May of 2009 and a drake and hen pair in Mendenhall Lake on April 30, 2012 out from Photo Point. These two are floating and diving in the fairly shallow water which makes me wonder if there are some sand lance or salmon smolt in the water that they are feeding on. They're too far away to see if their hunting is successful and identify the catch.

Order Galliformes Temminck ***1820 fowl***

Family Phasianidae Vigors, 1825 **Partridges, Grouse, Turkeys, and Old World Quail**

Lagopus Brisson 1760, Ptarmigan

la-go-puss   Ancient Greek λαγως *lagos*, hare, + πους *pous*, foot; for the very feathered feed reminiscent of a snowshoe hare.

Lagopus lagopus (Linnæus, 1758), Willow Ptarmigan, x'eis'awáa

The state bird of Alaska is hard to find here, and the only two I saw were on the Mount Roberts Alpine Loop Trail and Perseverance Trail in June and the *only* reason I can identify them is that were still about a third white. When in summer plumage, distinguishing the ptarmigan from grouse requires a very close look with a good mind remembering the differences, or a field guide in hand. The bill size is one thing to look for, larger on the ptarmigan than grouse.

Lagopus leucura (Richardson, 1831) White-tailed Ptarmigan

Latin LEW-coo-rah, American lew-CURE-uh   Greek λευκος *leukos*, white + ουρά *oura* tail.

Dendragapus Elliot, 1864

den-DRA-gah-pus   Greek δένδρον *dendron*, tree + ἀγαπάω *agapaō* to be fond of.

Dendragapus fuliginosus (Ridgway, 1873), Sooty Grouse, núkt

Latin fuh-lih-GIN (hard g)-owe-sus, American foo-lih-gin-OWE-sus Latin *fuliginosus,* derived from *fuligo*, soot; lamp-black.

I heard several on the West Glacier Trail on May 3 but never saw them. My first observation is June 11 on the Mount Roberts Alpine Loop Trail were a female with at least two chicks is underneath the last mountain hemlock (*Tsuga mertensiana*) on a counterclockwise hike of the loop. On June 12, Annette and I come across four hens with chicks on the Dan Moeller Trail, all rather tame and allowing us to approach within 3 meters, as this photograph shows.

Order Gaviiformes Wetmore & W.D. Miller, 1926

Family Gaviidae J.A. Allen 1897 **Loons, kageet**

Gavia J. R. Forster, 1788, Loons

GA (as in cat)-vee-uh Latin term for the Smew, another black and white sea duck.

Gavia stellata (Pontoppidan, 1763) Red-throated Loon

Latin STELL-lah-tuh, American stell-AYE-tah Latin *stellatus*, starry, starred, set with stars; referring to the "necklace".

Gavia immer (Brünnich, 1764), Common Loon

ihm-mer From the Latin *cavus*, hollow or cave; deep, having deep channel; referring to its diving ability. German *immer*, always.

I observed this duck only twice, once in May and on September 22 and 23 (same birds?) off North Douglas Island where two floated about 20 yards offshore. I'm sure they were common as they were large, and had very dark heads with white breasts, distinguishing them from what seems to be the more common Pacific Loon that I did not see.

Order Podicipediformes (Fürbringer 1888) Sharpe 1891

Family Podicipedidae Bonaparte 1831 **Grebes**

Podiceps Latham 1787, Grebes

poe-dih-seps Latin *podex*, fundament, buttocks; anus + Latin *pes*, foot; referring to the far back placement of the feet on the body.

Podiceps auritus, Horned Grebe, cháax

ARE-ih-tus Latin *auritus*, with or having ears.

Observed only once on April 26 at the beach on the Rainforest Trail on Douglas Island. The typical grebe look in the water caught my attention and I always have difficulty remembering how to tell horned from eared. Here it's easy, horned is the only one commonly seen other than the very distinctive Red-necked (Mendenhall).

Podiceps grisegena (Boddaert, 1783), Red-necked Grebe

Medieval Latin *griseus*, grey + Latin *gena*, cheek.

April 20, 2012 on Douglas Island Along the stretch of Douglas Highway where it rises just 3 meters above high tide line at the shore, I spot a single bird some 100 meters out. The neck looks short but is showing some red. White cheek patches are widest at the ear, tapering forward and back. The beak is stout and yellow. This photo is an extreme crop "enhanced" to show these features. This is a new bird to my Alaska life list!

The next day on a Juneau Audubon Society cruise to Berners Bay Up at the end of Slate Cove is a single bird in breeding plumage. I got some record shots of the bird taking off where the white leading and trailing wing pattern, red neck, white neck and heavy yellow bill are plainly visible. A bit later two more birds fly by and illustrate their characteristic humpback look when flying.

Order Procellariiformes (Fürbringer, 1888)

Family Procellariidae Leach 1820 **Shearwaters and Petrels**

Puffinus Brisson 1760 Shearwaters

Latin PUFF-ih-nus, American puff-EYE-nus From the English *puffin*, that used to mean shearwater, an unrelated bird.

Puffinus griseus, Sooty Shearwater

Latin GRHI-see-us, American GREE-see-us Latin *griseus*, bluish; gray.

Observed only once in the open water off south Shelter Island where the bird paralleled the boat and flew with us at about 26 knots. With their very long and pointed wings and cigar-like body, they look quite different from the myriad of chunky gulls I see out on the water every trip. What I noticed first about this bird was the wing beats, long and forceful with each stroke, quite distinct from the gulls. I then raised my binoculars and followed the bird for about 100 yards before it outpaced the boat and went well ahead of us.

Order Pelecaniformes Sharpe 1891

Family Phalacrocoracidae Reichenbach 1850 **Cormorants, yook**

Phalacrocorax Brisson 1760, Cormorants

Latin phal-uh-CROW-kor-axe, American phal-uh-crow-CORE-axe Greek φαλακρός *phalakros*, bald + κόραξ *korax*, crow; a crow (from its voracity), raven.

Phalacrocorax auritus, Double-crested Cormorant

ARE-ih-tus Latin *auritus*, with or having ears, referring to the “double crest” of breeding plumage feathers near the ears.

While not a common bird according to the checklists and Mendenhall, I saw them perhaps a dozen times in the downtown area in the same place as the great blue herons, between Gold Creek and the dock. On September 2, 2013 I was surprised to find this single bird on the barncle encrusted rock on the north end of Little Island. This extreme crop shows the orange gular patch that distinguishes this species from the far more common Pelagic Cormorant.

Phalacrocorax pelagicus Pallas, 1811, Pelagic Cormorant

peh-la (as it cat)-jih-cuss Greek πέλαγος *pelagos*, deep or open sea.

2009. On September 8 this became a life bird sighting at the Faust Rock light, sitting in the green portion of the tower. This is a very small cormorant with a thin neck and small head. Very black, but with a strongly iridescent deep blue color to it. The bill today is completely black, the bird is well out of breeding plumage. As we approach to about 20 yards, the bird drops off the light and flaps hard to get flying and heads away from us. I spotted a second bird on September 11 between Portland and Caughlin Islands as we were headed back into Auke Bay. This bird was flying about two feet above the water in the opposite direction. The very skinny neck and small head are obvious field marks for this species when out of the range of the rare Red-faced Cormorant—as we are here. September 12 yields another bird at the Poundstone Rock light. On September 22 three sit on Faust Rock light and a fourth is flying around looking for a landing spot. This bird is obviously more common in the fall than any other time.

2011. The bird is absent! Where are they? It’s not until #### that I finally spot one. I watch the Couglin can where I’m now used to seeing them proves fruitless the entire season.

Order Ardeiformes Wagler 1830

Family Ardeidae Leach 1820 **Bitterns, Herons, and Allies**

Ardea Linnæus 1758, Herons

ARE-dee-uh Classical Latin *ardea*, heron. In Roman mythology the town of Ardea, capital of the Rutuli, was razed to the ground, and from the ashes rose a lean, pale bird, shaking the cinders from its wings and uttering mournful cries.

Ardea herodias Linnæus, 1758, Great Blue Heron, láx'

hair-oh-dee-us Greek Ἡρωδιάς *Herodias*, a woman of the Heodian family; presumably from its resplendent plumage.

Apparently with a rookery and roosting site somewhere near Cope Park, these long-legged, long-necked waters show up regularly in the tide flats between Gold Creek and the dock, most often in the late afternoon or evening. On August 15, 2009 two juveniles in very brown plumage fed at Lemon Creek and another single juvenile at the beaver pond at the Mendenhall Glacier Visitor Center, all three with much white showing in the chin area. On a sunny October 4, 2010, a very tame bird perched directly over the Steep Creek fish and bear viewing walkway for an unusual view of this large bird. On September 9, 2011 a bird sat in the willows of Steep Creek just off the dike approach trail allowing a portrait through the bushes.

Nycticorax Moehring 1758, Night Heron

nick-tih-core-axe Greek νυκτικόραξ *nuktikorax*, bird of evil omen mentioned by Aristotle, Hesychius and other authors, probably a sort of owl, but long associated with the night heron (Greek νυκ *nux*, *nuktos*, night; κόραξ *korax,* raven); Latin *nycticorax*, night raven.

Nycticorax nycticorax (Linnæu s, 1758), Black-crowned Night-Heron

August 12. On my way home in the late afternoon, crossing Lemon Creek on Egan Drive, the BCNH is sitting on the sand at the west end of the bar just before the bridge on the north side of the river. He sat there in his characteristic hunched-over posture, facing away from me with his black back contrasting well with his light front and the black crown plainly visible. I knew immediately this is an unusual bird. The Mendenhall Wetlands checklist has it as casual or accidental for spring and summer, Bob Armstrong's *Guide to the brids of Alaska* lists it in the accidental section and *The Mendenhall Wetlands* bird lit has it as 1-9 in May and unknown small numbers in summer. I emailed Bob with my sighting and he responded that it has been "5 or 6 years since one has been seen here". I ran into Bob on the Alpine Loop Trail on 09-04 and he told me he found "my bird" in the area between Egan and Glacier Highway and "now there are two of us the birders here think are crazy!" This seems to be an exceptional sighting as I've been asked to provide as many details as I can to two of the "big" birders in southeast Alaska, Gus van Vliet of Auke Bay and Steve Heinl of Ketchikan for a possible occurrence not in North American Birds.

Order Falconiformes Sharpe 1874

Family Accipitridae Vieillot 1816 **Hawks (shaayáal), Kites, Eagles, and Allies**

Haliaeetus Savigny 1809, Sea Eagle

Latin hah-LEE-ee-tus, American hal-ee-EE-tus Greek ἁλιάετος *haliaietos*, osprey, sea-eagle. New Latin for sea-eagle.

Haliaeetus leucocephalus (Linnæus, 1766), Bald Eagle, ch'áak'

lew-co-SEH-fuh-lus Greek λευκός *leucos*, white + κεφάλι *kefali*, head.

Nearly ubiquitous, I doubt there has been a day when I didn't see at least one Bald Eagle. Some days it takes some scanning of the skies, particularly if it is at high tide, but at low tide, the birds are abundant. I also see them in the trees next to the parking lot at Statter Harbor probably half the time I'm there. They frequent the stream entrances to Auke Bay and we often slow down to watch them when leaving the harbor. There are two very large nests on the south side of Coughlin Island that successfully fledge birds most years and as late as the second week of September the young are with the parents here, but all are the same size! On Town, Tram & Treks, the drive over "the bridge" often yields at least one eagle on the power pole perches. A drive south along Thane Road at low tide is a sure bet to find at least a dozen eagles on the beach foraging for whatever they can find. When the chum salmon run began near the hatchery, eagles outnumbered the gulls at the mouth of Salmon Creek at times!

In May on a sunny afternoon walk on the Airport Dike Trail, I counted 37 eagles in what must have been a thermal over the mouth of the Mendenhall River. While on that walk, I kept hearing shotgun blasts. When I returned, I found a man with a USDA logo baseball cap unlocking the gate to go into the runway area of the airport with a shotgun leaning against the fence. I just had to ask him what sort of job he had with a shotgun at the airport. He works for Animal and Plant Health Inspection Service (APHIS) in their Wildlife Damage Management division and was shooting pyrotechnics from his shotgun to scare the eagles away from the north end of the runway as the planes were taking off in that direction. He showed my the box of shells he used and I told him they certainly were loud.

I then just had to ask him about the "salmon story" as if anyone could verify it, he would be the most likely that I've ever encountered to know the "real" story. He knew before I finished the question what I was asking and told me that, while it was before his time, the best he could tell the story is true. There is an account of it called "Salmon Three Salmon" by Mac af Uhr written in Airways Magazine that details the account [http://www.airwaysmag.com/channels.html?article_id=78&channel_id=7]. Eagles and other birds have been a problem for Juneau International Airport for many years.

Circus de Lacepède 1799, Harrier

Latin KER-cuss, American SIR-cuss Greek κύρκος *kirkos* circle, circler, from a mythical hawk, and its circling flight pattern. Old Latin name for a harrier.

Circus cyaneus (Linnæus, 1766), Northern Harrier, marsh hawk


sigh-ANN-ee-us Latin *cyaneus*, dark blue; sea blue; dark sky blue; in reference to the head of the male (which to most people is gray).

The name "harrier" might come from the Middle English *hayrer* as a small hunting dog. Since the bird is usually seen hunting, the extension of the name to the bird seems plausible if not probably. The former name "marsh hawk" is particularly appropriate for the Mendenhall wetlands.

This is one of those birds that even the slightest glance provides enough information to identify. A largish bird (substantially larger than the thousands of gulls that frequent the area), it has long wings that it uses to soar low over the wetlands. They are held in a dihedral, a shallow "V" and, somewhat like vultures (absent here), teeter along the axis of the body. They have a long tail in proportion to the body. This is reported to be a common bird in the Mendenhall Wetlands, but with my nearly uncountable drives up and down Egan along them, I very rarely see a bird out there. In 2009 I only had two sightings of this bird, in early May a single large female over Lemon Creek, and on September 19 a single gray male in nearly the same place but flying in the opposite direction. Each spring I seem to spot more of them. These photos are from April 29, 2013 on a day when three birds are actively hunting over the wetlands north of the Mendenhall River. This is a female, told by the brown mantle and wings. Both sexes have an obvious white rump easily visible when flying.

Accipiter Brisson 1760, Goshawks, Sparrowhawks

Latin ahk-KIH-peh-tur, American ah-SIH-peh-tur Latin *accipiter*, hawk; flying gurnard derived from *accipere*, to take, grasp, receive referring to its ability to grab birds in flight.

Accipiter striatus Vieillot, 1808, Sharp-shinned Hawk

stry-AYE-tus, stree-aye-tus Latin *striatus*, grooved, streaked, striped.

I had a single sighting of this bird in May of 2009 from the Mount Roberts Alpine Loop Trail, the bird was flying toward the Silverbow Basin with its characteristic accipiter flap-flap-glide flight pattern. This set the pattern for my sightings for this resident species that I only spot a few times a year. They pretty much dissapear in summer. On April 20. 2013, a large female put on a fabulous show for a group of us on a Juneau Audubon walk at Fish Creek Delta. It did its flap-flap-soar flight a bit above tree-top level flying right by us heading south. The bird was in perfect light and the orange barring on the breast simply glowed. The white rump patch was like a headlight! While hiking to the adit of the Nugget Creek flume in July of 2014 a pair of sharpies cried loudly at us, dropping down into the forest and darting through the trees in a bit circle around us. This certainly made me think they have a nest nearby, but despite all my searching in the dense forest, so such thing was visible.

Falco Linnæus, 1758, Falcon

fall-co, fal (as in cat)-co Greek φαλκον *phalkōn* to Late Latin *falco*, to Proto-Germanic *falkô*; all referring to a falcon/

Falco columbarius Linnæus, 1758, Merlin

call-um-bair-ee-us Latin *columbarius*, dove or pigeon-keeper, referring to a common prey of falcons.

Merlin comes to us from the early 14th century from the Anglo-French *merilun*, a shortened form of Old French (12th century) *esmerillon* for merlin or small hawk, from Frankish *smiril or some other Germanic source which in turn comes from the Classical Greek word σμύρις, *smuris*, a small falcon.

This resident bird is a difficult find and I only expect a couple a year, usually in April. My most exciting experience with this bird was while standing with my group on the platform beneath the main viewing room of the Mendenhall Glacier Visitor Center on August 23, 2011, a small dark falcon swoops down over the group between Kathy Benner and me. It seemed uniformly a dark ashy gray with only the slightest banding on the tail. The wings are long relative to the body and the tips pointed. The bird never once flapped as it streaked by like an Air Force jet fighter and was out of sight over the willow and alder shrublands almost as soon as we saw the bird. A single adult in full breeding plumage sits atop a spruce at the Mendenhall Glacier Visitor Center allowing a great view through the spotting scopes on April 25, 2013. The photos are from a bird at mile 38 "out-the-road" in the shore pine muskeg, sitting atop a dead pine, then flying off showing his very pointed wings. This is clearly a female, lacking the dark slate-colored back of the western race. Note the banded tail where the lighter bands are narrower than the darker, the dark underwings in flight, as well as the slight "moustache" below the eye.

Falco peregrinus Tunstall, 1771 Peregrine Falcon

pear-eh-gry-nus Latin *peregrinus*, foreign, strange, alien; foreigner, stranger, alien; pilgrim; hence wandering, wide-ranging.

Order Ralliformes Reichenbach 1854

Family Rallidae Vigors 1825 **Rails, Gallinules, and Coots**

Porzana Vieillot 1816, Rail, Crake

pore-za (as in cat)-nuh Local Venetian names *Porzana*, *Sforzana* and *Sporzana* for the smaller crakes.

Porzana carolina (Linnæus, 1758), Sora

Of or relating to the Carolinas in North America.

I had a single quick sighting of a dark, tiny—the size of a pigeon—rail off the Airport Dike Trail just past the big log in June of 2009. The checklists indicate this is the only possible identification unless it was something very unusual, but it looked like a Sora to me.

Order Charadriiformes Huxley 1867

Family Charadriidae Vigors, 1825 **Lapwings and Plovers**

Charadrius Linnæus 1758, Plovers

chuh-ra (as in cat)-dree-us Greek χαράδριος *charadrios*, a classical name for plover.

Charadrius semipalmatus (Bonaparte, 1825), Semipalmated Plover

seh-mee-pall-may-ted semipalmated, referring to the partial webbing between the toes.

Having not seen this species in Alaska before, the early summer of 2011 proved this species to be common, if solitary, along the eastern shore of Mendenhall Lake along the Nugget Falls Trail. An unmistakable bird in breeding plumage with the single bold black neck ring, clear white belly and tawny back. The bill is bright orange at the base with a very sharp black tip. Annette and I both saw it on several walks out to Nugget Falls. On the day of this photo, the bird kept flying about 20 yards in front of us then after we took a few steps flew back toward the lake, calling loudly. This behavior could mean it had a nest nearby, but we never found one.

Charadrius vociferus Linnæus, 1758, Killdeer

vo-SIH-fur-us Latin *vociferari*, to utter a loud cry, shout, yell; referring to it's loud, raucous call that gives the bird its common name.

Family Haematopodidae Bonaparte 1838 **Oystercatchers**

Haematopus Linnæus 1758, Oystercatcher

hee-muh-toe-puss Greek αίμα, *aima*, hence *hema-*, blood + Greek πούς; *-pous* a foot; hence blood-foot for its red feet.

Haematopus bachmani Audubon, 1838, Black Oystercatcher

Honorific for Audubon's friend John Bachman, a Lutheran minister from Charleston, South Carolina, who pronounced his name "BACK-man".

A bird of rocky islands in saltwater, I only see this when out on the water on whale watching trips. Captain Collin Pilcher heard one and pointed them out to me on one of my first W&T trips in 2009. It is a rather unique sound that was totally new to me. Sibley describes it as "loud whistled yelps" and this is what I heard several dozen times, alerting me to get the binoculars out to find one. They were always more common north of Shelter Island than south. I probably saw them a dozen times, usually two or three individuals.

Each season since, I look for them on all the rocky points and reefs and still often hear them before spotting the birds. When they fly across the bow, it is great fun to point out the amazing orange bill and feet.

Familly Scolopacidae Vigors 1825 **Sandpipers, Phalaropes, and Allies, x'al'daayéeji**

Actitis Iliiger 1811

ack-TIE-tis Greek ακτιτής *aktitēs*, coast-dweller.

A ditypic genus composed only of this North American bird and the very closely related Common Sandpiper (*Actitis hypoleucos*), of Eurasia.

Actitis macularius (Linnæus, 1766), Spotted Sandpiper

ma (as in cat)-cue-lair-is Latin *macula*, spot, stain; spot, stain, blemish.

As a bit of a surprise for me, I see this bird on our Whales & Trails walks on the Moraine Ecology Trail pretty regularly, particularly during mid summer. They fly past us just barely over the water of Mendenhall Lake and we see them on the shore of the beaver pond as well as out on the shoreline north of our W&T beach. I now expect—and do—see them a few times a month. I've also seen them at the Amalaga Salt Chuck (this photo from August 21, 2010 is of a non-breeding—no spots—bird) where Peterson Creek flows through a most interesting salt and fresh water lake created by a rock dam that holds freshwater in during low tide but lets salt water in during high tide thus creating a perfect mix of small crustaceans for this shorebird to hunt. I never cease to be enchanted by the dipping action of the birds when standing on the sands or atop a rock. Note the very short neck, a character that along with its rather solitary nature and dipping behavior is helpful at identifying the bird at a distance.

Tringa Linnæus 1758, Yellowlegs

Latin TRIHN-gah, American tring-gah New Latin *tringa*, name for the green sandpiper by Aldrovandus in 1599.

Identifying a Yellowlegs is easy: large shorebird with long bill and yellow legs that feed for small crustaceans in the sandy mud with a sewing machine motion with their heads rapidly going up and down. Distinguishing the species of these birds is a challenge, particularly when they are not together, allowing a direct comparison. When viewing, careful observation is necessary or you'll just have to settle for "Yellowlegs". Size of the bird and its bill is an unreliable character.

Tringa melanoleuca (J. F. Gmelin, 1789), Greater Yellowlegs


meh-lan-oh-lew-cah Greek μέλας *melas*, black + λευκος *leukos*, white; hence black-and-white.

Common and nesting in the Mendenhall Wetlands, the birds are frequently seen at Otter Pond on the Airport Dike Trail. The most reliable character for me is the length of the bill. Greater Yellowlegs have a bill much longer than their head. Many field guides make a note that the bill is "slightly upcurved" but I find this so subtle as to be useless for me. They also have barring on the flanks below the wings, visible here. In my summer walks up the Auke Nu trail into the Spaulding Meadows, the many nesting birds call loudly in apparent attemps to get those of us on the plank trail to move away. Occasionally an agressive bird will fly toward us and make what could be described as a weak attack dive. They fly towards us, but at about 10 meters sweep away and head back to the nest. As dogs romp in the muskeg, the bird calls become a cacophany!

Tringa flavipes (JF Gmelin, 1789), Lesser Yellowlegs

fla (as in cat)-vih-pees Latin *flavus*, yellow, golden, gold colored + *pes*, foot.

This is the most regularly seen shorebird on the Airport Dike Trail, and I think I saw at least one on every walk, particularly in the ponds past the big log. The most reliable character for me is the length of the bill. Lesser Yellowlegs have a bill about as long as the head or slightly longer. There is little to n barring on the nearly clear white flanks and belly, visible here.

Arenaria Brisson, 1760, Turnstone

Latin ah-reh-NAH-ree-ah, American air-uh-nair-ee-uh Latin *arenaria*, sand-pit (shared with the plant genus for sandworts).

Arenaria melanocephala (Vigors, 1829), Black Turnstone

meh-lan-oh-sef-uh-lah Late Greek μέλας *melas*, black + κεφάλι *kefali*, head.

All of my Juneau sightings of this bird are out on the water, as this photo from September 9, 2010 shows a gathering of these shorebirds on Eagle Reef. Chunky, short-legged with a very dark mantle, head, neck and upper chest with a clear white belly, this bird is unmistakable. I expect to see some at False Outer Point and Otter Point on Douglas Island in the rocks, but I've never seen them there.

Calidris Cuvier 1800

cah-LEE-dris Greek καλιδρις *kalidris*. A gray water bird mentioned by Aristotle that remains unknown.

Taxonomy: The phylogeny of this genus *sensu lato* (in the broad sense) is unresolved and probably polyphyletic. If so there are at least three genera that may be carved out of it, but at least one species is so poorly understood genetically that it throws doubt upon the entire group's division. For the time being, it seems prudent to consider the genus broadly.

Notes: Most birders will admit to at least some hesitation regarding the identification of "peeps" and this genus of shorebirds can be especially troublesome and real knowledge comes only through repeated experience with the actual birds and consultation with various field guides and especially fellow birders. I've been in many an "argument" over the proper identification of a single peep in a group of other peeps. Beware of cockiness!

Calidris canutus (Linnæus, 1758), Red Knot

ca (as in cat)-new-tus Latin *canutus*, gray.

Calidris pusilla (Linnæus, 1766), Semipalmated Sandpiper

Latin poo-SIH-lus, American pew-SILL-us Latin *pusillus*, tiny, very small.

Calidris mauri (Cabanis, 1857), Western Sandpiper


maw-ree Latin *mauri*, Mauretania, a Roman province on the northwestern coast of Africa.

Expecting to see tens of thousands of this bird in 2009, I only see a few to several hundreds, with my first observation on May 11 in on the Airport Dike Trail. My expectations were based upon the reports from the Copper River Delta where perhaps millions of these birds can be seen on a single day, I'm quite disappointed by what I actually saw. On only one walk of the dike trail did I see a "wall" of sandpipers take off and fly as a single group, and these were at least a mile away, out along the actual channel.

In 2012 I see the waves of birds migrating through that I expected. On May 12 on a day not fit for man nor beast to be outside, a Juneau Audubon Society walk chasing the outgoing tide along the Mendenhall River yields an uncountable number of the birds on the mud that only fly up when we walk by, and they only move a short distance away before getting out of the driving rain in the winds. On May 14 I see several dozen waves of birds fly by the boat. I'm always amazed at the coordination they show in these flights. It seems they are flying as fast as a jet—significantly faster than we travel in the boat—yet can maneuver as if they are a single organism and make instant direction changes in the same way schooling fish do in the ocean. What is the tigger for these moves and how do they communicate it to the entire group so they do it as if it were completely choreographed? Is it air pressure from the change in wing beat of their neighbor or just a very close watch? I don't know.

Calidris melanotos (Vieillot, 1819), Pectoral Sandpiper

Latin meh-LA-no-tos, American mel-ah-no-tos Late Greek μέλας *melas* black + Latin *notos*, spotted, hence black-spotted.

A new life bird spotted several times in May of 2009 in the pond just past the big log on the Airport Dike Trail. This bird is easily identified by the very sharp line between the densely streaked breast and the pure white belly. This is a bird I should have seen many years ago, how did it miss it? It hasn't made my checklist since 2009 either, so I must work on my sandpiper observation skills.

On August 31, 2012 while returning from a bike ride to the glacier, I stopped at my daughter's house but as I rode onto East Valley Court, I spotted a dozen sandpiper in the lawn of the house across the street. I slowed to observe them when a neighbor said "I think they're a sandpiper" to which I responded, "yes, Pectoral Sandpipers". The birds moved one house west so I followed them. Their backs betrayed their identity with the very scaly looking coloration on the wings that I first noted, then the creamy eye stripe but the heavily barred upper chest and clear white belly are the dead give-away field marks for this species. The next morning I read on EagleChat (the listserv for SEAK birders) that a group was wandering about the grassy areas on Vintage Boulevard as well.

Calidris ptilocnemis (Coues, 1873), Rock Sandpiper

Latin tih-LAW-neh-mis, American tih-low-nehm-is Greek φτερό *ftero* or *ptilo*, feather,soft, down + κνεμε *knēmē* leg.

I found them several times in May on the Airport Dike Trail when they stop here on their migration to the far west coast of Alaska. They are nearly always with the yellowlegs in the pond just past the big log. This is a chunky very dark gray sandpiper that is pretty easy to spot when in with a flock of other peeps.

Calidris alpina (Linnæus, 1758), Dunlin

al-pie-nah Latin *alpinus*, of the Alps, hence of alpine regions from its nesting grounds in the far north.

Mendenhall and the checklists have this as abundant in spring, but I've only seen them a few at a time on the Airport Dike Trail such as these birds on April 25, 2010. The vast majority of my lifetime sightings of this bird are in winter plumage and it has been since college days at Humblolt State for breeding plumage like these birds. The rusty back and black belly separated by clear white make this small shorebird unmistakable.

Calidris himantopus (Bonaparte, 1826), Stilt Sandpiper

hih-MAN-toe-pus Prefix obscure, probably "long" or "long-legged" + Greek πούς; *-pous* a foot from a reference by Piny.

Records show a pretty reliable occurrence of this bird for a week to two weeks every August in the Juneau area. This photo of two of the long-legged sandpipers was taken on August 25, 2010. While nesting on the Arctic shores, most of the birds head to the Gulf of Mexico and Atlantic shorelines for winter via the Great Plains. But some wander down the Pacific Flyway each fall on their way south, so ours are definitely outliers of the main population and migratory pattern. This means all Juneau birds are in nonbreeding plumage or are a juvenile (note the very scaly back with prominent white outlines of the scales) like these birds. Is the fact that this is their first migration south that they take a different route? Every bird I see is a juvenile. Note the rather steep angle of the body of the rear bird. With their long legs they have to tip more to plunge their bills when feeding, a good field character along with the rather heavy bill.

Limnodromus Wied 1833, Dowitcher

Latin lim-NAW-dro-mus, American limb-no-dro-mus Greek λίμνη *limne*, a pond + Byzantine Greek δρόμος dromos, a race; hence "racing around a pond".

Limnodromus griseus (J. F. Gmelin, 1789), Short-billed Dowitcher

Latin grih-see-us, American gree-see-us Latin *griseus*, bluish; gray.

Like scaup, Mendenhall has a category for "Dowitcher spp." as these are difficult to distinguish. I'm not used to seeing this bird in breeding plumage and it is helpful here as this species is much darker and black and not at all rufous. I only saw this bird once in the largest pond just east of the bench on the Airport Dike Trail.

Limnodromus scolopaceus (Say, 1823), Long-billed Dowitcher

Latin sko-LAW-pah-sus, American sko-low-PAY-shus Red-breasted.

As with the short-billed, my identification is based mostly on color as this bird was with the short-billed and distinctly rufous in color.

Gallinago Brisson, 1760, Snipe

gal-lin-a (as in pay) -go Latin *gallina* hen + *-ago* resembling; Modern Latin *gallinago*, woodcock, snipe.

Gallinago delicata (Ord, 1825), Wilson's Snipe

deh-lih-cah-tus Latin *delicatus*, dainty, nice, delicate.

Taxonomy: Elevated to a full species in 2002, it was formerly a subspecies of Common Snipe: *Gallinago gallinago delicata* Ord, 1825

> Formerly considered part of *G. gallinago* because of overall morphological similarities (Oberholser 1921), but now separated on the basis of differences in winnowing display sounds associated with differences in the outer tail feathers (Thönen 1969, Tuck 1972, Miller 1996) that are comparable to differences between other closely related species in the genus.

Banks, R.C., et al. 2002. *Forty-third supplement to the American Ornithologists' Union check-list of North American Birds*. The Auk 119(3):897–906.

Notes: If I see a very obvious—but chunky—shorebird inland over open areas I look for short legs hanging behind, a very long bill, and white stripes down the back when the bird banks, I think snipe. Their *kuk-kuk-kuk* or *kuk-a-kuk* call is distinctive from other shorebirds.

While I spot this bird at least once a year, my sightings are scattered throughout my April to October residence here and are clearly opportunistic. The three places I've seen them are in the open muskeg near the end of the Montana Creek road, around the shoreline of Mendenhall Lake, and the interior iris swamp at Eagle Beach State Park picnic area.

Phalaropus Brisson 1760, Phalarope

fah-lah-ROW-pus Greek φάλαρος *phalaros*,coot + πούς *pous*, foot.

Phalaropus lobatus (Linnæus, 1758), Red-necked Phalarope

low-bah-tus Late Latin *lobus*, lobed; "from the scallops on the toes like the ... coot" (Brisson 1760).

If you spot a largish, horizontal shorebird with a long neck sitting on the water, think phalarope. Wilson's is a casual visitor from the interior of Canada and Red's rarely move far inland from their offshore migration route. I've seen neither in Juneau.

My first sightings each year are in mid-May as these are mostly birds of migration here. I've only seen them in migratory rafts, usually of dozens—if not hundreds—of birds sitting on the water. They normally only take off when the boat approached more closely than they are comfortable with, and then usually fly only 10 or so meters away, low to the water, before dropping onto the water again. Even with as much time as I spend on the water in the spring and fall, I don't see this bird every year. When I do, they abound in impressive numbers. With a nesting population in Glacier Bay, they are occasionally seen in our waters in summer, but I've not seen them but in spring and fall.

Family Laridae Vigors 1825 **Gulls, Terns, and Skimmers, kéidladi**

Chroicocephalus Eyton 1836, Gulls, F

crow-ih-co-seh-fah-lus Greek χροα chroa, color + κεφάλι *kefali*, head; for the black head in breeding plumage.

Taxonomy: While erected long ago, these smallish gulls are often included in a wider circumscription of *Larus* and moved back into this genus by the American Ornithological Union in 2008.

Chroicocephalus philadelphia (Ord, 1815), Bonaparte's Gull


fih-lah-DELL-fee-uh Of or pertaining to the city of Philadelphia, Pennsylvania, where the type specimen came from.

Taxonomy: Synonym *Larus philadelphia* (Ord, 1815), a name still used as the change has not been fully accepted and many scientific publications still continue to use *Larus*.

Notes: This is a near daily observation in the Gastineau Channel, usually with hundreds of birds. What makes this observation stand out from my many years of seeing this bird in the lower 48 is that in May and June they are in full breeding plumage.

Larus Linnæus 1758, Gulls, kéidladi

Latin LAH-roose, American lare-us Latin *larus*, gull; ravenous sea bird; mew.

Larus canus Linnæus, 1758, Mew Gull, kootl'éit'aa


CAY-nus Latin *canus*, gray hairs; old age; white, gray; aged; from the color of the mantle.

This species replaces the ring-billed here and is just as abundant, with a good chance of seeing one every time I look at salt water. They are easily distinguished from the other gulls by their small but chunky size. When viewing closely, their eyes seem to be larger in proportion to their heads than other gulls. They fly more delicately than the large gulls.

Larus argentatus Pontoppdan, 1763, Herring Gull

Latin are-JEN-tah-tus, American are-jen-TAY-tus Latin *argentatus*, silvered, adorned with silver.

More common here than I was expecting, I see at least a couple of these on nearly every boat trip as their black wing tips distinguish them from the more common glaucous-winged. The bird on the left (August 25, 2010) is in breeding plumage with clear white head, neck and breast with bright yellow bill and deep orange-red gonydeal spot and the base of the lower bill. The bird on the right is a fist summer bird with a black-tipped flesh-colored bill and very mottled look to the plumage that tapers from mostly dark on the rear to mostly light at the head, but dark around the eyes. This bird has just fed on a dead herring (visible next to the bird) immediately after a humpback whale bubble net feeding attack. It is apparently satiated as it now ignores the herring.

Larus fuscus Linnæus, 1758, Lesser Black-Backed Gull

FUSS-cuss Latin *fuscus*, dark, swarthy, dusky.

Reports of this bird out on the Peninsula of Mendenhall Lake continue to come in, and try as I might, I can never pull this bird out of the mass of other—and larger—gulls. On the morning of August 27, 2010 there is a report on Eaglechat of a bird along the Airport Dike Trail, so I head out. No sooner than I get out of the car and get my gear ready and head down the trail, I spot the bird! The dark mantle, slender profile and smaller size immediately confirm the identification of this life bird. The bird cooperates and lets me get some photos of him as it works the mud along the Mendenhall River. Sibley notes that "Nearly all North American records are of the paler-mantles Britain/Iceland population..." so the lack of a "black" back isn't unusual. In comparison to all the other gulls around, the mantle is decidedly darker.

I get reports—unconfirmed—that the bird was killed at the airport as part of the wildlife management program. This report leads to a very different conclusion:

> Juneau observers failed to find a Lesser Black-backed Gull in the Juneau area in 2011. At least one Lesser Black-backed Gull has been found in the Juneau area nearly every year since 1990 when an adult at the Juneau landfill 16–19 September 1990 provided the first unequivocal record of this species in Alaska (UAM specimen; Gibson and Kessel 1992). Another adult was found the following summer, in 1991, and an adult, presumably the same bird, was found nearly annually through fall 2010. That bird was also frequently observed in the gull colony near the foot of

the Mendenhall Glacier, where it was paired up with a Herring Gull at a nest with two eggs 12 June 1993 (van Vliet et al. 1993). Considering the bird was at least four years old in 1991, it would have been at least 23 years old in 2010.

Heinl, S.C. & A.W. Piston. 2011. *Summary of southeast Alaska bird observations: Fall: August–November 2011*. http://www.juneau-audubon-society.org/Birds/Reports/2011%20Fall%20-%20SE%20Alaska%20NAB%20Summary.pdf

The somewhat obvious conclusion is that the bird likely perished naturally of old age.

Larus glaucescens Naumann, 1840, Glaucous-winged Gull


glaw-SEH-sens Derived from the Latin *glaucus*, bluish gray.

On April 29, 2009 ~1,000 are calling, soaring above and standing on the peninsula in Mendenhall Lake. They often can be heard from great distances away and out of sight. This is *the gull* species for this area, with numbers in the hundreds of thousands I'm sure. They are visible every day, even when away from the water as they fly over the Mendenhall Valley all the time, presumably headed for the rock cliffs on the peninsula in the lake where they nest. Out on the water they are nearly omnipresent, save for a week or two in late July and early August when they almost disappear for reasons I've not yet been able to determine. Even when the eulachon and sand lance are running in late April and May north of Juneau and many birds head to Berner's Bay, there are still plenty that stick around. This single bird in full breeding plumage (from July 27, 2007) is at Sheep Creek at the Gastineau Channel and well-illustrates the clear light gray mantle without any black, pink legs, and bright red gonydeal spot.

Hydroprogne Kaup, 1829

Latin high-DRAW-poh-nee, American hi-dro-PRO-nee From Ancient Greek ὕδωρ *hudōr*, water + Ancient Greek Πρόκνη *Prokne*, sister to Philomela, as well as the wife of Tereus, and mother of Itys who was changed into a swallow; hence taken as the name for a genus of swallow including the Purple Martin, *Progne* F. Boie, 1826. The word literally means "water swallow" as it flies like a swallow over the water.

Taxonomy: Formerly placed in the genus *Sterna*, mtDNA sequences determined this is a monotypic genus well separated from regular terns. The A.O.U. accepted the change in the 2006 with the 47th Supplement.

Bridge, E.S., A.W. Jones, & A.J. Baker. 2005. *A phylogenetic framework for the terns (Sternini) inferred from mtDNA sequences: implications for taxonomy and plumage evolution*. Molecular Phylogenetics and Evolution 35: 459–469

Hydroprogne caspia (Pallas, 1770), Caspian Tern

Greek Κάσπιοι *Kaspioi*, the name for ancient peoples by the Caspian Sea where the bird was described by Peter Simon Pallas (1741–1811), German naturalist who explored the Urals, the Caspian Sea, China, and the Altai.

Taxonomy: Formerly *Sterna caspia* Pallas 1770

Notes: On May 20, 2011 I'm standing out at the "private" beach on the Moraine Ecology Trail enjoying the view with my guests on a lovely day, I spot five very large terns flying toward us about 20 meters up. Totally unexpected and immediately a bit confused, I put my binoculars to my eyes and exclaime with some amazement, "Caspian Terns!". This is a bird I've long known and see nearly every time I'm to the coast in Georgia and Florida. The bird is considered "rare" in spring, summer and fall in SEAK and "rare" in Juneau in spring and fall. These birds are in full breeding plumage. Apparently a recent arrival (Armstrong & Gordon, 2001), it is a great sighting. On May 12, 2012 I spot four birds in exactly the same place. On a trail meeting with Mary Willson, she tells me nests have been found in Yakutat.

Sterna Linnæus, 1758, Tern

STIR-nuh Apparently from the Old English *stearn*, a sea bird; perhaps derived from the Swedish *Tärna* or Norwegian *Terne*.

Sterna paradisaea Pontoppidan, 1763, Arctic Tern, k̲'eik̲'w, kichyaat

pare-uh-DIS-ee-uh Derived from the Church Latin *paradisus*, Paradise, Garden of Eden; abode of the blessed. Since this bird really doesn't have a home but the sky, its name must derive from the sky as its abode, thus "up in the heavens".

My first observation here was in the sand flats of Mendenhall Lake on May 9, 2009 when I saw 5, then in the afternoon counted 37 at the mouth of the Mendenhall River in the evening. Once they arrive from Patagonia, they are a guaranteed sighting from the Mendenhall Glacier Visitor Center every late spring (April 21 - 26), and it is a fun occasion to await, much like the returning of the swallows to San Juan Capistrano. Their numbers have ranged from a high of 110 in 2010 and a low of 30 in 2007 (Baluss, 2013, personal communication).

When the terns arrive, they seem to not be paired up and the males (?, the sexes are similar, at least to me) take up the challenge of wooing a female by catching small fish (capelin, herring, sand lance and eulachon from salt water and salmon smolt from fresh water) and presenting it as a mating offering while sitting on the ground. As this bird spends the vast majority of its life flying—and in daylight—standing on the ground is a very unusual event that seems strictly related to mating and nesting. Most of the time when I watch this out at Photo Point or on the Nugget Falls Trail, the female seems to mostly ignore the male and only rarely—twice I've seen it—accept the "gift". They obviously do, as nests are made and eggs laid. Surveys at the lake count between 6 to 12 hatchlings a year. When the eggs hatch (June 20 - July 20), the adults become very active flyers as they head out to the channel for food. When they fly back, they seem to follow the Mendenhall River and nearly all of them have a small fish hanging from their beak, making them look hook-beaked! The young fledge between July 2 and 20, but try as I might, I've never knowingly seen a new bird flying.

One day in June of 2009, a group of six were harassing a Bald Eagle right over our heads at the W&T beach. Apparently, the eagle had been over to the nesting grounds and attempted or succeeded at catching a young bird. The terns repeatedly dove at the eagle, head first, attempting to poke it with their beaks. It reminded me of my similar experience with them on Seal Island in Maine. This behavior repeats itself every year and on May 8, 2013 several of us Juneauites out at Photo Point yelled "go get him" to a tern aggressively chasing a Common Raven. The photo of the tern and the Bald Eagle is from July 14, 2011.

Terns frequently sit on the outermost concrete dock at Statter Harbor, sometimes several dozen at a time. I presume they are simply resting. They are common sights in the sky above Auke Bay but I rarely see them over the open water.

I've made a feeble attempt to note the last day I see the birds, but it always sneaks up on me and suddenly they are gone. In 2011 they left the day before a jökulhlaup (July 21) from the Mendenhall Glacier completely flooded their nesting grounds. Had this happened while the birds were still nesting could have been a disaster for this population. In 2012 another jökulhlaup happened on July 6 but was much lower. However high it might have been, the tern nesting was already gone. It seems that Common Raven had already killed off all the chicks and the nesting season was a total loss. In 2012 the terns returned to Mendenhall Lake on May 2. This late date seems to be explained by the very winter-like weather of April. For their first week here, only the edges of the lake are free of ice, dramatically limiting their smolt catching options. I watched some birds head off down the river, presumably to the wetlands to forage for small fish. Surveys show the birds normally leave for the southern migration between July 21 and August 10

Is it the same terns returning to Mendenhall Lake every year? Do the same terns return to the same location in Patagonia and Antarctica for the austral summer? I've not found any banding or tracking studies from Pacific birds to answer this question. None of the Mendenhall birds have been tagged here as their numbers are considered somewhat precarious. Egevang et al. 2010, found the Atlantic birds to be rather faithful to their northern and southern destinations, while adjusting their migration route to wind and ocean resource availability. It seems reasonable to assume our Pacific birds behave similarly.

Gwen Baluss of the U.S. Forest Service monitors this nesting site and the general dates come from her observations.

Family Alcidae Vigors 1825 **Auks, Murres, and Puffins**

Uria Brisson, 1760, Murre

YUR-ee-uh Greek ουρια *ouria*, kind of waterfowl mentioned by Athenaeus.

Uria aalge (Pontoppidan, 1763), Common Murre

Latin ah-AL-geh, American AL-gay Danish *Aalge*, name for an auk.

This is a special bird for our waters, only encountered occasionally, and most often as a swiftly-flying black and white object flying by our whale-watching boat at 25+ knots. My most common observation is a chunky bird with a black top and bright white bottom with narrow wings that beat swiftly as the bird flies no more than 1-3 meters off the surface of the water. Every bird I've seen has been in Saginaw Channel. In 2010 I spotted one bird. 2011 is a banner year for them, having spotted them five times including five birds sitting on the water just 30 yards away from the boat on August 18 when I took the left photo. These birds are beginning their molt to winter plumage with speckling beginning to show on the bird on the left and the white neck and cheek with the curved black eye-line developing on the bird on the right. A week later on the 27th, the two birds on the right are almost completely in their nonbreeding plumage of fall.

Cepphus Pallas, 1769, Guillemot

seh-fuss Greek κεππος *kepphos*, a waterbird; pale waterbird mentioned by Aristotle, Dionysius, Hesychius and others.

Cepphus columba Pallas, 1811, Pigeon Guillemot, k'eik'w

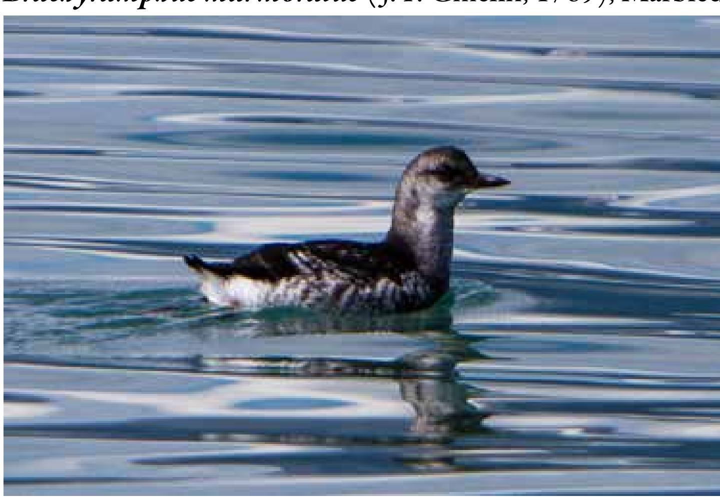
co-LUM-bah Latin *columba*, pigeon; dove.

I see them regularly in late spring and early summer out on the salt water but then they disappear. They return in mid-August and often outnumber the usually more common Marbled Murrelets. Their small size, white wings and distinctive posture make identification easy. Spotting the red legs and feet trailing behind in flight isn't easy in the cloudy or foggy weather, but is obvious when one knows where and what to look for. In early August of 2011 I spotted a single bird in the Gastineau Channel where I've never seen them before.

Brachyramphus Brandt 1837, Murrelet

bra (as in cat)-key-ram-pus Greek βραχυς *brachys*, meaning "short-distance" + Greek ραμφυς ramphus, bill.

Brachyramphus marmoratus (J. F. Gmelin, 1789), Marbled Murrelet, ch'eet, kéel



mahr-more-ah-tus Latin *marmoratus*, marbled; overlaid with marble.

On boat trips in late spring and summer this bird is nearly a guaranteed sighting. Looking like a nerf football with wings, they fly low (under 10 meters and usually much less) over the water with fast wingbeats. It seems as though they have to fly with a great fury in order to keep from falling into the water! Most views are long distance, typically 50 to 100 meters, but occasionally we can sneak up on one before they're intimidated by the boat. The bird on the right got surprised by us and all I could catch with my camera on June 11, 2011 was the tip of one wing, its speckled rump and feet. It does illustrate that these birds are designed for swimming, both in the water and in the air. Their wings are long and pointed for maneuverability and their feet located far rear for paddling, yet they are fast flyers and usually are flying faster than our boats, even when we're doing 30 knots +. As they come up behind us, it seems they have a need to pass us on the bow as I've never seen them move to the other side of the boat from the rear. They are always fun to watch.

Order Columbiformes Latham 1790

Family Columbidae Illiger 1811 **Pigeons and Doves**

Columba Linnæus 1758, Pigeon

co-LUM-buh Latin *columba*, pigeon; dove.

Columba livia Gmelin, 1789, Rock Pigeon, gus'yé kindachooneidí

lih-VEE-uh Latin *livere*, be livid or discolored; be envious; reason for use undetermined.

Taxonomy: When did this bird get the name change from dove and how did I miss this? AOU 44th Supplement in *The Auk* 120(3):923–931, 2003 "Change the English name of *Columba livia* to Rock Pigeon, to conform to the recent name change by the British Ornithologists' Union (1992)". Pigeon makes much more sense, particularly since that's what everyone calls them.

Notes: The only place I regularly see them is downtown, only once at Salmon Creek and only once in the Mendenhall Valley. Is this because the eagles will snatch them as they move away from the urban environment? They occasionally do get as close to the water's edge as the Coast Guard station building, but have to compete with the myriad of gulls that usually hang out there.

Order Apodiformes Peters 1940

Family Trochilidae Vigors 1825 **Hummingbirds**

Selasphorus Swainson (1832), Hummingbird

seh-LAS-for-us Greek σέλας *selas*, brightness rooted in flame + Greek suffix -φόρος -*phoros*, to bear; hence carrying flame.

Selasphorus rufus (Gmelin, 1788), Rufous Hummingbird, dagitgiyáa

ROO-fuss Latin *rufus*, red; red-haired.

First 2 on May 3, 2009 on the West Glacier Trail at the covered bench. The same day I see my first early blueberry flower I see my first hummingbird. Coincidence? This set the pattern for every year until 2013.

> Upon arrival in Southeast Alaska, the rufous must obtain nectar from flowers adapted for insect pollination, such as blueberries, salmonberries and rusty menziesia, because only near the end of their nesting season is there a significant bloom of flowers adapted for hummingbird pollination.

(Nature, p. 30).

It seems here they follow the blueberries north, arriving in synchrony with the flowers so there is no coincidence, just good sense.

April of 2013 was cold (mean temperature of 36°F, 5°F below normal) and snowy (14 days with measurable snow) and few flowers came out. The only blueberry flowers I could find were in very open areas like the Airport Dike Trail. Even into the first week of May, most early blueberry bushes are flowerless! I've placed a hummingbird feeder on our front window for three years and this is the first year I've seen hummingbirds visit it. There seems to be little food for them in the wild and many of us are wondering how many of the tiny birds won't survive.

Order Coraciiformes Forbes 1884

Family Alcedinidae Bonaparte 1831 **Kingfishers**

Megaceryle Kaup 1848, Kingfishers

Latin meh-GA-ker-lee, American meg-gah-SIR-lee Byzantine Greek μέγας megas, big + Greek κηρύλος *kerulos* hence *ceryle*; a bird mentioned by Aristotle, Hesychius and other authors, not further identified but probably mythical and associated with the halcyon, a bird often identified as a kingfisher.

Megaceryle alcyon (Linnæus, 1758), Belted Kingfisher, tlaxaneis'

AL-see-on Ancient Greek Ἀλκυόνη *Halkyónē*, halcyon; referring to the metamorphosis of the goddess Alcyone, wife of Ceyx, into a bird usually identified as a kingfisher.

A regular in the ponds of the Dredge Lakes area and common along the shoreline of Mendenhall Lake and the beaver ponds of Steep Creek. I see them on every river system I hike in mid-summer and along the immediate coastline. My best guess is their primary food here are salmon fry. I see no other small fish in the ponds or streams.

Order Piciformes Meyer & Wolf 1810

Family Picidae Vigors 1825 **Woodpeckers and Allies, gandaadagóogu**

Sphyrapicus Baird 1858, Sapsucker

Latin s'phi-RAH-pih-cuss, American sphere-ah-pih-cuss Greek σφῦρα sphura, hammer + Latin *Picus*, woodpecker.

Sphyrapicus ruber (Gmelin, 1788), Red-breasted Sapsucker

ROO-bur Latin *ruber*, red, ruddy, painted red.

The only place I see this bird with any frequency is on the Rainforest Trail. Only twice have I seen one on the East Glacier Trail and only on September 18, late in the evening, did I see one fly away from us, white back stripe plainly visible, on the West Glacier Trail. Along the Rainforest Trail are many hemlocks with sapsucker holes in the bark. Why don't they go after the black cottonwood (*Populus trichocarpa*) with its far thinner bark and presumably far less tannic sap?

Picoides Lacépède, 1799, North American Woodpecker

Latin phi-CO-ih-dees, American pih-COY-dees From genus *Picus*, Latin *picus*, woodpecker + Greek όιδες -*oides*, resembles, looks like.

Picoides villosus (Linnæus, 1766), Hairy Woodpecker

vil-low-sus Latin *villosus*, shaggy.

Right at the beginning of the Airport Dike Trail on the day I was looking for the Lesser Black-backed Gull (August 27, 2010), I heard a bit of commotion in the willow thicket where the construction had made a mess of the plants. I stop and look carefully and find a dark bird back in the thicket with an obvious white stripe down its back. I began to concentrate on getting a photo, but the bird wasn't being cooperative and kept going deeper into the thicket and all I got was his stripe with his head cut off! I was able to get a couple of quick views of the thick bill, which coupled with the large size, confirming it as a Hairy Woodpecker, the only one I've seen in Juneau.

Colaptes Swainson 1825, Flicker

co-LAP-tees Greek κολατες *kolaptes*, chiseller.

Colaptes auratus (Linnæus, 1758), Northern Flicker

Latin are-AH-tus, American are-AYE-tus Latin *auratus*, gilded, overlaid, adorned with gold.

Order Passeriformes Linnæus 1758

Family Tyrannidae Vigors 1825 **Tyrant Flycatchers**

Contopus Cabanis 1855, Peewee

Latin KON-toe-pus, American con-TOE-pus Greek κοντώς *kontos*, pole, shaft + πούς *pous*, foot.

Contopus cooperi (Swainson, 1832), Olive-sided Flycatcher

Honorific for U.S. zoologist William Cooper (1798–1864).

On August 22, 2011 at the Steep Creek Bridge two very large (for flycatchers, at least) birds are flying about the snags in typical flycatcher fashion, sitting, swooping, sitting and swooping again. These large birds sit quite vertically, have very short tails and are uniformly brown save for a rather white chin and bib. This means they can only be this species, new for me in Alaska.

Empidonax Cabanis 1855, Flycatcher

em-PIH-duh-naks Greek ἐμπίς *empis* gnat, mosquito + ἄναξ *anax* lord (tribal), master; from their ravenous appetite for the insects.

Empidonax difficilis S. F. Baird, 1858, Pacific-slope Flycatcher

Latin dih-FIH-sill-is, American dih-fih-sill-is Latin *difficilis*, difficult, troublesome; hard; obstinate, intractable; inflexible.

Only in spring do I spot any empidonax—called empids for short—flycatchers, and make this identification largely on the maps in Sibley coupled with the yellow-olive underparts of the mature birds I see. The others on the checklists here are far more gray-backed and white underneath.

Myiarchus Cabanis 1844, Tyrant Flycatchers

my-ee-are-cuss Greek μυῖα *muia*, fly + Greek ἀρχός *archos*, ruler, chief, leader; from their ravenous appetite for the insects.

Myiarchus crinitus (Linnæus, 1758), Great Crested Flycatcher

Latin CRIH-nih-tus, American crih-NYE-tus Latin *crinitus*, hairy; having long locks, long haired.

On my last day in Juneau, October 3, 2009, I head out to do some errands, one of which is to stop at the University of Alaska Southeast student housing area to see if I can find the flycatcher that's been all over Eaglechat since September 30. There are three records for this species in Alaska and they are all on September 29! What a coincidence this is. It is a very rare bird for Alaska, listed as "accidental" on the state checklist.

I drove through this morning, but didn't see anything that resembled what I'd read about where the bird was, so left. At home, I called Beth Peluso, who saw the bird, and she gave me good directions. I simply parked near building A and walked around. I spotted a bird between A and C in a western hemlock (*Tsuga heterophylla*) and put my binoculars to it and sure enough, it's the flycatcher. I spent the next 45 minutes following it as it flew around the four buildings nearby, trying to get a decent photograph and shot 46 but kept only 6! The bird was the perfect flycatcher, perching up high and swooping down low and every once in a while stopping in a bush, usually a red osier dogwood, to peck at one of the ripe, white fruits. While on the Sitka spruce (*Picea sitchensis*) leader (photograph) it made about a half dozen calls, all perfect for this species. All this in an area full of people and activity. One 5-year old boy followed me around for 20 minutes wanting me to play sword with him, but he did look and see the bird, at least for a moment.

Family Corvidae Vigors 1825 **Jays and Crows**

Cyanocitta Strickland 1845, New World Jay

sigh-ann-oh-sih-tuh Greek κυανός *kuanos* dark-blue; Latin *cyaneus*, dark blue; sea blue + Obscure Greek *citta*, bird.

Cyanocitta stelleri (J. F. Gmelin, 1788), Steller's Jay, x'éishx'w

stel-lair-ee Honorific for German naturalist Georg Steller (1709–1746).

It is so fitting to see Steller's namesake bird near where he made the first scientific journey in Alaska. The observation point on the East Glacier Trail is a good spot to find this guy, and they fly about the Mendenhall Valley regularly, but they are not really very aggressive, at least not as much as at Crater Lake where, along with Clark's nutcracker and gray jaw were called "camp robbers". The birds here seem large to me, perhaps because I have so much experience with the blue jay of the east, a smaller bird. While common, they are not encountered on every hike in the Mendenhall Glacier Recreation Area.

Pica Brisson, 1760, Magpie

pie-kuh Medieval Latin *pica*, magpie; jay.

Pica hudsonia (Sabine, 1823), Black-billed Magpie, ts'eegeení



hud-sewn-ee-uh Of or pertaining to Hudson Bay.

New to my Juneau list on September 10, 2009, this showy, raucous bird lands in the top of a 20-foot black cottonwood (*Populus trichocarpa*) just 10 yards away and one of my guests spots it and asks what in the heck it is. Unmistakable, I immediately exclaim its name and say its my first sighting here of this species! This bird leaves Juneau for the summer, returning in tiny numbers (1-9 *The Mendenhall Wetlands*) in September and remains in small numbers (10-99) from October through April. It has now become a sign of late fall when the leaves are about half gone and the prospect of oncoming winter. On September 27, 2011 I spotted my first "out-the-road" at Mile 26 swooping across the road in the unmistakable manner of a magpie. Later in the day while biking along the Eagle River at Eagle River State Recreation Area I find a group of nine foraging about the low-tide mudflats looking for, and finding, bits of salmon left by the other scavengers. Try as I might, I've never seen on in April when I arrive.

Corvus Linnæus 1758, Crow

CORE-vuss Latin *corvus*, crow or raven.

Corvus caurinus Baird, 1858, Northwestern Crow, ts'axweil


Latin CAR-ih-nus, American car-EYE-nus Late Latin *caurinus*, of, belonging to the northwest wind.

Omnipresent in all habitats. I know I would have great difficulty distinguishing this species from the American crow, and fortunately, I'm well north of where the two species overlap. Sibley notes they are "identical to American Crow except in voice" but describes that as "slightly lower, hoarser and more rapid than American Crow" and "not identifiable except by range" so good luck in the interior of British Columbia where both occur! I think the three crows will be merged into a single species at some point. The adult bird on the left is begging for food at Eagle Beach picnic area on June 12, 2011 while the juvenile on the right is making a lot of noise around its mother, seemingly begging for food from her, near Haines on July 26, 2008.

Many novice birders get confused by crows and ravens and it does take a practiced eye to distinguish between the two when briefly spotted or watched from a distance. Up close like these two, it's very easy. Their bills, while large, do not dominate the face and the "moustache" is much shorter than the obvious nasal bristles of the crow. Size can be confusing, but Ravens are always larger than Crows. In flight the tails are different.

Corvus corax Linnæus, 1758, Common Raven, yéil


core-axe Latin *corax*, raven.

Each April on arrival in Juneau, I have to get my mind right about this bird as I'm used to them being very rare in the East. Here they are omnipresent in all habitats and particularly abundant downtown and along the docks there and at Auke Bay. They are less common on the water than crows. It doesn't take long when one sees so many raven and crow to be able to distinguish them at a glance. The juvenile on the right soars, unlike most crows, and has a wedge-shaped (not triangular) tail that distinguish them from crows.

One of the most fascinating opportunities for studying raven are listening to their calls. In fact, one phrase most naturalists here use is "if you hear a call you don't recognize, it's probably a Raven". They are far more trouble with trash cans than bears as they watch people open and close the bear-proof cans and learn, often remarkably quickly, how to open them.

Alaudidae Vigors, 1825, **Larks**

Eremophila F. Boie, 1828, Horned Lark

Greek *erēmophilēs* desert-loving, from έρημος *erēmos,* desert + φιλέω *phileō,* to love.

Eremophila alpestris (Linnæus, 1758), Horned Lark


Latin *alpestris,* of the high mountains

Just as I'm leaving the point, a bird flies out of the woods and lands on a rock about 5 meters in front of me and I'm stunned to immediately recognize it as a lark! The very unique black chest crescent, swooping black face marks and little horns are totally unique to this bird.

Before I can take off my pack and get out the big camera, the bird drops over the edge and out of sight. With the big gun in hand, I look over the edge and spot it foraging on the lichen-encrusted rocks 4 meters below me. I snap a large number of photos hoping for at least a record shot where the identity of the bird is certain, this is a pretty severe crop of the best of the lot.

This bird is list as rare in spring in the *Birds of Southeast Alaska* checklist and *Guide to the Birds of Alaska*. The Juneau Audubon checklist considers it occasional ("Very small numbers at least briefly in each year; may be very hard to find.") making this a significant sighting. I tell Doug Jones about this bird on May and he tells me he's only seen the bird here once.

Family Hirundinidae Vigors 1825 **Swallows**

Tachycineta Cabanis [1851], American Swallows

Latin ta-key-KIH-neh-tah, American tack-ee-sin-eh-tuh   Greek ταχυς tachýs, swift + κινεώ kīnéō move.

Tachycineta bicolor (Vieillot, 1808), Tree Swallow

Two-colored.

I spot them first on April 30, 2009, flying all about Valley Boulevard on a very sunny day and see them until late summer when they disappear.

Tachycineta thalassina (Swainson, 1827), Violet-green Swallow

Latin tha-LASS-sih-nuh, American thala-sin-uh   Latin *thalassinus*, sea-green.

The first swallow I see from the house is this one, a favorite bird learned well at Crater Lake. From my bedroom and office window, I can see them at eye level and note the white that extends above the eye to distinguish them from the Tree Swallow that proves to be far more common. The green back isn't as good a field mark as it really depends on the angle of light and the Tree can show a green flash when turning in sunlight.

Riparia Forster 1817

rye-pear-ee-uh   From specific name *Hirundo riparia*; Latin *riparius*, bank-nesting (*ripa*, river-bank).

Riparia riparia (Linnæus, 1758), Bank Swallow

Hirundo Linnæus 1758, Swallow

high-run-do   Classical Latin *hirundo*, swallow; martin; small bird.

Hirundo rustica Linnæus, 1758, Barn Swallow

Latin *rustica*, of the country(side).

Second in number to the Tree, this swallow nests in the rafters of the pavilions at the Mendenhall Glacier Visitor Center and flies just overhead almost every day from spring through summer, disappearing the first week of September. Sometimes it looks like they are dive bombing the folks walking along at the center! On July 9, 2011 the two fledglings on the right were content to sit on the cap of the fence along the stairs to the Mendenhall Lake beside the pavilion. Perhaps three dozen people walked by as I stopped to admire the fellow, they seemed totally nonplussed by all the commotion. They look plump and well-fed. Perhaps they are contemplating life on their own when they must feed themselves!

Family Paridae Vigors 1825 **Chickadees and Titmice**

Poecile Kaup 1829, Chickadee

PEE-sih-lee Greek ποικίλος *poikilis*, unknown small bird.

Poecile rufescens (J. K. Townsend, 1837), Chestnut-backed Chickadee, kaatoowú

Latin ROO-feh-sens, American roo-FEH-sens Derived from the Latin word *rufus* red; red-haired.

Our adorable little tit, these guys were far more uncommon in spring than I was expecting. I hear them regularly, but not in large number and not every day on the trails as I expected. During summer and early fall they became more abundant, and in August are nearly always out in the spruce on the Moraine Ecology and a few on the East Glacier Trails. I find them terribly hard to photograph as they never sit still, always rapidly moving about searching for the little insects that they glean from under the leaves, in the flowers and fruits, particularly of the alders. This fellow was one of several dozen along Steep Creek at the dike approach trail on September 29, 2011.

Family Sittidae Lesson 1828 **Nuthatches**

Sitta Linnæus, 1758, Nuthatch

SIT-tuh Ancient Greek σιττα *sittē*, a bird like a woodpecker mentioned by Aristotle, Callimachus and Hesychius; hence nuthatch.

Sitta canadensis Linnæus, 1766, Red-breasted Nuthatch

ca-nuh-DEN-sis Of or pertaining to Canada.

September 15, East Glacier Trail, sitting atop a Sitka spruce (*Picea sitchensis*), I heard it's *yank yank yank* first, turned and spotted it on the tree. Armstrong and the Juneau checklist consider this an uncommon bird in Southeast Alaska for the fall.

Family Troglodytidae Swainson 1832 **Wrens**

Troglodytes Moehring 1758, Wren

traw-glow-die-tees Greek τρωγλοδύτης troglodutes, one who lives in a cave; in seclusion.

Troglodytes pacificus Baird, SF, 1864, Pacific Wren, woolnáx̲ wooshk̲áx̲

puh-SIH-fih-cus Of or pertaining to the Pacific Ocean; here the Pacific coast of North America.

Resplit from *Troglodytes troglodytes*, Winter Wren by the American Ornithological Union in 2010. Many are singing on the West Glacier Trail on May 3, but I never see any of them but take care of than on May 7 on the Bishop Point Trail where Dan Hopson and I see at least a dozen. They sing on every East and West Glacier trail hike from May through June.

Family Cinclidae Sundevall 1836 **Dippers**

Cinclus Borkhausen 1797, Dipper

Latin KIN-klus, American sing-clus Greek κικλνος *kinklos*, small, tail-wagging, unidentified waterside bird mentioned by Aristotle, Aristophanes, Aelianus and other authors, Latin *cinclus*, latticework.

Cinclus mexicanus Swainson, 1827, American Dipper, water ouzel, hinyikl'eixí

mex-ih-cane-us Of or pertaining to Mexico.

Mary Willson has studied these birds along Steep Creek for many years and this year tagged one of the females on the leg and the wing, but I never saw it. While resident here, it takes a good eye and a long watch to find them on Steep Creek and they cannot be counted on for every crossing of the upper bridge. The section above Glacier Spur Road is their nesting area and here they usually flit about in the brush, but often will pose as we stand and the lower bridge and watch them. They also frequent the salmon viewing crossing of Steep Creek (where the photo on the left was taken August 27, 2010) as well. When they comply with their name and dip while standing on a rock or branch above the water they delight. When they head underwater and walk upstream, its a hoot to watch this unique feeding behavior. Their long toes grab onto the gravel of the bottom—even slippery algae-covered—and have no trouble walking against the substantial current of the stream. With this unique feeding technique, they have a food source not taken by many other animals.

The photo on the right, from a very foggy and rainy July 18, 2008, is of a recently fledged juvenile who is severely pestering its mother for food. We watched this persistent bird for nearly a half hour while the mother simply ignored it, a strategy that is probably helping the survival chances of the young bird as it needs to learn to feed itself. Here on the shores of Mendenhall Lake, I assume the abundance of insect larvae is far lower than up Steep Creek.

Family Regulidae Kinglets

Regulus Bartram 1791, Kinglet

Latin REH-guh-lus, American reh-GEW-lus Latin *regulus*, petty king, prince; referring to the colored stripe, “crown”, of many species in the genus.

Regulus satrapa Lichtenstein, 1823***,*** Golden-crowned Kinglet

Latin SA-trah-puh, American sah-trap-uh Latin *satrapa*, governor; viceroy.

Nowhere near as common as the ruby-crowned, I spot them most commonly in summer and in August mixed in with the ruby-crowned as fledglings in outwash area and less commonly on East Glacier Trail. The golden crown is not always visible, but the white eye-stripe is, which along with the usually prominent wingbars distinguishes it from the Ruby-crowned.

Regulus calendula (Linnæus, 1766), Ruby-crowned Kinglet

Latin cah-LEN-dew-lah, American cah-lend-you-lah Latin *kalendae*, then *calendula*, meaning first day of the month; shared with the genus of common garden plants, the name probably refers to “all the time” as in the plant flowering all year and the bird singing all year.

First heard then observed on May 7, 2009 on the Bishop Point Trail, this bird is abundant and at least heard singing every day from April through early June, then only occasionally seen during the summer and when heard only chips. The nesting season near the glacier was highly successful with literally dozens of fledglings seen of most every walk of the Moraine Ecology Trail or East Glacier Trail during summer. In September, some are still flitting about between the spruce and cottonwood in the outwash area. Their call is loud and enchanting and especially welcome on a nice spring day, even if their rather dull olive-green color isn’t up to the color of their cousin. The ruby crown is not often seen as the bird can completely cover the crown with its olive feathers.

Fmily Turdidae Rafinesque 1815 **Thrushes**

Sialia Swainson, 1827, bluebirds

Greek σιαλίς *sialis, an* unidentified bird, so-called from its cry, mentioned by Athenaeus and Hesychius; the “Blew Bird” of Catesby (1731).

Sialia currucoides (Bechstein, 1798), Mountain Bluebird

Latin *curruca*, an unidentified small bird mentioned by Juvenal and the specific name of the Lesser Whitethroat of temperate Europe + Greek όιδες -*oides*, resembles, looks like; from its resemblance to the bird.

On a Juneau Audubon Society bird walk at Eagle Beach on April 14, 2012 we are greeted by this very uncommon bird in the Juneau area that cooperates by sitting on a spruce leader on the dike just past the end of the parking lot and allows a reasonably close approach if about 40 yards. This is about a 50% crop of the image from my 7D with 70-200 at 200 with the 2× multiplier at 400 mm for an effective 640 mm with the crop factor. I have to admit, I was thinking Western Bluebird and comment when I get the bird in my binoculars about very little orange, betraying the fact that I don't have all our birds' ranges in my head. I'm then corrected on the species. We are well away from the range of the Western and a bit west of the normal interior migration pattern for this bird. It is listed for SEAK as "rare" in spring and summer and "very rare" in winter and Juneau as "rare" in spring and summer. So this is an excellent find and a great way to start birding.

While dog walking on the Industrial Drive access to the Mendenhall Wetlands on May 3, 2012 I come across another sitting atop the chain link fence. It lets me approach to within 25 meters before it flies off into the scrub, to return to the fence after we pass.

Catharus Bonaparte 1850, Thrush

CA-thar-us Greek καθαρός *katharos*, pure, clean; presumably for the nearly white belly of many species.

Catharus ustulatus (Nuttall, 1840), Swainson's Thrush

Latin us-TOO-lah-tus, American us-tew-lay-tus Latin *ustulatus*, russet-backed.

This bird is the best sound at Gastineau Guiding's office on the Rock Dump in spring. They sing loud and clear all day, every day! Angelyn Bennion considers them her favorite bird and this song one of her favorite sounds. Since she spent so much time in the office, it seems like these birds were there to give her at least the sound of being out on the trail. They are just as common in the Delta Western boneyard. Curiously, they are far less common on the trail, but often heard on East Glacier. Their call is a distinctive rising spiral of flute-like tones. They seem to like the shrubby cover that all the , Sitka alder (*Alnus viridis*) give them in the abandoned areas of the Rock Dump.

Catharus guttatus (Pallas, 1811), Hermit Thrush

guh-taw-tus Latin *guttatus*, derived from *gutta*, drop, spot, speck; for the speckled breast.

I saw this bird on *every* East Glacier Trail hike during breeding season and they produced many little ones this year. Once July and August hit, the seemed to disappear entirely! On September 11 out on the Rainforest Trail a group of ~12 flitted around and poked among the stones on the beach. What were they doing? Obviously feeding on things, but I've never seen this behavior before or seen them on the shoreline.

Turdus Linnæus 1758, Robin

TUR-dus Latin *turdus*, thrush.

Turdus migratorius Linnæus, 1766, American Robin, shoox'


my-grah-TORE-ee-us Latin *migrare*, transport; move; change residence; to *migrator*, *migratoris* migrant, wanderer.

My first sighting is on May 7, 2009 on the Bishop Point Trail. I see these birds almost daily in the Mendenhall Valley but their numbers definitely decrease during mid summer but return to spring levels in late August. The photo on the left is from a glorious May 29, 2010 high up on Mount Roberts above the Gastineau Channel sitting on the greenstone in its spring finery. The bird on the right is gathering old man's beard lichen (*Dolichousnea longissima*) for a nest along Steep Creek by the dike approach trail on May 19, 2011. In 2011 they arrive just like the first ship of tourists: first there were none and now they are abundant! They are always around when I leave in October.

Ixoreus Bonaparte 1854, Varied Thrush

iks-OAR-ee-us Greek ιξος ixos, mistletoe + *oreos*, mountain from their habit of eating the berries in the mountains of the west.

A monotypic genus.

Ixoreus naevius (J. F. Gmelin, 1789), Varied Thrush

NEE-vee-us Latin *naevius*,spotted, marked

My first hearing of my first season was on May 7, 2009 on the Bishop Point Trail. The "telephone call in the woods" is a common sound, and I note that it is appropriately called "varied" as they have a low, mid and high pitched ring tone. While nesting here, during July the young are almost everywhere on the East Glacier and Moraine Ecology Trail, once the babies fledged, the birds seemed to disappear for the month of August and the first I saw after that was on the East Glacier Trail on September 8. This was in brilliant adult plumage which makes me wonder if it isn't one of this year's young in new feathers. Was their disappearance simply due to their silence? Probably.

A curious feather pattern shows up here on some birds yet I've never seen it in a field guide or in the literally hundreds of photos available online to view: white patches at the tips of the outer wing feathers. American Robin have this pattern and one comment on the Juneau eaglechat listserve wondered if it represented a hybrid bird. As no other part of the thrush is robin-like, I'm sure that is not the case. It could be this is a recessive trait that might harken back into the bird's evolutionary history.

This is an incredibly difficult bird to photograph as it's a deep woods dweller, here partly obscured by branches between me an the bird on October 4, 2010 along the dike approach trail to the Trail of Time.

Family Sturnidae Rafinesque 1815 **Starlings**

Sturnus Linnæus 1758, Starling

STIR-nus Classical Latin *sturnus*, starling.

Sturnus vulgaris Linnæus, 1758, European Starling

vul-gare-is Latin *vulgaris*, usual, common, commonplace.

While shuttling a Photo Safari from the Glacier to Auke Bay at Mendenhall Loop Road (Back Loop) and Glacier Spur on September 16, a bird flew from off the road to the right directly in front of the van then turned around and headed back toward the house. It's bright yellow beak and chunky black body with characteristic starling flight made it an easy ID. While listed as "uncommon" on the checklists, this means it is usually found in suitable habitats which for this bird is urban areas. This is my first sighting of the bird in Juneau and asking around the only one who recalls seeing them is Skip Gray near the KTOO building downtown.

Family Motacillidae Horsfield 1821 **Wagtails and Pipits**

Anthus Bechstein, 1805, Pipit

ANN-thuss Latin *anthus*, small bird that inhabited grasslands mentioned by Pliny, not further identified. Anthus, son of Antinous and Hippodamia, was killed by his father's horses and metamorphosed into a bird which imitated the neighing of horses but fled at their sight.

Anthus rubescens (Tunstall, 1771), American Pipit

Latin ROO-beh-sens, Americanb roo-BEH-sens Derived from the Latin *rubescere*, turn red, redden, become red.

A spring and fall bird here, nearly absent in the summer, I saw my first here on May 9, 2009 on the Airport Dike Trail with at least 25 in the rock rip rap along the Mendenhall River right at the north end of the runway. While common in spring and fall and regularly sighted in the summer, this is an easily overlooked bird. I don't see one every year! My first clue to identification is a sparrow-like bird with no obvious markings or color patches, a rather blah bird. A closer look reveals a subtle superciliary line (eyebrow) and a pale throat that can create at least the impression of a gray cheek triangle accented by a dark black eye. The general outline of the bird is that of a trim sparrow with a long tail. If the tail wags, it's a good diagnostic character. The birds are often in groups. On May 9, 2013 a loose flock of 13 played around the shallow water along the Nugget Falls lakeshore trail with many of the birds out on the ice picking around as it they are foraging. What would be out on the ice? l

Family Bombycillidae Swainson 1831 **Waxwings**

Bombycilla Vieillot 1807, Waxwing

Latin bom-BIH-kih-lah, American bom-bih-sill-uh Greek βομβυξ *bombux*, *bombukos*, silk + Modern Latin *cilla*, tail; Latinized from the German name *Seidenschwanz,* silktail, for the Bohemian Waxwing.

Bombycilla cedrorum Vieillot, 1808, Cedar Waxwing

see-droor-um Latin *cedrorum*, of the cedars

During the month of July these are a nearly every walk sighting at the upper bridge over Steep Creek on the Trail of Time. Less frequent on the Moraine Ecology Trail, they still are out there, and several times they were in the black cottonwood (*Populus trichocarpa*) in the back yard on Valley Boulevard. Did they nest? They were here long enough to have done so, but I never saw any fledglings, all had perfect adult plumage.

Bombycilla garrulus (Linnæus, 1758), Bohemian Waxwing

Latin gahr-roo-lus, American gare-you-lus   Latin *garrulus*, chattering, babbling, noisy.

On July 14, 2010 while walking down the stairs at the pavilion at the Mendenhall Glacier Visitor Center I spot two waxwings that have a very different look to them: they seem large and far more plump and more gray than rich tawny in color. As they flit between the willows a white wing spot and trailing inner wing is obvious, a character their cousin Cedar Waxwings lack. When they land in the willow, they have two white spots, one low on the wing behind the red wax and one halfway to the shoulder. I now have a new life bird!

Family Parulidae Wetmore et al. 1947 **Wood Warblers**

Taxonomy: This family underwent a significant overhaul with the *Fifty-second supplement to the American Ornithologist's Union Check-list of North American Birds* published in *The Auk* 128(3):600–613, 2011. The ABA checklist version 7.3 of November 2011 adopted the AOU changes as well. No common names have been changed, but there has been a wholesale revision of the family: 40 species changed scientific names; 1 new genus added; 6 genera have been lumped with other genera; and, a new linear sequence has been created. Former names are included here.

Parkesia Sangster, 2008, Waterthrush

Latin par-KEH-see-uh, Americian PARK-see-uh   Honorific for U.S. ornithologist Dr. Kenneth Carroll Parkes (1922–2007).

Parkesia noveboracensis (Gmelin, 1789), Northern Waterthrush

Latin *novus*, new + *Eboracum* York, England; hence New York, United States.

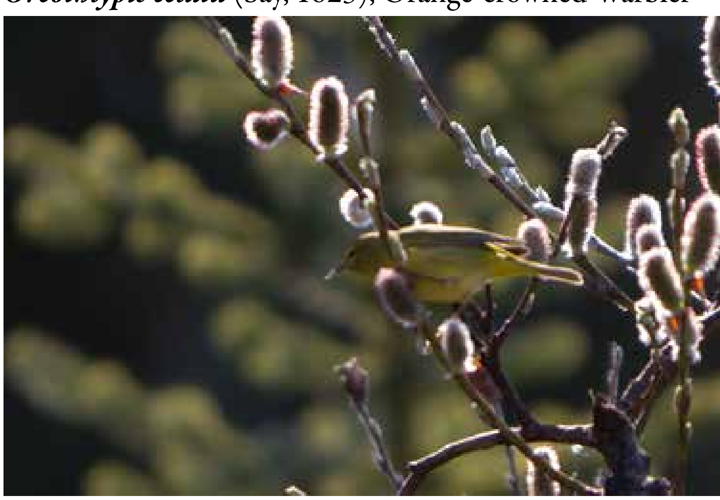
Taxonomy: formerly *Seiurus noveboracensis*

Notes: On May 3, 2009 I spot a single bird walking along the west shore of Mendenhall Lake just east of the start of the West Glacier Trail. At first I was going to call this a pipit as it was rather yellow-tan, but the horizontal habit and lack of white outer tail feathers ruled that out. When it stopped and started bobbing, I looked much closer and the plain dark back, pale and thin eye stripe with the streaked breast simply shouted Waterthrush although the bird was way out in the open, something I've not observed before.

Oreothlypis Stejneger 1884, New World Warbler

Greek όρος *oros*, mountain + θλυπις *thlupis*, an unidentified small bird, perhaps some sort of finch or warbler.

Oreothlypis celata (Say, 1823), Orange-crowned Warbler



Latin SEH-lah-tah, American seh-LAH-tah   Latin *celatus*, secret, hidden.

Taxonomy: formerly *Dendroica celata*

Notes: While considered “common” spring through fall, I find them an occasional bird of the glacial outwash plain, I see them irregularly near the Mendenhall Glacier Visitor Center when on Whales and Trails walks along the Moraine Ecology Trail. Their numbers seem to vary from year to year and 2013 was a “banner” year for them. I’m thinking this is because the willow are flowering so much later and it is one of the few places where they’re able to find small insects and has concentrated them in the outwash plain where the willow abound. Their call is very reminiscent of the multitude of Oregon Junco here and it takes some aural study to be able to distinguish them, but the warbler has a more melodic tone than a straight chipping trill.

Geothlypis Cabanis 1847

Greek *geō-* ground + θλυπις *thlupis*, an unknown small bird, perhaps some sort of finch or warbler

Geothlypis tolmiei (J.K. Townsend, 1839), MacGillivray’s Warbler

Honorific for Dr. William Fraser Tolmie (1812–1886); Scottish doctor, explorer, collector and Hudson Bay Company official in western North America (1833–1860).

The common name is an honorific for Scottish Ornithologist William MacGillivray (1796–1852).

A regular summer visitor that is often heard and seldom seen in the woods above Thane Road. It apparently nests in the Sheep Creek valley.

Geothlypis trichas (Linnæus, 1766), Common Yellowthroat

Greek τρίχας *trikhas*, a type of thrush, apparently from α *thrix*, τρίχος *trikhos*, hair, but could also be from τρίχας *trichas*, divided into threes. Etymology obscure.

I hear this bird’s distinctive wichy-wichy-wichy or wichety-wichety-wichety call with some regularity on the outwash plain of the Mendenhall Glacier, but I rarely see the distinctive bird’s yellow chest, black eye-stripe and olive back.

Geothlypis petechia (Linnæus, 1766), Yellow Warbler

peh-teh-chee-uh Italian *petecchia* small red spot on the skin, in this case red feather spots on the breast.

Taxonomy: formerly *Dendroica petechia*

Notes: Perhaps the most widespread of all the warblers in North America, one can find this lovely yellow bird just about anywhere in the Juneau area beginning in late April. The Moraine Ecology Trail seems to be a hotbed of nesting for this gorgeous little warbler, but they are common all about the alder thickets at the Mendenhall Glacier Visitor Center and in the Rock Dump as well. In May their *sweet, sweet, you’re so sweeet* call is pleasant to hear and easily identified for just about the entire month and the males call for a female to mate with. The fledglings of this warbler stay with mom for a long time, well into July (I took this photo on the Steep Creek Trail on July 8, 2010), constantly begging for food well beyond the time they should be able to forage for themselves. By mid-August, it takes a lot of work to find one of these birds as the fall migration south has them all exiting the area.

Setophaga Swainson 1827, North American Warbler

Latin seh-TAW-fah-guh, American seh-toe-FAY-ga Greek σης *sēs* moth + φαγος *-phagos*, -eating.

Taxonomy: When modern genetics found that redstarts and dendroica warblers were paraphyletic and needed to be merged into a single genus, the arcane world of taxonomic rules required the wholesale name change of all 29 members of the genus *Dendroica*. The genus *Setophaga* Swainson 1827*,* formerly including only the redstarts, has priority over *Dendroica* G. R. Gray, 1842 since it was published first. The A.O.U accepted the change with the 52nd supplement in 2011. The change had no effect on common names. Many birders still call the group "dendroica" warblers.

Lovette, I.J. et al. 2010. *A comprehensive multilocus phylogeny for the wood-warblers and a revised classification of the Parulidae (Aves)*. Molecular Phylogenetics and Evolution 57 (2): 753–70

Setophaga coronata (Linnæus, 1766), Yellow-rumped Warbler, Audubon's Warbler, butter-butt

Latin co-ROW-nah-tus, American core-oh-NAY-tus

Latin *coronatus*, garlanded, adorned with wreaths.

Taxonomy: formerly *Dendroica coronata* (Linnæus, 1766)

Setophaga coronata auduboni (J. K. Townsend, 1837) is the trinomial for the western population of the Yellow-rump which was previously recognized as a separate species, *Setophaga auduboni* or *Dendroica auduboni* (J. K. Townsend, 1837) and called Audubon's Warbler. Easily differentiated from the eastern population by their yellow (rather than white) throat.

Notes: This is by far the most common warbler I encounter. I was not expecting this, but they are everywhere, and they do not disappear during summer. They are common, if not downright abundant, on the Moraine Ecology Trail. July brings a large number of fledglings to the outwash plain and lower brushy slopes with their fluffy young feathers looking a bit ragged, yet the "butter butt" is bright and showy. Unlike their Yellow Warbler relatives, the young butter butts seem to congregate together without adults. In late August and early September a flush of new birds come through as their numbers definitely rise from August. Could it be that their "butter butts" are just more easily seen and identified? I don't think so, as I still see lots of the little olive birds like kinglets. When in breeding plumage, this is one gorgeous bird with the deep black contrasting with the brilliant yellow and white.

Setophaga townsendi J. K. Townsend, 1837), Townsend's Warbler

town-SEN-dee Honorific for US ornithologist, explorer and collector John Kirk Townsend (1809–1851).

Taxonomy: formerly *Dendroica townsendi* (J. K. Townsend, 1837). There is a rule in the International Code of Zoological Nomenclature against naming a species for one's self. While Townsend named this species with an honorific for himself, he took the name given by his travelling companion, botanist and zoologist Thomas Nuttall so the rule was technically "kept".

Notes: From my readings coming into this season, I was expecting this to be the most common warbler of the woods, but it was not by a long ways. At first I just heard them and found them to be rather secretive. I was expecting them to behave more like the Black-throated Green Warbler of the east, since they are their western counterpart, but they are not nearly as loud, showy or obvious. Their call is similar and easy to learn and hear, but they do not respond to spsssing and remain mostly out of sight. While I say that, the most common call here is not that similar to the calls on the iPhone apps, such as *The Sibley's eBird Guide to Birds of North America* or the All About Birds website [http://www.allaboutbirds.org/guide/townsends_warbler/lifehistory/ac] and it confuses me every spring when I return and hear the call. When I think of the eastern bird's call, that is a helpful reminder, but the *zee-zee-zee-du-dee* isn't the common pattern here. Ours is more rollicking and almost an upward spiral somewhat reminiscent of a thrush and is *wheeo-wheeo-wheeo-zee-zee-zit*. I kept hearing this bird on May 6, 2010 and it really confused me. So I persisted in following the bird and finally saw it and grabbed this photograph and nailed it as the call of our Townsend's. I've found this is the most effective way to learn new bird calls.

Cardellina Du Bus (1849)

car-del-ih-nuh Diminutive from Italian dialect name *Cardella* for a Goldfinch.

Cardellina pusilla (A. Wilson, 1811), Wilson's Warbler

Latin PEW-sill-uh, American pew-SILL-uh Latin *pusillus*, tiny, very small.

Taxonomy: formerly *Wilsonia pusilla*

Notes: What I thought would be the most common warbler in the area turned out not to be, but it is still a common bird. Nesting here, they can make quite a fuss when one gets into their territory, as I often did in May on the East Glacier Trail, where they were far more frequent than on the Moraine Ecology Trail. They are also common in breeding season on the Mount Roberts Alpine Loop Trail. Easily identified as an adult with the black cap, the dull olive color of the juveniles became an instant recognition while they fledged, and there were many of them!

Family Emberizidae Vigors 1831 **Emberizids**

Spizella Bonaparte 1831, American Sparrow

Latin SPIH-sel-luh, American SPIZ-ella Greek diminutive σπιζα *spiza*, finch.

Spizella arborea (A. Wilson, 1810), American Tree Sparrow

are-BORE-ee-uh Latin *arboreus*, tree-, of tree; resembling a tree; from its habit in trees.

Passerculus Spix 1824

pass-sir-cul-lus Latin *passerculus*, little sparrow.

Passerculus sandwichensis (Gmelin, 1789), Savannah Sparrow

sand-wich-en-sis		Derived from the name "Sandwich Bunting" of naturalist Johann Friedrich Gmelin's (1748–1804) description of a bird from Unalaska Island and Sandwich Sound, Alaska (cf. "Named after Sandwich Island, one of the Kurile or Aleutian Archipelago", Coues 1882).

The common name comes from the location where ornithologist Alexander Wilson (1766–1813) encountered the bird in Savannah, Georgia.

This is one extremely common bird of the bushes here. Abundant in the alder thickets of the Rock Dump as well as the beach grass on the Rainforest Trail and all over the Airport Dike Trail, one is sure to see this bird in the right habitat. The iris swale at Eagle Beach picnic area is another almost guaranteed place to spot the bird in the beach rye grass. They usually have a tawniness to the cheeks and chin area other blah sparrows lack.

Passerella Swainson 1837

pass-sir-ella		Diminutive of Latin *passer*, sparrow (compare with the Late Latin *passarella*, little sparrow).

Passerella iliaca, Fox Sparrow

ill-ee-a (as in cat)-kah		Latin *iliacus*, of the flanks.

May 1, 2009 is my first encounter with this species here. While shovelling snow at the Nature Center up on Mount Roberts, Crystal Gwinn asks me about this brown and gray bird and what it might be. I toss out some ideas and she says, "it's right here!" So I move to the deck and sure enough here is the fox sparrow! Virtually still and completely approachable, I pick it up and it makes no attempt to get away from me. Since it is right in the path to the front door, I want to move it away to a protected spot so it won't get stomped or terribly frightened. It apparently flew into the window and got stunned. I place it on the back side where the trail begins in a protected spot where it remains for about 20 minutes before it disappears, presumably recovered.

Each year, especially in May, I hear the birds singing in the alder thicket below Thane Road as I walk from the Rock Dump to Franklin Dock. I don't often see the birds, but their lovely liquid call makes the walk a delight, even on a rainy day. Our birds are particularly dark in color. Occasionally I hear them calling in the thicket at the Delta Western yard (boneyard).

Melospiza Baird 1858, North American Song Sparrow

Latin meh-LAW-spih-zuh, American meh-low-SPY-zah Greek μέλος melos, song, tune + Greek σπίζα spiza, finch.

Melospiza melodia (A. Wilson, 1810), Song Sparrow

meh-low-dee-uh Greek μελῳδία *melodia*, singing.

On May 3 several are singing in the bushes along the fence in the Delta Western boneyard. During breeding season the birds are very melodious on the Airport Dike Trail and fairly frequent on the Moraine Ecology Trail. Their call is a delight and the pinspot on the breast makes them easy to identify among the sparrows that can be notoriously difficult to determine species.

Melospiza lincolnii (Audubon, 1834), Lincoln's Sparrow

ling-con-ee-eye Honorific for US naturalist,explorer and collector Thomas Lincoln (1812–1883).

Only spotted on the Airport Dike Trail, either in the beach grass at the river or in the alder thicket on the dike the far end of the trail. I got confused at first with the breast spot thinking these were songs, but the yellow color and small size just didn't seem right. Out comes the field guide and, of course, they are Lincoln's.

Zonotrichia Swainson [1832], American Sparrow

zo-no-TRIH-key-uh Greek ζώνη *zōnē*, band, girdle + τρίχα *thrix*, *trikhos*, hair.

Zonotrichia leucophrys (J. R. Forster, 1772), White-crowned Sparrow

Latin lew-COFF-rees, American lew-co-frees Greek λευκος *leukos*, white + ὀφρῦς *ophrus*, eyebrow; hence "white-browed".

Common in the brushy area above the covered bench on the West Glacier Trail. On September 24 I spot a juvenile in the back yard with a small flock of juncoes where his bill looked just like theirs! Abundant on the Airport Dike Trail.

Zonotrichia atricapilla (Gmelin, 1789), Golden-crowned Sparrow

a (as in cat)-trih-CA (as in cat)-pill-uh Latin *atricapillus*, black-haired (*ater*, black + *capillus*, hair of the head).

Some use the adjective "handsome" for this sparrow as the breast is detailed with a very fine barring, but that only shows up with a close look. At a distance the sparrow looks pale below with a typical brown-black with speckled white back. The twin black stripes from the middle of the eye to the golden crown offer a wonderful contrast to the golden forehead. A quick glance from the year can confuse as the nape crown is white, so when spotting a White-crowned Sparrow from behind, hold off on your identification for a slightly better look.

While a regular spring visitor, these birds are on their way to the tundra up north for breeding and stop here only for feeding along the way. I see them some springs in early April, but it's usually the first or second week of May when they become obvious to my eyes. In May of 2013 this bird seemed particularly abundant, especially in the outwash plain of the Mendenhall Glacier. I took these photos on the rocks of Photo Point. Their route back south to coastal Washington, Oregon and California takes a very different track as they are very uncommon here in the fall.

Junco Wagler 1831, Junco

Medieval Latin *junco*, reed bunting, derived from Latin *iuncus*, reed. Confusing as these birds are not often found in reedy habitats.

Junco hyemalis (Linnæus, 1758)***,*** Dark-eyed Junco

hi-mal-is Latin *hiemalis*, of winter, (*hiems*, *hiemis* winter); moving south in the winter; "snowbird".

These birds are easily identified even with a short glance. Their white outer tail feathers are flashy and contrast not only with their other feathers but against whatever background they happen to be in. They spend a lot of time on the ground looking like, foraging and behaving like a sparrow.

Taxonomy: There are several easily separated and identified Juncos that were previously considered separate species but now have been reduced to subspecies. Two of these occur in the Juneau Area.

Junco hyemalis oreganus (J. K. Townsend, 1837), Oregon Junco

oar-eh-gay-nus Of or pertaining to Oregon.

This is the signature bird of the Moraine Ecology Trail, encountered on every trip! I continue to call these "Oregon Junco" as this western race is so distinctive with its "executioner's cap", tawny brown back and almost pink sides. These birds are common in every woods here, on every trail and may well be the most common songbird in the area, at least by my reckoning. They are full year residents.

Junco hyemalis hyemalis (Linnæus, 1758), Slate-colored Junco

Winter visitors to Juneau, these remain in the area as late as the end of April or perhaps early May and return with the first snow. Their tops are almost a uniform slate-gray and bellies white without a hint of brown or pink. This picture is from my condo complex in the Mendenhall Valley in April of 2012. I notice there is an indistinct yet clearly discernible difference in the gray of the head and of the body. In fact, this photo shows a line between the two! I interpret this as evidence of hybridization between the Slate-colored and Oregon Junco. Eastern slates are a perfectly uniform gray.

Family Fringillidae Vigors 1825 **Fringilline and Cardueline Finches and Allies**

Loxia Linnæus 1758, Crossbill

LOX-ee-uh Greek λοξος *loxos*, oblique; hence crosswise, referring to the crossed beak.

Loxia curvirostra Linnæus 1758, Red Crossbill

cur-vih-ross-truh Latin *curvus*, curved + *-rostris*, -billed (*rostrum*, beak, bill).

The only place I've seen this bird—which should be fairly common—is on the Rainforest Trail and beach on Douglas Island and then only green-bodied females with dark wings.

Loxia leucoptera Gmelin, 1789, White-winged Crossbill

lew-COP-tur-uh Greek λευκος *leukos*, white + πτέρον *pteron*, wing.

I got this life bird at the John Muir Cabin on September 30, 2010. A small flock of 8 flitted about the spruce trees with a finch-like song that I did not recognize, and so followed until I could see the birds. The white bands on the wings set this apart from the Red Crossbill, a bird I have not seen since my days at Crater Lake, now decades ago. The birds came to a small spruce just ten yards from the deck of the cabin where I was able to observe their crossed bills easily and see the red on the male and the yellow-green on the females.

Carduelis Brisson 1760, Redpoll & Siskin

car-dew-ell-is Latin from the name *Fringilla carduelis*, the European Goldfinch, meaning goldfinch.

Carduelis flammea (Linnæus, 1758), Common Redpoll

FLAM-ee-uh Latin *flammeus*, flaming, fiery; fiery red.

I spotted my first redpoll since living in Pennsylvania three decades ago out the bedroom window on April 12, 2009, It is Easter Sunday, and Isaw more while walking to church service at 11:00 a.m. These delightful little finches stayed around for the entire month of May, but then disappeared. While the bird book maps show this area as in their year-round range, my Alaska checklists show them absent in summer, which they proved to be. I've always thought of them as being in conifers, but here they don't seem to make any distinction between the evergreens and broad leaved and are found in equal number in each. In 2010, 2011 and 2012 I didn't spot a single one upon my spring return to Alaska, yet there were continued reports of them around. The very late spring of 2012 with its near record late snows has the birds sticking around far longer and regularly in groups of a dozen to several dozen doing their buzzy song in the bare branches of the , Sitka alder (*Alnus viridis*).

Carduelis pinus (A. Wilson, 1810), Pine Siskin

Latin PEE-noose, American PIE-nus Latin *pinus*, pine.

Like the redpoll, an early spring bird in the Mendenhall Valley. In 2009 I never saw one anyplace else, but while walking around the neighborhood they were common in late April but gone by mid May. In subsequent years I spot them in bushy tree edges in many places but miss them entirely in 2010. They do not arrive for winter by early October when I leave.

Class Mammalia Linnæus 1758 **mammals**

Latin *mamma,* breast, udder.

References:
Alaska Department of Fish & Game. 2008. *Alaska wildlife notebook series*. Division of Wildlife Conservation, Alaska Department of Fish & Game, Juneau.
American Cetacean Society. 2003 to date. *Fact sheets*. San Pedro, California. [These are individual articles on cetacean species available as PDF files from http://acsonline.org/education/fact-sheets/]
American Society of Mammalogists. 1969 to date. *Mammalian species*. [These are individual articles on the North American species. Numbers 1-823 are available as PDF files from http://www.science.smith.edu/msi/msiaccounts.html]
Baker, R.J. et al. 2003. *Revised checklist of North American mammals north of Mexico*. Occasional Papers, Museum of Texas Tech University, Number 229, December 1, 2003.
Jefferson, T.A., S. Leatherwood & M.A. Webber. *FAO species identification guide: Marine mammals of the world*. United Nations Environment Programme, Nairobi, Kenya. Food and Agriculture Organization of the United Nations.
Kays, R.W. & D.E. Wilson. 2002. *Mammals of North America*. Princeton University Press, Princeton, New Jersey.
O'Clair, R.M., R.H. Armstrong & R. Carstensen. 1992. *The nature of Southeast Alaska, a guide to plants, animals and habitats*. Alaska Northwest Books, Anchorage.
Wilson, D.E. & S. Ruff. 1999. *The Smithsonian book of North American mammals*. Smithsonian Institution Press, Washington, D.C.

Wynne, K. 2007. *Guide to marine mammals of Alaska*. Alaska Sea Grant College Program, University of Alaska Fairbanks.

Order Artiodactyla Owen 1848 ***Even-toed or cloven hoof ungulates***

Greek άρτιος *artios*, whole, intact; thus entire or even numbered + δάχτυλο *dactylo*, finger or toe; thus "even-toed".

Family Bovidae Gray 1821 **antelopes, bovids, cattle, goats, sheep**

Latin *bos* ox; bull; cow

Oreamnos Rafinesque 1817

or-ee-ahm-nos Greek prefix -όρεο -*oreo*, hill, mountain + ἀμνός *amnos*, a lamb.

Oreamnos americanus (de Blainville, 1816), mountain goat, tawéi, jánwu

uh-mer-ih-KAY-nus of or referring to the Americas

For much of the year these North American endemics are remote and require long-distance viewing. Early in the season (the photo top left, April 29, 2009) the goats are low, here on the peninsula jutting into Mendenhall Lake. A close look to the left side of Nugget Falls (top right photo, April 21, 2013) sports a billy. Two weeks later (May 9) this solitary billy shows off his cliff-climbing skills in the dark greenstone just away from Nugget Falls on the glacier side.


Through June and into July they could be seen just about every day up near the top of Mount Juneau and occasionally above the avalanche chute on Mount Roberts as well as on Mount Bullard from the scenic viewpoint on the East Glacier Trail. Always binocular objects, I describe them to my guests as "dirty blobs of snow that move" on the mountains. On August 30, sitting in church during Pastor Tari's sermon, I spot three of them just below the summit of Thunder Mountain, the first I'd seen since early July. It seems with the most excellent weather of summer, they've headed off into the wilderness far from sight on my daily haunts in Juneau.


On May 2, 2011 while on a training session up West Glacier Trail we come upon the remains of a carcass of a goat that met its demise during the winter. The only things left are the inedible: tufts of hair, well-mummified shreds of skin, the larger bones—all marrow free—and most interesting to examine, the toenails! Being goats, they have two toes on each foot, each with a sheathing of keratin, clearly considered inedible. The four we find have amazingly sharp-pointed ends, a character that must help them traverse the very steep slopes they call home. Are the rings clearly visible created annually? If so, this goat was about 15. While that strikes me as perhaps old, it may be part of the reason all we find are the remains as the animal was too old to be able to survive the winter.

Family Cervidae (Goldfuss 1820) Gray 1821 **caribou, cervids, deer, moose, wapiti**

From Proto-Indo-European **ḱer-* horn to **ḱerwós*, to Greek κεραϝός *kerawós*, horned to Latin *cervus*, stag, deer.

Odocoileus Rafinesque 1832, North American deer

oh-doe-coy-lee-us Greek δόντι *donti*, tooth + Latin *coelus*, sky, heaven, heavens; hence empty and hollow referring to the hollow teeth.

Odocoileus hemionus sitkensis, Merriam 1898, Sitka black-tailed deer, guwakaan young deer, yagootl

heh-mee-oh-nus	Greek ἡμίονος *hemionos*, apparently obliquely referring to the dichotomous forking pattern of the antlers.
sit-KEN-sis	Of or pertaining to Sitka, Alaska.

I spotted three deer in June along the road on Douglas Island just east of False Outer Point, the only deer I saw in 2009. This youngster was browsing the roadside at Brotherhood Bridge on October 8, 2010. While appearing healthy, I'm very concerned about its ability to survive the winter if its mother is nowhere around. The most curious thing about "deer watching" for me here is the frequency of seeing them out in the low tide zone of salt water. Nowhere else have I experienced deer at the ocean's edge, but nowhere else has the ocean's edge been so generally placid. It seems they are browsing for food, perhaps the plentiful rockweed (*Fucus*) of other seaweeds that the Tlingít's also browsed for. The most common place I see them at salt water is at Waydelich Creek's mouth into Auke Bay. They have a clear forest path from the mountains to the water and a mix of fresh and salt water if they need to dilute all the salt eating seaweed gives them.

Deer population in SEAK his highly weather dependent. With two record snowfall winters in a row in 2004 and 2005, their numbers plummeted. Winters have been mild since then and their numbers are rapidly rising. Harvesting in the Juneau area as been remarkably constant over the last decade with an average of 747 taken per year. Curiously, the highest harvest was the year after the hard winters with 1,251 taken in 2006.

Sitka Black-tailed Deer Hunting in Alaska, http://www.adfg.alaska.gov/index.cfm?adfg=deerhunting.main

Order Carnivora Bowdich 1821 *carnivores*

Latin *carnivorus*, carnivorous, flesh-eating. From *carō*, flesh, + *vorāre*, to devour.

While carnivores are traditionally thought of as "meat eaters"—a term that can refer to any organism that eats meat—perhaps a better descriptive name for this most diverse order of mammals might be "carnivorans". Ranging in size from the least weasel (~25 g) to the southern elephant seal (~5,000 kg) the order includes animals that are terrestrial, aquatic, or both.

The most commonly used classification includes two suborders: Feliformia, the cat-like animals; and Caniformia, the dog-like animals. In the Caniformia, Canidae and Amphicyonidae diverged very early and form parallel clades that in a hierarchical system are equal to all the other families that are in Infraorder Arctoidea. In contains three Superfamilies: Ursoidea, the bears with one extant and one extinct family; Musteloidea with four families; and, Superfamily Pinnipedia with three extant and one extinct family. This illustrates one of the problems of the Linnæan hierarchical system.

Suborder Caniformia Kretzoi, 1943*, dogs*

Current classifications include six families (Canidae, dogs; Ursidae, bears; Ailuridae, red panda; Mephitidae, skunks; Mustelidae, badgers, weasels and otters; and Procyonidae, raccoons and coatis) and one unranked clade of the aquatic branch, the pinnipeds, that are sometimes elevated to their own order Pinnipedia Illiger, 1811

Family Canidae G. Fischer de Waldheim, 1817 **dogs**

Canis Linnæus 1758, dog

Latin KAH-niss, American KAY-niss	Classical Latin *canis*, dog, hound.

Canis lupus Linnæus, 1758, gray wolf, gooch

LEW-pus Latin *lupus*, wolf.

Taxonomy: Wolf taxonomy is confused. ITIS lists 34 subspecies of *Canis* recognized as valid, but this includes the common dog, dingo and red wolf. Recent molecular work seems to indicate the species named *Canis lupus* needs to be considered in the broad sense. Wilson, D. E., and D. M. Reeder (eds). 2005. *Mammal Species of the World: A Taxonomic and Geographic Reference* (3rd ed). Johns Hopkins University Press, only recognize five species of *Canis* worldwide with two in North America, *C. lupus* and *C. latrans*.

Notes: I awoke at 4:45 a.m. this morning, April 14, 2009, and decide to head up to Skater's Cabin to see if I can spot one of the two wolves that have been prowling the Mendenhall Lake area. At the cabin, not much is out and about but I hear the mew gulls crying up at the ridge by the glacier. I scan the shoreline with my binoculars but spot nothing but the gulls, so I drive to the end of the road. As I slow down to drive around the parking lot, there trots Romeo—the black wolf—up onto the snow where he stands and looks at me long enough for me to get the camera out and get one shot! Handheld at 1/5 second, I'm pleased with how well it came out. He is large, and from my vantage point I think he stands nearly waist tall on me and probably weighs nearly 150 pounds. I use Cleo's 100 pounds and size for comparison and he's quite a bit larger. He takes a good look at me, then turns and trots nonchalantly into the woods.

Romeo is the Mendenhall Valley resident wolf and has been out and about every winter that Bess and Patrick have lived here and was first sighted in 2005. This late winter a second wolf—quite gray I'm told—joined Romeo. One of the wolves got someone's small pet dog according to a Forest Service sign at Skater's Cabin and they warn all dog walkers to be very careful. This is my first wild wolf sighting! How cool.

This wolf's story ends sadly as he was apparently shot and killed illegally in 2010. There is now a plaque to his honor on the Nugget Falls Trail and he is sorely lost by many Juneauites who considered him very much a part of the community. Unlike the other wolves who occasionally show up, Romeo seemed genuinely interested in people and their dogs and even seemed to want to "play" with some of the dogs.

Family Mustelidae G. Fischer de Waldheim, 1817 **mustelids**

Latin *mustela*, weasel

Lontra Gray, 1843, otter

lawn-truh Italian word for otter derived from the Latin *lutra,* otter.

Taxonomy: *Lutra* Brisson, 1762, was the first genus for all otters and even though British zoologist John Edward Gray created *Lontra* for the New World otter in 1843, it was not generally accepted until the publication of genetic research that strongly supported New World otters as separate from Old World otters. They both have a common ancestor around seven million years ago creating distinct lineages.

Koepfli K-P. & R.K.Wayne. 1998. *Phylogenetic relationships of otters (Carnivora: Mustelidae) based on mitochondrial cytochrome b sequences*. J Zool (Lond). 246:401-416.

Marmi, J., J.F. López-Giráldez, and X. Domingo-Roura. 2004. *Phylogeny, evolutionary history and taxonomy of the Mustelidae based on sequences of the cytochrome b gene and a complex repetitive flanking region*. Zoologica Scripta, 33: 481–499.

Koepfli, K-P, K.A. Deere, G.J. Slater, C. Begg, K. Begg, L. Grassman, M. Lucherini, G. Veron & R.K. Wayne. 2008. *Multigene phylogeny of the Mustelidae: Resolving relationships, tempo and biogeographic history of a mammalian adaptive radiation*. BMC Biology 2008, 6:10.

Lontra canadensis mira (Goldman, 1935), North American river otter, northern river otter, river otter, kóoshdaa

can-uh-den-sis; meer-uh Of or pertaining to Canada; Latin *mirus*, wonderful, strange, or remarkable.

Taxonomy: Synonyms include *Lutra canadensis* (Schreber , 1777), *Lutra mira* Goldman, 1935 and *Lontra vancouverensis* (Goldman, 1935).

There are currently seven subspecies of river otter recognized, two of which are in the Pacific Northwest cordilleran mountains and coastal archipelago: ours and *L.c. pacifica* Rhoades, 1898, of Haida Gwaii.

Notes: There is a single general place where I see river otter in Juneau: Auke Bay. They are occasional on the low tide flats near Waydelich Creek and very rarely, swimming in Statter Harbor. The are surely far more common, I just haven't seen them.

Enhydra Fleming, 1828, sea otter

ehn-hi-druh εν *en*, in + ύδρα *hydra*, water; hence "living in water"

In a monotypic genus, sea otter are in a line of descent removed by some seven million years from river otter but have a common ancestor with European otter, diverging from them about five million years ago (Koepfli, 2008, see *Lontra*). Unique among the mustelids, they are almost entirely aquatic and are fully capable of living their entire life at sea. Since they eat, sleep, mate and give birth in the ocean, they are more successfully aquatic than pinnipeds!

Enhydra lutris kenyoni, Wilson, 1991, northern sea otter, yáxwch', yúxch'

loo-tris, ken-yawn-ee Latin *lutris*, otter.
ken-yown-ee Honorific for Karl W. Kenyon (? - 2007), author of *The Sea Otter in the Eastern Pacific Ocean*.

Taxonomy: Three subspecies are currently recognized. The Western Pacific (Kuril and Commander Islands) *E.l. lutris*, Linnæus 1758; the central California coast *E.l. nereis* Merriam, 1904; and ours, the Eastern Pacific from the Aleutian Islands south along the coast to Vancouver Island. Curiously, Kenyon when asked if he was honored to have this subspecies named after him, he was "furious about it because he didn't believe the Alaskan sea otter was a sub species" [1]

Status: The sea otter's fate was sealed when Georg Steller brought some 900 pelts back to St. Petersburg from his journey to Kayak Island, Alaska in 1741. None in Russia had ever experienced such a quality pelt. "*Enhydra lutris* ha[s] a hair density between 120 000 and 140 000 hairs/ cm^2" [18,600 to 21,700 in^2], the primary hairs representing less than 1% within the hair coat." [2] This number is impressive, but far lower than the commonly used 50,000 or even 1,000,000 used by the U.S. Fish and Wildlife Service. [3] Demand for pelts provided a lucrative business for Russian Alaska as pelts are far easier to ship across the North Pacific then haul them some 10,000 km [6,200 miles] across Siberia than heavy gold. When New Archangel, now Sitka, became the capital of the Russian American Company, they shipped more than 1,000 pelts a year for over 50 years. A major motivation for the Russians to sell Alaska to the United States came from their dramatic overharvesting of the sea otter. Here in SEAK the otter was effectively eliminated making their presence here untenable.

Sea otter act as a keystone species throughout their range. Foraging voraciously on urchins, they prevent urchins from destroying the giant kelp forests in their range. With the demise of the otter came the upsurgence of the urchin which led to a catastrophic decline in giant kelp. While few find urchin an important food source, Dungeness crab numbers rose dramatically as well. An entire ecosystem was radically changed.

For almost exactly a century, sea otters were absent here.

> Between 1965 and 1969, the Alaska Department of Fish and Game translocated 403 sea otters from Prince William Sound and Amchitka Island to 6 areas along the outer coast of Southeast Alaska. Consequently, sea otters in SE AK contain a genetically diverse mixture of mitochondrial DNA from their source populations (Bodkin and others, 1999) and are considered to be a separate stock from southcentral and southwestern Alaska stocks based on genotypic differences and geographic distribution (Gorbics and Bodkin, 2001). [4]

The slow, but speeding, resurgence of the sea otter in SEAK gives rise to some very different points of view. Conservationists and much of the general public consider it a triumph. Crab fishermen look at it quite differently. "One study done in Prince William Sound found that a sea otter could eat 14 adult Dungeness crabs per day. The population of sea otters could eat the entire commercial catch of Dungeness crabs in Southeast Alaska in less than two weeks." ... "Scientists agree that in the next few years, the rapidly growing sea otter population will reduce crab numbers to a level that probably existed just before the Russians arrived." [5] As sea otter regain their former range, they become direct competitors with man for shellfish. At least on bill have been presented to the Alaska legislature to introduce a bounty on sea otter by State Senator Bert Steadman. [6] Steadman's bill takes advantage of a "loophole" in the Marine Mammal Protection Act of 1971 allowing native take for "subsistence and artisanal purposes". We don't know how long it will take to restore the former balance between sea otter and their environment here in SEAK. There will certainly be a period of transition when the foraging effects of the otter will be out of balance with their prey. This conflict is sure to intensify in direct proportion to the number of sea otter.

[1] *Soundings*, the newsletter of the American Cetacean Society, Monterey Bay Chapter, June 2007.
[2] Kuhn, R.A., H. Ansorge, S. Godynicki & W. Meyer. 2010. *Hair density in the Eurasian otter* Lutra lutra *and the sea otter* Enhydra lutris. Acta Theriologica. 55(3), pp 211-222
[3] http://www.fws.gov/alaska/fisheries/mmm/seaotters/history.htm
[4] Esslinger, G.G. & J.L. Bodkin. 2009. *Status and Trends of Sea Otter Populations in Southeast Alaska, 1969–2003*, Scientific Investigations Report 2009–5045. U.S. Geologic Survey, Reston, Virginia.
[5] http://seagrant.uaf.edu/news/99ASJ/04.01.99_OttersRebound.html
[6] Sea Otter Bill introduced. 2013. http://bertstedman.com/new/?p=2877

Notes: I have a long history with sea otter in California. My first Alaska experience at the harbor in Cordova is illuminating. Annette and I on our second day in Alaska walk to the harbor from our daughter's place. Looking out over the placid water, I comment "look at all the logs!" When we get closer, they are all sea otter!

While on a training cruise on May 1, 2012, Captain Gary Judkins gets a call on the radio from Rum Runner that there is a sea otter at Faust Rock, and we excitedly head north up Saginaw Channel. I spot the otter in the water about 30 meters from the bell buoy. It is a single, large animal. As Captain Gary slows the boat, the otter pops its head up frequently and every time looks directly at us in the boat, showing its white face. Twice it lays on its back and uses its "hands" like its feeding, but it hasn't dived so I'm not sure it has anything to eat or even if it is handling anything. There are five Steller sea lion on the buoy with two more swimming around it and the otter stays well away from them. We observe them for about 15 minutes and they remain apart. This is my first Juneau area sighting, and I wonder where this otter came from: east from Glacier Bay where they have been seen up Excursion Inlet, or up from Ketchikan. Since we only about 45 water miles from Excursion Inlet, it seems likely our animal is from the Glacier Bay population.

My second sighting is August 13, 2014 of a single animal at the southern end of Little Island. Laying on its back, it is unmistakable. This time I'm able to get two photographs before as we have very little time to observe. The whiskers show up in the rather severe crop of one image.

Neovison Baryshnikov & Abramov, 1997, mink

neo-vih-zohn Greek νέος, *neos*, new + *vison* probably from the Swedish word for weasel, *vessla*.

Neovison vison nesolestes Heller, 1909, American mink, island mink, Alexander Archipelago mink, nukshiyáan, lukshiyáan

American neh-sahl-ess-tess, Latin neh-SAHL-ess-tess Etymology undetermined, but it is a homonym with a damselfly genus.

On August 12, 2009, I spotted the cat-like creature on the Moraine Ecology Trail at the shore of the beaver pond right above where the sockeye are spawning directly across from the lodge with the video camera. The mink looked across the pond straight at us for a moment, but as soon as our group got to the opening to see the pond, it ran off out of sight into the woods so only those close to me were able to see. The pelt was a very dark brown, looking nearly black but showing some color. This is my first sighting of this animal since Crater Lake days! On September 22, 2010 I spot one right under the Steep Creek bridge at the bear viewing platform and manage to capture a photo of its tail, left, and face, right with my iPhone 4. These photos are highly cropped from the original, but clearly identify the animal. On an early October day in 2011 I happen to come across Bob Armstrong out on the Moraine Ecology Trail and while we're talking just above the beaver lodge with the camera, a mink scurries up the sand slope and runs right behind Bob and disappears into the willow shrubs. Since he was facing me, as soon as I point it out it's gone and Bob misses it.

Mustelids I'm missing in my Juneau experience:
Gulo gulo, wolverine
Mustela erminea, short-tailed weasel, ermine
Mustela nivalis, least weasel

Pinnipedia Illiger, 1811, *pinnipeds*

Latin *pinna* in secondary sense as fin + *pes*, genitive *pedis*, foot; thus "having feet as fins".

Current classifications consider this group an unranked clade within the Caniformia. Totally unique with their extreme adaptation to their semi-aquatic environment, evidence indicates a monophyletic ancestry that arose some 50 million years ago in the Eocene. Their common ancestor was long thought be from either the bears or the mustelids. The discovery in 2007 of the fossil *Puijila darwini* in early Miocene deposits in Nunavut, Canada, provides a clear line to the mustelids.

The clade is currently divided into two superfamilies Otarioidea, the eared seals and Phocoidea, the "earless" seals.

Superfamily Otarioidea (Gray, 1825) Lucas, 1899

Family Otariidae Gray, 1825 **eared seals, sea lions**

oh-TAIR-ee-ih-dee   Greek ὠτάριον *otarion*, little ear.

This family is noted for having external ear flaps (pinnae) and having a well-developed pelvis with rear legs that are used for walking on land in addition to their use as flippers. Their primary locomotion in the water is with their large front flippers. Genetic evidence shows the family divided into three clades: northern sea lions; northern fur seal and its extinct relatives; and, the Southern Hemisphere species.

Berta, A. & M. Churchill. 2012. *Pinniped Taxonomy: evidence for species and subspecies*. Mammal Review 42 (3): 207–234.

Eumetopias Gill 1866

Greek ευ- *eu*, typical, well, normal + μέτωπον *metopon*, broad forehead.

Eumetopias jubatus (Schreber, 1776), Steller sea lion, Сивуч (sea wolf), taan

Latin *jubatus*, having a mane.

Honorific for Georg Steller (1709–1746), German Naturalist on Bering's expedition to Alaska in 1741, the first to scientifically describe this animal.

"Sea lion" was applied from 1690's to various species of large eared seals and is easily understood as this is a predatory animal where the male develops a "mane" that was seen as resembling the familiar lion. The Russian Сивуч "sea wolf" probably comes from their familiarity with the predatory wolf and made the metaphoric connection to the sea animal just as the English speakers who were familiar with lions did.

Taxonomy: German naturalist Johann Christian Daniel von Schreber (1739-1810) gave the name *Phoca jubata* in 1776 only later in the same year to give it the current name. Did he recognize a mistake he made calling it a seal—totally unrelated—and then correct his mistake the same year? I've not been able to find out. He wrote a multi-volume treatise on mammals of the world, *Die Säugethiere in Abbildungen nach der Natur mit Beschreibungen*, using the binomial nomenclature system recently invented by Linnæus. This demonstrating his extensive knowledge, it seems like an amateur mistake.

Notes: The vast majority of Steller sea lion I see are juveniles that I am unable to determine their sex. Early and late in the season adult male and female show up and are easily identified by their size and different morphology. Males are substantially larger than females, with a much stouter neck and as they mature a set of imbricated (shingled) very stiff hairs develop from just behind the ears to the upper back that looks enough like a mane to give them both their specific epithet as well as their English common name. The top left photo illustrates to nearly equally sized bulls, but the one on the right has a more developed mane. They are still wet so appear quite dark. The photo to the right shows a bull on the right and a mature cow with pup on the left. The well-developed pelvis and "legs" are easily seen in both upper photos.

The tongue-sticker appears to be a mature cow and the swimming lion a juvenile. Their external ears are plainly visible.

It is a very rare day on the water when I don't see at least one sea lion, and usually a dozen or more. I see them in three distinct habitats.

Open Water Sea Lions

How much time does a Steller sea lion spend in the water? I am unable to answer what seems to be a rather simple question from either my observations or my research. I don't know! It seems likely that most of their time is spent in the water, largely as they are aquatic animals and their food is found in the open ocean. The fact that these animals mate, bear young and rest on land show they have yet to fully make the evolutionary move to a truly aquatic life and are thus fairly recent in their move to the ocean from land. Sea otter are nearly exclusively aquatic, spending almost no time on land. They need to rest, but their bodies are not built for buoyant floating like sea otters and I've *never* seen a Steller sea lion still on or in the water.

Eating

Being carnivores, sea lions spend the majority of their time in the water foraging for food. Most any fish will do, with capelin, sandlance, pollock, herring, cod, salmon, flatfishes, sculpins common as part of their diet in southeast Alaska. They also eat squid, octopus and occasionally seal pups. When I see open water sea lions, there are usually a dozen or more and this leads me to think that they use some form of social foraging to improve their odds of finding and catching fish. Having never been in the water with the sea lions, I simply assume they swallow the small fish whole. I do occasionally see them eat the much larger salmon. Here, they come to the surface and toss the body of the salmon a bit out of their mouth to gain a better purchase and use their large teeth to cut the fish into smaller pieces. As the left photo from August 14, 2010 shows, gulls don't waste any time coming around to catch any of the cast off pieces that they can.

Thermal Regulation

In a study done on feeding [1], the typical stomach temperature of a Steller sea lion was 37°C, the same as we humans. Being homeothermic, their morphology creates a physical barrier to heat loss and their physiology creates a metabolism that serves to keep them warm. But more is required.

The water temperature a foot or so below the surface around Juneau ranges from 4 to 13°C. Whenever submerged, sea lions must deal with a 33 to 24 degree temperature differential. Their blubber layer and pelage are their first defence, but behavior comes to play when they are cold and can't get on land or a buoy to warm up. In these photos from May and June of 2013 I captured lions holding their pectoral flipper out of the water for several minutes each. This is surely a way to expose a part of their body that quickly absorbs heat that can then be pumped through the rest of the body by the heart using little energy, at least when compared to more aerobic activity.

The need for behavioral thermal regulation can be keen as "estimates of blubber and total body lipids ranged from 5% to 17% of total body mass" [2] making Steller sea lions rather lean when compared to other cold water mammals. "Blubber comprised 30%-40% of total body mass for harbor seals." [2]

[1] *Steller Sea Lions Say Ahhh for Science* http://seagrant.uaf.edu/news/02ASJ/06.21.02sealions-say-ahh.htm
[2] Pitcher, K.W. & D.G. Calkins. 2000. *Steller sea lion body condition indices*. Marine Mammal Science 16(2):427-436.

Sea Lions at haulouts

The most obvious reason sea lions go on land is for rest. Sea lions spend a large portion of their life swimming in the water and every moment they are swimming requires energy. Hauling out gives them a chance to reduce their energy expenditure and recuperate from all the wandering for forage while swimming. I have found no studies on the time they spend in water versus on land, but based upon my observations a large majority of their time is spent in the water. It would follow that some periods of rest are required.

There are other benefits to spending some time out of the water. During the late summer to early fall month-long molting period they are often seen on land as it seems drying out their pelage hastens the molting process. Drying out probably helps reduce the number of parasites on their skin. When the ambient temperature of the air and land is greater than the water, they can reduce metabolism by using the warmer environment for thermal regulation. Every haulout I've seen has plenty of social action going as there are always multiple animals—often many hundreds—where social interaction takes place much of the time. They are protected from predators here, primarily the orca. On one whale watch, I witnessed an orca rise out of the water with a large piece of sea lion blubber in its mouth.

Being semi-aquatic animals, mating and birthing do not take place in the water but on land at very specific locations that are distinguished with the name rookeries instead of haulouts. All of the southeast Alaska rookeries are on the outer coast on rocky islands.

Buoys

Three buoys in Juneau waters can nearly be counted on for having sea lions on them. The obvious reason they climb on them is for rest. Sea lions spend a large portion of their life swimming in the water and every moment they are swimming requires energy. Energy spent requires energy replenished. These buoys offer a flat surface for resting and absorbing solar energy.

Faust Rock Buoy

Faust Rock buoy (LLNR 23950) is a red and green lighted bell buoy located due east of the tip of Mansfield Peninsula of Admiralty Island at 58.418278, -134.927688 at the meeting of Saginaw Channel with the Lynn Canal. It marks the location of a rock that lies only 2.3 fathoms (13.8 feet) below the water surface at mean low tide. The view of it to the west includes the lighthouse complex of Point Retreat and the view east the upper channel of the Eagle Glacier. As of this writing in 2014 I've only been to the buoy once without a sea lion resting on it. When a bald eagle (*Haliaeetus leucocephalus*) sits on the solar collector, it makes a fitting decoration to the buoy for a view of the Eagle Glacer.

Poundstone Rock Buoy

Poundstone Rock buoy (LLNR 23845) is a red and green lighted bell buoy located near the northern end of Favorite Channel at 58.528838,-134.933743 almost exactly due west of Eagle River and Herbert Glacier. It marks the location of a rock that lies only 2 fathoms (12 feet) below the water surface at mean low tide. These photos illustrate the view to its north northeast is the Sentinel Island Lighthouse, to the east the Herbert Glacier and to the west the Chilkat Mountains across the Lynn Canal.

Gibby Rock Buoy

Gibby Rock Buoy (LLNR 23800) is an all red, short, lighted buoy located where Fritz Cove opens up into the northern end of Stephens Passage at 38.898556, -77.037852. In February of 2000, the original metal structure built upon the rock collapsed and was replaced with a temporary floating read lighted buoy located 80 yards north of the old buoy and rock. In April of 2010 the temporary buoy was damaged and removed. It was replaced by the current buoy, also considered temporary. The new buoy went up just before the whale watching season began, but by the time boats headed that way, it was already occupied by sea lions most of the time. By the summer of 2014 it became a “standard” stop to see the sea lions on trips that didn’t go as far north as Faust of Poundstone.

How do they get up there?

The most common question asked about the buoys is just how the sea lions get up on the platform. The only difficulty they have is when it is fully occupied and they must jostle with the current occupants. Propelling themselves upward with their strong rear flippers is the easy part. Muscling into scarce place is the hard part. In these two photos from June 12, 2012 show a determined large juvenile doing his best to intimidate a slightly smaller juvenile while the others appear to play no attention to the fuss. I see this behavior as an extremely important part of the social development of the sea lions as it is a game of “king of the hill” where the larger, stronger, most aggressive, and persistent will force their way onto the platform. This is a precursor to the behavior that will be necessary for the bulls to gather and maintain a harem and for the females to protect their pups on the rookeries.

The summer of 2012 featured a particularly young juvenile that ventured high into the superstructure of the Faust Rock buoy. Surely it is this youngster's small size that allows him the flexibility and agility to climb up here. The front flippers must be the primary means of propulsion with the rear used just for bracing. I wish I saw the youngster climbing! Often the position of sea lions looks anything but comfortable, but this one seems highly relaxed in what can't be the most enjoyable of lounging racks!

Haulouts

Benjamin Island

Early in the season (April through June), Steller sea lion frequent a haulout on the western shore of Benjamin Island (see map right from http://alaskafisheries.noaa.gov/protectedresources/stellers/habitat.htm). This is a "Designated Steller Sea Lion Critical Habitat" with special regulations found in 58 FR 45269, August 27, 1993.

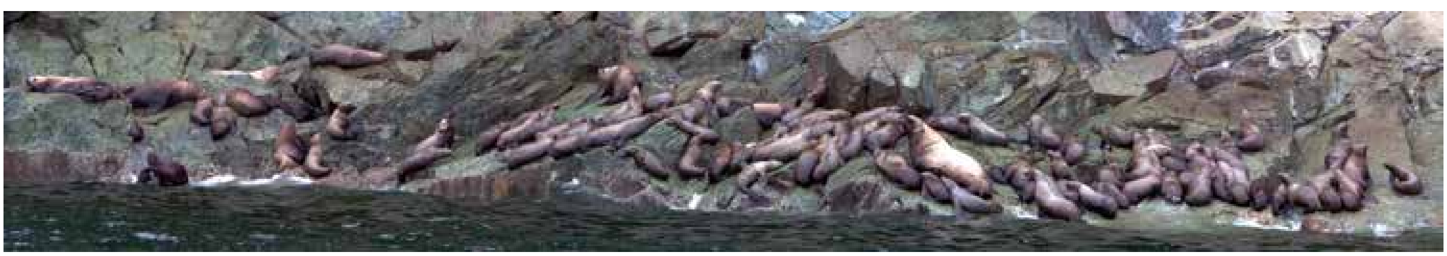
They congregate in large numbers, sometimes in the low hundreds. The relative abundance of gently sloping rock here allows many places for these large animals to get out of the cold water and warm themselves and rest.

The amount of waste they produce is simply amazing and is probably the reason why they abandon this haulout after a month's use—it simply gets too filthy even for these guys! There can be quite a stench as we slowly cruise by observing, and when the rocks are empty there is an obvious coating of white guano over nearly the entirety of the exposed rock surface.

Is it coincidence that just about the time they foul their house it is also time for pupping out on the open ocean shoreline and many leave for the rocky islands where the older males set up and control their harems and cows watch over the newly born pups?

In this photo from June 14, 2009, there are 96 individuals.

On June 25, 2010 I count 134 individuals. There are three large adults, one with a pup laying its head that I interpret as being a cow with last years pup.



In this composite panorama from June 23, 2014, there are 94 individuals. This is the latest date I've seen sea lions at Benjamin Island. Note the tremendous range of sizes of the animals here this day. There are many pups from last season and one very large bull and everything in between.

Little Island

Little Island is a treeless rise of gabbro with a blocky, flat-topped summit of about 50 feet above sea level with a red and white daymarker and flashing white light on its southern edge. It is the northernmost island of the Stephens Passage archipelago, just north of Ralston Island with Favorite Channel to the East and the Lynn Canal to the west. This means that very deep water (233 fathoms) is close to the west and much shallower (124 fathoms) to the east. I'm supposing that this change in the undersurface topography causes tidal flow patterns that create a varied set of environments for their prey fish thus providing plenty of food for the large number of animals.

The periphery of the island is of coarse gravel to volleyball-sized boulders that is inundated by the twice-daily high tide. These exposed beaches provide a late season haulout, usually beginning in mid-August. My earliest sighting was on August 5, 2014. They probably continue to use the haulout after the whale watch season ends the last week of September when my trips there end leading to my latest sighting of September 24, 2013. An obvious advantage of this site when compared to Benjamin Island is the twice daily cleaning action of the tides. This is at the same time a disadvantage as the high tides severely limit the available emerged land for hauling out. Since the waters are warmer this time of year, and there is more available space, the congregation of animals here can exceed 500 individuals. Little Island has not been designated a critical habitat for the sea lions.

On September 6 2009 I headed out on Allen Marine's St. Philip for a whale watch. At Little Island we found such a large population of sea lions that I could not count them from the boat. So I took a series of photographs of the island, stitched them together in Photoshop and counted 303 of the creatures by moving slowly through the photograph, where they didn't keep moving! This is now my standard strategy to count sea lions.

When we first arrived, there was a group of harbor seals at the point, but they scattered with the approach of our boat. The roaring and barking of the animals was loud enough to cover the sound the idling engines of the ship. Note the largest animals, presumably male, are on the interior of the island. This is probably a mixture of the sexes, but I don't know how to tell young seal lions sex. Since the pupping season is over and the outer rocky islands abandoned until next year, I'm presuming these are mixed groups. The various sizes of the lions is apparent in the photograph.

On September 24, 2013 this very long panorama shows 573 individuals of every age from this year's pups to old adults.

On August 5, 2014 this panorama shows 242 individuals.

Social Behavior at Haulouts

Aggression: On my suggestion on an Entrée Alaska trip on September 12, 2009, Captain Collin Pilcher sailed within 50 yards of Little Island on a rainy day. The sound was loud and when the breeze blew toward us from the lions, the odor was a bit pungent. Two large males up on the flats were facing each other and bellowing loudly. We never saw them make any form of physical contact and all the other lions stayed well away of these two. It appears the lion on the right is larger so the one on the left is a younger male out showing off his power to the established leader. Note how neither is making eye contact with the other. Two much younger lions seem to be watching and mimicking the behavior. The photo on the right from September 15, 2012 shows two older juveniles (teenagers?) barking and mouthing each other. This proves to be the typical pattern of behavior for the adult animals: lots of loud bluster and posturing of both the neck and open mouth but essentially no body contact except from the breast line and below. This probably serves as training for the real aggression that adult males must use to maintain their harem at the rookeries.


Sleeping: The majority of the animals on the beach at Little Island are simply snoozing. They congregate so close together that they are in almost full body contact with animals on either side, even when there is unoccupied beach space. Most have parts of their body resting on other animals. I'm guessing that physical contact might have two functions here: thermal regulation (it's warmer touching others) as well as some social function where touching each other has a role on group cohesiveness. Sea lions are *very* social animals.


Scratching and Molting: I've never observed social scratching, just individuals scratching what itches. When Steller sea lions molt they often loosing large patches of pelage at a time. I presume this itches, as watching them scratch is pretty much the second most common thing they do after snoozing! For breeding adults, the molt takes place well after they've left the rookeries and so is a common sight at Little Island in September. Non-breeding adults and juveniles begin molting earlier, sometimes as soon as early July. In these two photos, the bulls (not the same individual) shows no apparent sign of molting, but are certainly scratching away at something causing an itch. The center large non-breeding animal in the right photo shows extensive molting on its hindquarters on August 22, 2014.

> In the wild, juveniles (ages 1-2 years) were the first to moult followed by adult females, bulls and pups. The mean date when juveniles started their moult was 21 Jun which was significantly different from the mean start date of 07 Aug for adult females, and differed from the mean start date for pups of 01 Sep (one month later). Mean completion dates were also about one month apart (19 Sept for juveniles, 26 Oct for adult females and 17 Nov for pups). Duration of the moult was about 45 days for each age group (pups and adult females).

Daniel, R.G. 2003. *The timing of moulting in wild and captive Steller sea lions* (Eumetopias jubatus). Master's degree thesis for the University of British Columbia.

Inter-species Socializing


On September 6, 2009 we get to enjoy a humpback whale calf and a young sea lion play in Favorite Channel as this photo shows. They dove together, rolled together and seemed to enjoy each other's company. Does this behavior start with the sea lion (I think so) or the whale? Collin tells me he's seen the whales flip the sea lions out of the water with their flukes! And the lion swims right back to do it again. How can this be interpreted as anything but fun? These two young animals were together for the entire 30 minutes regulations allowed us to be with them. When the whale rolls it is very obvious when the pectoral fins rise up more than a meter out of the water and splash down only for the next one to come up and do the same. The sea lion would swim next to the whale when it did this as well as circle the beast. I really like this shot with the sea lion going head first down right in front of the whale (its tubercles are visible as well as its eye).

Far more common are Steller sea lions being in near proximity to the humpbacks, as the right photo from June 6, 2014 illustrates. This behavior is more difficult to interpret, but is probably related to the whales feeding on herring. Bubble net feeding had not yet begun, but whales do forage for schooling herring on their own, and it seems likely that when a school of herring is startled by a whale, they'll swim off in all directions which should make it easier for a sea lion to capture some.

Branded Steller sea lions

Both the Alaska Department of Fish and Game and NOAA have branded sea lions. Current branding is done primarily by ADF&G. Pups are electronically branded at their rookery and some animals are branded when they are older and wander. Brands are done in the center of the left flank and include a single letter representing the rookery and up to three digits. As the animal grows, the brand grows and is often easily visible. If they are not branded as pups and the rookery isn't known, the digits are preceded by an equal sign (=). A complete catalog of brands and wanderings is maintained. I provide my photographic sightings of Steller sea lion to Lauri Jemision and Kelli Hastings of ADF&G. In turn they provide me with updated information on the sightings of the individual. As of this writing (November 2014), I have photographs of 21 branded Steller sea lions.

W58 on the left is a female branded as a pup on July 2, 2002 on White Sisters Island. She had a pup at her natal rookery when she was five. She's seen most often at Benjamin Island but has been spotted at Gran Point near Haines, White Sisters, except for a brief sighting when she was two on Sail Island in Frederick Sound. I took this photo on June 21, 2014 at the Faust Rock buoy. I have nine photographs of her over three years.

=413 was not branded at his rookery but as a juvenile of undetermined age at Benjamin Island on October 30, 2003. This photo is from Little

Island on August 19, 2009, my only encounter with him.

Entangled Steller sea lion

Entanglement in marine debris is a contributing factor to Steller sea lion injury and mortality. During our vital rates field research, we photo-document sea lions that are entangled and those with visible evidence of ingesting fishing gear. In a study covering 2000 – 2007, packing bands (commonly used for holding cardboard bait boxes closed) were the most common neck entangling material, followed by rubber bands, net, rope and monofilament line. Salmon fishery flashers were the most common ingested gear observed, followed by longline gear, hook and line, spinners/ spoons and bait hooks.

What can we do to reduce entanglements? "Lose the loop!" Simple procedures such as cutting or reducing entangling loops of synthetic material and eliminating the use of packing bands on boxes can prevent entanglements.
http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.stellerentanglements

The neck entanglement case of H80

H80 was branded as a pup on July 1, 2001 on the Hazy Island rookery. At some point in his life, he became entangled in some sort of strap, probably a packing band, that wrapped around his neck. As he grew, the strap began to dig into is skin and opened a wound that is clearly visible in my photographs. In 2013 Lauri Jemison and a crew of researchers were able to sedate him and attempted to remove the entanglement. As my sequence of six years of photographs shows, the scar remains visible with raw skin and perhaps musculature as well each year. The wound appears to be greatly healed in the August 7, 2014 photograph when he was 13 years old

Entanglements: flashers

The four individuals are the unfortunate victims of flashers. When commercial troller rig their lines, they include flashers to get the attention of the king salmon. Attached to the base of the flasher is a large treble hook with herring attached as bait. Since Steller sea lion seem to prefer salmon to all other fish as food—pretty much just like all Juneauites!—they spot the flashers and hooked salmon and go after it. If they get a good purchase on the salmon, they run the great risk of getting the hook as well. When I spotted the poor animal bottom left on Little Island on August 24, 2012, I immediately called the NOAA Marine Mammal Stranding Network hotline (877-925-7333) and reported it with complete coordinates. I thought the animal was dead, but later that day when researchers arrived, they could not find the animal. It looked very gaunt to me and if it was alive, was in very poor health. Removing flashers is extremely difficult and Kelli tells me if a sea lion sheds it, the flesh around the would dies, the hole enlarges, or it simply rips through the skin. It surely interferes with the animals ability to eat

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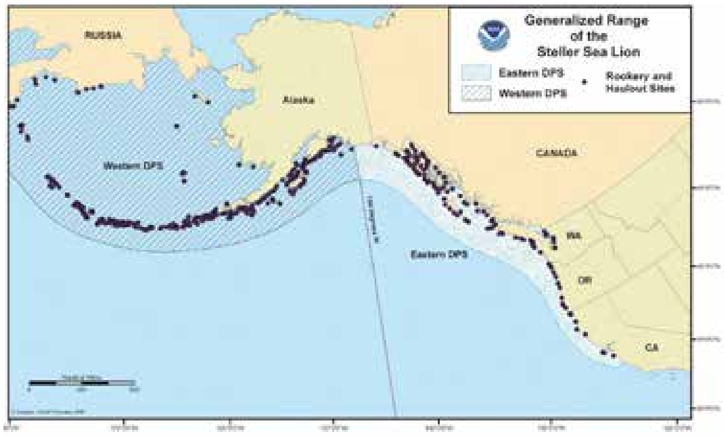
Eastern vs. Western Population Dynamics



The Alaska range of the Steller sea lion is divided into two Distinct Population Segments (DPS) at 144° West longitude, Cape Suckling. The eastern population is healthy and growing in population while the western population has dropped more than 75%! The western is classified as endangered and the eastern population was delisted entirely on June 4, 1997. Both populations are subject to the Marine Mammal Protection Act of October 21, 1972.
http://www.nmfs.noaa.gov/pr/species/mammals/

So why is the eastern population growing and the western declining (the map is from *NOAA*)? The answer has yet to be determined but the hypotheses include ideas that fit into one of two models. The "bottom up" force which results in their environment not being able to sustain their numbers for various reasons from over fishing to climate change. The "top down" force which directly reduces the number of lions by human-caused killing, increased predation and pollution.

That the Bering Sea has a 250 year history of over fishing/hunting is a given. The number of animals killed is astonishing. Georg Steller described in scientific detail the cold water sirenian that now bears his name —Steller's sea cow—in 1741. By 1768 the slow moving animal was extinct due to over hunting. Did the removal of the animal that ate huge amounts of the tops of the kelp forest have a lasting effect? The sea otter was hunted to near extinction from 1741 to 1911 and its numbers plummeted from several hundred thousand to perhaps only a thousand. Did the removal of the animal that kept in check the urchin population that eats the base of the kelp forest have a lasting effect?

Superfamily Phocoidea (Gray, 1821) Smirnov, 1908

Family Phocidae Gray, 1821 **earless seals, true seals**

"True" seals lack external ear flaps (pinnae) and have a dramatically reduced pelvis with rear legs reduced to mere flippers (see photo of harbor seal vertebral column found at Auke Rec beach). They are incapable of walking on land and must drag themselves with their front flippers. Commonly thought of as being mostly smallish animals (as in relation to the Steller sea lion) the southern elephant seal can exceed 5,000 kg!

Phoca Linnæus 1758

FOE-kuh from Ancient Greek φώκη *phṓkē* to the Latin *phoca*, seal.

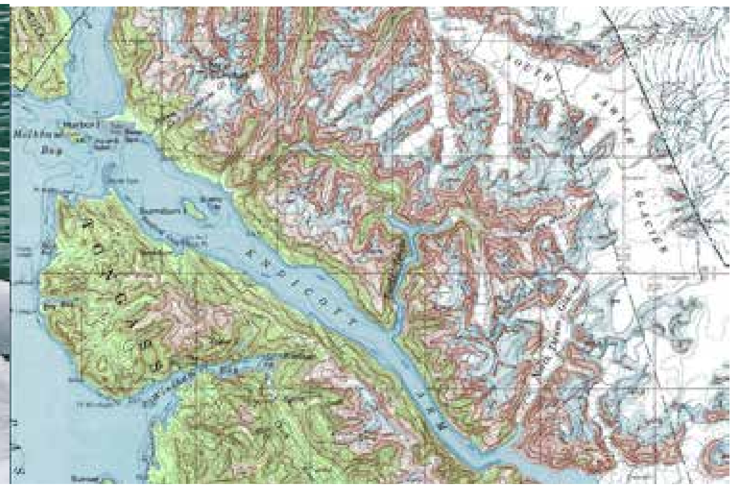
Phoca vitulina richardsi (Gray, 1864), harbor seal, tsàh

Latin vih-TOO-lih-nuh, American vih-tew-LIE-na Richards.

Latin *vitulina*, veal; presumably from their edible flesh. Honorific for an undetermined

Harbor seals can be identified at a glance when swimming as their heads remain parallel to the surface of the water as they swim and their round heads resemble bowling balls with their large eyes looking like the finger holes. Upon close examination, seals lack external ear flaps— pinnae— (to say they are "earless" refers to the lack of these flaps as they do, indeed, have ears). Seals are more aerodynamic than sea lions in shape and primarily use their rear flippers for swimming. On land, they can't "walk" as the rear flippers always remain trailing behind. These characters make them more highly adapted for their mostly marine life. However, mating, pupping and nursing occur on land or icebergs.

Note that this report only includes my experience from 2009 and will be substantially edited.



June 14, 2009 in ***Endicott Arm*** (see map) is harbor seal day. The females gave birth on ice floes to many pups earlier this month, and the flat icebergs are loaded with seals! Many moms and pups are together and there are lots of other seals just laying on the ice in their typical upward arc position. How this can be comfortable is a question a human would ask, but it is obviously comfortable to them. I presume the reason for this is that it reduces the surface area in contact with ice so as to prevent heat loss while resting. As the Allen Marine boat slowly glides through the water toward the Dawes Glacier, we bump into quite a bit of ice but dodge the floes with seals. I see at least 50, but really don't make any effort to count them as they are in view in every direction in the fjord.

The photo on the left is of two adult seals who simply watched the boat as we glided by. The photo on the right is of a baby whose mother already dove off the ice into the water and baby was trying to do the same. The babies are about a quarter the size of the adults and already rather mature-looking. It is probably two weeks old and already has plenty experience diving off the ice, swimming in the fjord and climbing back on the ice and learning to eat on its own.

While apparently abundant in the waters here, this is not a guaranteed sighting on a whale watch. I probably only see them once a week out on the water, and occasionally see them swimming in the Gastineau Channel where their "V" wake and head held horizontal to the water make a snap identification.

On September 6 on a Big Brother-Big Sister whale watch on Allen Marine's St. Philip we cruised by ***Hump Island*** and I counted 74 seal lying on the gravel beach. Their pelts were an amazing assortment of colors, from nearly charcoal black to tawny, but always with spots, some light on dark and others dark on light. We stayed about 150 yards offshore and cruised by slowly, probably less than 1 knot. The naturalist aboard asked everyone to be quiet so as not to spook the seals back into the water. The kids didn't really comply, but the knot of seals did remain in place and did not seem to mind our approach. About a dozen of the group look small enough to be this year's pups.

Family Ursidae G. Fischer de Waldheim, 1817 **bears**

Ursus Linnæus 1758, Bear

UR-suss Latin *ursus*, bear.

Ursus americanus Pallas, 1780, American black bear, s'eek

uh-mare-ih-cane-us Of or pertaining to the Americas.

Taxonomy: Currently 16 subspecies are circumscribed, five of which occur in Alaska:

- *Ursus americanus americanus* Pallas, 1780, American black bear (widespread on the mainland)
- *Ursus americanus carlottae* Osgood, 1901, Haida Gwaii black bear, Queen Charlotte black bear (Queen Charlotte Island and neighboring Alaska islands)
- *Ursus americanus emmonsii* Dall, 1895, the glacier bear with a unique silvery blue to blue-white pelt of southeast Alaska
- *Ursus americanus perniger* J. A. Allen, 1910, Kenai black bear of the Kenai Peninsula
- *Ursus americanus pugnax* Swarth, 1911, Dall black bear, of the Alexander Archipelago islands

Notes: "How do you tell a black bear from a brown bear?" This is a common question whenever we see a bear. Black bear are smaller, usually much smaller; black bear are mostly black (but can be brown or cinnamon); black bear have a concave profile from forehead to nose; black bear lack an obvious shoulder hump; and, black bear have short claws that make a curve. Black bear are meant for climbing.

I have only seen the American black bear in the Juneau area.

Note that this report only includes my experience from 2009 and will be substantially edited.

I wish I took better notes in the field! Then I could write with better authority about all my bear encounters. My notes and photos include these sightings an my memory of them. My first bear encounter is on May 19 on the East Glacier Trail, my first lead on this trail. While on the way back down, just past the switchbacks and large boulders, I hear some rustling in the black cottonwood (*Populus trichocarpa*) trees and look up to my left and see two tiny cubs up in the tree. They're no larger than a kid's teddy bear, less than 12 inches long! I stop the group and point them out, then get busy looking for mom as she's surely not far away. I walk a bit out the trail, just far enough to see over a rise, and there is mom, standing right in the trail! She looks at me and turns around and walks into the forest on the right of the trail. OK, cubs on the left, mom on the right and the trail goes between them! When everyone gets their fill of the cubs and mom, I tell them we're going to have to walk between them. So I gather the group into a smaller package, get out the bear spray and we walk "purposefully" between the bears. Mom is about 10 meters off the trail and busy eating. She lifts her head up to look at us as we walk and then goes back to eating! When we're about 20 meters past, I stop and let the group enjoy their bear encounter some more before we head down the trail. It turns out this is the bear given the name Nickie that will frequent the area all summer.

July 30, at the Steep Creek bridge, the sockeye run is beginning and the bears are arriving. I had two photo safari shuttles today and so I walked over to the bridge to watch the sockeye about 9:30 a.m. While enjoying the fish from the vantage point of the bridge, here comes this very black bear walking up Steep Creek. This young male weighs something like 225 pounds and is probably 4 or 5 years old. He wanders back and forth from one side of the creek to the other before heading off back downstream through the alder thicket to the right. Only a couple other people are there with me to enjoy. Unfortunately, I had my new Canon G10 set so that my shutter speed was only $1/25^{th}$ of a second and every photo but this one is very blurry from the movement of the bear. Of course, my next walk there today with my second shuttle and there are no bears around. As far as I can tell, this is the only time I saw this particular bear. He had no external tags and nothing about his appearance—other than his jet black fur—to make him individually distinctive, plus the only other jet black bear I saw was about twice the size of this one.

August 7 and all the Steep Creek trails are closed to visitors. Now confined to the elevated walkways, not, as I tell my guests, to keep the bears away from the people, but to keep the people away from the bears. This photo shows a typical bear encounter for most at the Mendenhall Glacier Visitor Center. This young, probably only 3 years old, black is wandering about apparently aimlessly, not interested in food. With all the salmon carcasses around, it is probably full at the moment. While the people are intensely interested in him, he seems oblivious to them. The adult bears here always seem single-minded about coming for the salmon. They now have well-worn pads in the grass where they eat the salmon and the number of carcasses grows daily. It is early in the run and most of the more mature bears seem only to eat the brains and the bellies, apparently what they consider to be the prime parts. Both are full of fat and thus calories and probably are quickly metabolized into stored fat in the bear. The bears are putting on something like 10 kg of fat a week with all this bounty of food.

On this day the sow named Nickie has been fishing in the creek and has several salmon up on the bank and she's eating the brains and bellies. The two cubs are up a spruce tree playing with each other and almost falling from the branches several times. It takes moving around on the platform to see them and, curiously, most folks don't seem interested in looking for them. Have they been spoiled by the single bear close up?

The cubs are much cuter. One cub is cinnamon and the other black. The cinnamon is a bit larger and seems the dominant cub, at least by the position it takes on the spruce tree, always above the other. The cubs climb easily, as if they'd been doing it for years, not just the few months they've been alive. The paws of a black bear are made for climbing, with all five "fingers" arranged almost in a straight line so the claws all come out like a comb. Amazingly, very little bark breaks off as they clamber around the branches. Did mom send them up while she was fishing to keep them out of her way? Did they climb because they wanted to? Is there something up there that interests them (I don't see anything besides them—no bird in its right mind would be near them!)? The two definitely do things together, the black following the cinnamon wherever it goes up or down the tree. August 14, A five bear day! It's a typical Alaska rainy day today and I have a W&T shuttle without being a second guide, giving me time to wander around. I head up the road, stopping at the Steep Creek beaver pond on the west side of Glacier Spur Road to watch the sockeye. I continue slowly up to the fish viewing platform at the first parking lot and chat with a Forest Service interpreter while watching the fish. She gets a call on the radio that she's about to have "an interpretive moment" meaning a bear is on the way. In just a few moments, this really scraggly subadult (top photo left) comes walking downstream and stops just below me at platform. This color pattern is interesting and I'm not sure if it's due to shedding of the winter coat, or a juvenile coat, or if the bear is simply variegated. Since it is mid-August, shedding of a winter coat seems unlikely. Juveniles coats seem to be the same as adults, at least from looking at all the cubs I've seen here. That leaves me with the conclusion that this is the natural coat of this bear. The bear is probably 3 to 5 years old and about 175 to 200 pounds, not a large bear, but its frame seems pretty well filled out so feeding hasn't been a problem.

The bear stares at the creek, looking for salmon, but with all his commotion walking through the water, they've all headed downstream and there aren't any here for it to catch. It stays in one spot, watching for several minutes, then heads downstream, out of sight, and the ranger radios to the next interpreter downstream of the "interpretive moment" coming.

I walk along the path and out into the decking to see what's going on and find a dark cinnamon sow with *three* cubs in the Steep Creek usual eating area. Mom is eating, and there are at least three salmon on the ground in front of her, along with carcasses of already devoured fish. One large (probably ~ 100 pounds) cub is about 10 meters up a spruce tree (2nd photo left), seemingly playing as it's bouncing up and down on the branches. Being so large, this has to be a second year cub. His siblings are probably 15 pounds smaller and don't seem as interested in the bouncing branches. None of the three seem very interested in eating, exploring and playing are what they're doing while mom is eating.

I cross the road and head over to Steep Creek on the Trail of Time access where, while watching salmon, a dark black bear (bottom photo left) is on the prowl in the creek looking for salmon. It looks very much like the July 30 bear, but when I compare photos, this one has a longer, narrower snout and generally is more bulky. It probably weighs 225 pounds and is probably 5 or so years old and has been off on his own for a couple years at least What strikes me most about this bear is how beautiful his coat is. If eating salmon with all it's omega-3 oils is good for hair, this bear has been eating plenty! The coat just shines and is even in length and color, very much unlike my scraggly bear whose coat looked like a old hippie with frazzles dreadlocks!

All the bear I see in this area pay very little attention to we humans. I attribute this to two factors: first, there is plenty of food and this commands their attention over nearly everything else; second, their experience with humans has been, for the most part, benign in that we do not represent a ready threat to them. Being intelligent animals, they have learned to accommodate humans in their environment.

Now all the humans I see in the area are just the opposite! They pay apt attention to the bears and when walking by the viewing areas it is very easy to tell if there are bears around. People crowd together, point, sometimes shout at friends and family to come over and see, and are all together very excited and physically animated. One of the functions of the Forest Service interpreters along the Steep Creek viewing area is to keep people quiet so as to not alarm the bears. When a fresh bus load of people converge on the walkways, this is no easy task! People want to see the bear, and from the platforms, feel safe and sometimes act a bit foolish. Out on the trail things are a bit different without the protection of the railings and raised decking. When folks are looking at salmon they are quiet and simply stare down at the fish. I find it just as much fun watching the people as the bears!

August 15 a very scraggly black subadult is digging in the grass between the stairs to the upper parking lot of the Mendenhall Glacier Visitor Center and the kettle pond. The stairs are crowded with people watching but I'm able to get a spot tucked into a corner of the fence that is out of the way yet allows me a pretty good look. It looks like the same bear from yesterday with clumps of brown hair scattered through its mostly black coat and with pale tan cheeks and chin and a darker top of the snout. What is the bear digging for? Everyone (our guides and the Forest Service interpreters) all say ground cone. There are plenty of them around, but in this particular spot I don't see any. The bear is totally intent on finding things in the organic soil and I'm assuming it's all vegetative material as I don't see it pulling up worms or voles or anything remotely like an animal. I'm just not sure what it is eating here!

The bear then crosses under the stairs and goes to the spot between the ramp trail and the stairs and begins digging here (where the photo, right, was taken). I move to the trail and get within 3 meters of the bear, trying to determine just what it is eating. Forest Ranger Laurie is actively managing the people and uses me to help move people from the ramp trail over to the steps where there is fence to keep the people from the bear. The bear is mostly intent on eating whatever it is finding here. There are some ground cones that it has found and dug around. The base of these plants range from the size of a golf ball to a tennis ball and the roots that spread out from that to the , Sitka alder (*Alnus viridis*) are thinner than a pencil. It would take a lot of that to fill a bear.

I'm still using the P mode on the Canon G10 and it is choosing a much too slow shutter speed for hand holding of 1/20th of a second.

August 19, a five bear day! I did not write contemporaneous notes, but did write "5 bear" on my calendar and remember this day vividly. Guide Dave Sherman and I have an East Glacier Trail day and he heads out first, but I catch up to them at the Steep Creek bridge as he's got a sow with two cubs. This is the sow that has been named Nickie, at least by Laurie with the Forest Service. Dave and his group are just past the bridge and the bears are just downstream of the bridge. Dave takes his group on while I stop to watch with mine. All three go under the bridge while we're above and the sow grabs a sockeye salmon with her right paw and transfers it to her mouth, all the time walking with cubs in tow. She walks up onto the ground where the grass has been flattened from previous meals, drops the flapping fish and continues walking.

She turns right and climbs up onto the flat where the large rocks are at my miner's lettuce stop. I take my group up the trail right to the turn where we can clearly see. We're about 10 meters away and as she shows no interest in us, out of her zone. There she has another fresh fish and with both her claws and teeth, rips meat from it and gives it to the cubs to eat. I never see her eat anything for herself. We watch for about 20 minutes and they devour the fish. She then leans her back against a tree, spreads her back legs apart and lets her front legs fall down at her side. The two cubs then begin to suckle! Her mammaries are plainly visible and obviously engorged with milk.

We watch, absolutely enthralled, for about five minutes, when, all of a sudden, her ears go straight up, her eyes and face point straight across the trail (away from us), her back goes stiff, she shows her teeth with a bit of slobber, and she sends the cubs up the spruce tree. These are the "classic" behaviors for an aggressive bear that I told my folks about during our "bear talk" back in the parking lot. Now they get to see it in person! I look downstream and see a large, perhaps 400 pound, black male bear tromping up Steep Creek. I nearly shout "back to the bridge" and get my group up there in what seems a safe spot. This is one of the largest black bear I've ever seen. From the safety of the bridge, we watch it take a swipe at a sockeye in the stream but miss. I start talking to the bear as it approaches the bridge "hey, Mr. Bear, how 'bout going that way!" and point to my right, away from the sow and cubs. The group joins in with me, making sure the bear hears lots of people. Sure enough, the heads into the thicket of alder and spruce there and having never even looked in the direction of the sow and cubs, I doubt he ever knew they were there.

A family of three comes along and joins in with my group at my encouragement, not wanting them to go any further up the trail for a close bear encounter. Several folks come down the trail and I tell them to head back and go out the other way. With the big male gone, we walk back toward the sow, the cubs still up the tree. We get as close as the ditch were the Siberian miners lettuce and monkeyface grow. The sow now lays down on her belly, hands crossed and head laying on them. A bit disconcerting are the ten large claws showing from under her chin (my photo right shows five of them), but she seems quite content for the moment with the big bear gone and the kids up the tree, out of her way, and it seems simply a moment to take some time for herself.

It has been about 45 minutes now, and I've got to get our folks hiking as we've got four miles yet to cover. She closes her eyes and seems to be sound asleep, taking a nap! I get out my bear spray out, take off the safety and keep it pointed at the bear, and walk along the trail, hugging the right side as far away from her as I can be and begin talking quietly to her: “hey mamma, how are you doing, here I am, you’re OK” but when I get about 3 meters from her she raises her head, opens her jaw showing her teeth and gives me a brief but definitive low growl that is more like a bark. A bit startled, I backtrack to my group and decide we’ve got to take a detour. The only route is to cross over the 10 meters of boulders, rocks and alders from right at the end of the bridge to just before the twin boulders the trail splits just up from the bear.

I get everyone through and over the rocks and trees staying about 10 meters from the bear while I stand between them. Once everyone is up on the slope we headed off like a normal trek, the family heading on at my first interpretive stop. About a quarter mile later, we find them heading back down the trail at a near run, telling us “there’s another bear!” I continue with my group and at one of my regular stopping spots just before the first cabled rock face crossing, while chatting with the group someone says “there’s a bear!” and sure enough, here comes another bear, #5 for the day, ambling down the steps then trail toward us. It’s about 135 to 150 pounds and I think a third year bear spending its first solo summer. When he gets below the steps and onto the trail, he seems a rather jolly bear, reminding me so much of Yogi Bear, and seems to saunter, rocking back and forth from left to right, rather than walk. I get my group together on the trail, get out the bear spray yet again. About 5 meters ahead of us, the bear make a right turn for about 5 meters, the a left and continues with his saunter until he’s about 5 meters past us, then turns left and gets back on the trail heads down.

Today we’ve answered one of life’s great philosophical questions. Before any of these encounters, I stopped at a pile of fresh scat at the junction of the access trail with the Trail of Time so we all know that bear *do* shit in the woods. Then with this fifth encounter, we have direct evidence to answer one of the most common questions I’ve gotten about bears while out hiking with guests: do they use the trail? Direct affirmative on that one!

August 20, the next day, yet another bear encounter! I’m shuttling photographer Brandon Hauser from Auke Bay to the Glacier, and just past the Mendenhall River Community School on Back Loop Road I spot a bear pull over and rummage through a trash can as I pass (photo left). I stop and back up for the folks to see and take pictures. Brandon climbs up onto the seat of the airporter so he can shoot through one of the small windows that open. He then knocks the lens shade off his 100-400 mm lens and it goes rolling outside. I tell him that with all my recent experience with bears, I’ll get out and retrieve it for him, and I do. The bear isn’t concerned with this at all, simply continuing to scrounge for whatever food it can find. There must have been some cake with white frosting or whipped cream, as one time when it pulled its head from the can the snout was covered with white (just a little bit is visible in the photograph). Just as we left a truck with CBJ logo on it pulled up, so the owners of this can will get a citation for not having it bear proof. The city is serious about this, having passed an ordinance in 2001 (Ord. 2001-23) requiring storage of all garbage in “bear resistant containers” and on collection day to not place them on the street before 4:00 a.m. Fines begin at $25 for the first offence, $50 for second offence within two years, and $100 for third and subsequent offences within two years.


September 21, a dark brown bear (photo bottom left), about 200 pounds, walks across Glacier Spur Road just as I turn the airporter van into the bus parking lot, giving all on Skip Gray's photo safari a good view as I drive slowly. I continue into the lot and park to let them out. I then wait for his group to get ahead as I want to go on the Trail of Time to get a photo of the fir clubmoss gemmae. After about ten minutes I catch up to them almost immediately as the bear is on the access trail about 25 meters in front of the group. Skip keeps them back and quiet and the bear shows no interest in them, and simply digs shallowly along the side of the trail in several places. The bear turns left onto the Trail of Time so Skip takes his group right on their regular route. I follow the bear—it is going where I am—and spot that it has a sky blue tag on the end of the right ear (visible in the photo). I stay about 20 meters behind the bear and she doesn't seem to mind my presence at all and continues to walk on the trail, once again demonstrating that bears do walk on trails. After all, why not? There are no brambles and branches to get snagged in and the edges of the trail often have loose soil that is easy to dig. She certainly takes advantage of that as she digs in at least a dozen places. None of her digs are very deep, just a few centimeters, really just scratching the top surface off and looking for whatever interests her right underneath.

I stop to examine each of its digging areas to determine what food is there (top photo). Suspecting ground cone as the desired food, I only find it in two of the ten places I examine, and this is one of them. I push the disturbed soil around looking for evidence of what the bear ate, but I find nothing! So I'm still at a loss to say what these digging bears are eating besides the ground cone.

At marker 10 on the Trail of Time the bear leaves the trail and heads into the rocks, but stops and does some more digging and eating (2nd photo right). A couple comes walking up the trail and I stop them and point out the bear and the three of us watch it for about ten minutes before the couple wants to continue on the trail. I ask them to walk with me, away from the bear while I have my bear spray out, just in case.

The bear is really nonplussed about our presence and simply looks up once or twice from digging and eating. There are mushrooms everywhere, but here in the rocks it is clear the bear has no interest in them as I see it just claw them away as it digs and eats whatever it's finding.

I finally leave her and head to my clubmoss but run into the Forest Service scientist Doug and tell him about the bear and he tells me she is a 21 year old sow, now long past breeding age. In 2006 she was caught, weighed in at 200 pounds, tagged and had a tooth pulled that gave her an age of 18. I commented on how mellow she was, and Doug says this is how she's always been.

October 2 is my last bear encounter of the season. It's a nice autumn day with just a bit of crispness in the air and time to walk the dogs. I head up to the glacier and take the old power line trail but find the pond at the old turbine too full to walk up the flume, so we head out to the road and cut into the Trail of Time on the access trail. Because the girls (Cleo and Sugar) like walking off leash and the area is pretty devoid of people with the season being over, that's what we done all the way up the power line trail. We get right up to the old CCC log cabin and there is Bear #1, my 21 year old sow walking diagonally across the trail from the right to the left. Sugar is out in front, about 3 meters from me and Cleo is right at my side. Sugar stops dead in her tracks and looks straight at the bear. The bear stops for a moment and gives the three of us nothing more than a lingering glance, then ambles off into the thicket of alders and young spruce immediately disappearing into the forest.

On bear poop! Early in the season bear poop was nearly solid plant material, almost exclusively black cottonwood (*Populus trichocarpa*). Very fibrous and black, it rivals elephant poop for its cellulose content. The cottonwoods provide both nutrition and bulk to clean their systems out. Later in the season the salmon come in and their diet changes to a large portion of meat. The poop becomes far looser, sometimes to the point of looking diarrheic. Yet it still has some seeds in it, evidence that they are still mostly vegetarian. When the salmon run is ending, they switch back to nearly all vegetation with devil's club being a major component. In September, nearly every plop of poop is full of barely digested drupes of the plant. John Neary of the Forest Service wondered out loud at the NOAA naturalist training if they use it as a way to control intestinal parasites.

Usus arctos horribilis Ord, 1815, grizzly bear, brown bear, xóots ark-tose Ancient Greek ἄρκτος *arktos*, bear. hoar-ih-bill-is Latin *horribilis*, terrible, fearful, dreadful.

Taxonomy: All along the southeast Alaska and British Columbia coasts the bear are called "brown" by the locals to distinguish them from their smaller interior relatives that are commonly called "grizzlies". The "brown bear" in the broad sense— *Ursus arctos* Linnæus, 1758—has a range in North America and Eurasia and is the most widely distributed bear.

There is little agreement on how to divide up the various subspecies that have been carved into as many as 90 or as few as five. Four have been named for Alaska:

- *Ursus arctos horribilis* Ord, 1815, as the dominant bear but one whose coastal members are much larger than the interior
- *Ursus arctos middendorffi* Merriam, 1896, the very large Kodiak bear of Kodiak Island
- *Ursus arctos sitkensis* Merriam, 1896, of Baranof Island that appears more closely related to the polar bear (*Ursus maritimus*) than the brown bear
- *Ursus arctos stikeensis* Merriam, 1914, from the Stikeen River of British Columbia and Alaska

That they are closely related to polar bear is given credence by brown bear-polar bear hybrids being encountered, first in 2006 and again in 2010 where their ranges increasingly overlap due to a warming climate.

Notes: "How do you tell a brown bear from a black bear?" This is a common question whenever we see a bear. Brown bear are larger, usually much larger; brown bear are brown to blonde; brown bear have a flat profile from forehead to nose; brown bear have an obvious shoulder hump; and, brown bear have long claws that make a straight line. Brown bear are meant for digging, not climbing.

I've yet to see a brown bear in the immediate Juneau mainland area. I was up on the East Glacier Trail many times in 2009 and saw many black bear, but never the browns as indicated in the photo of the warning sign. I did see some bear scratching on spruce trees that could have been from either black or brown bear. Fellow guide and part time Forest Service employee Brenda Wright saw them twice! Fellow guide Stacy LaMascus had a very close encounter with a brown at Point Bridget the same year.

My first experience with browns here is at Sweetheart Creek, about 40 miles south where Port Snettisham heads east off Stephen's Passage and forms Gilbert Bay to the south. Here the brown bear gather for the sockeye run and the easy pickings from both the river and the fishermen. On August 3, 2008 We anchored our boat in the bay and canoed to shore and saw several bear along the shoreline. When we got all of us and our equipment to shore, we trudged on a manway through tall salmonberry and whistled and talked the whole way to let the bear know where we are as we cannot see where they are or determine how close they are to us.

Arriving at Sweetheart Creek, Annette and I begin fishing right where the creek flows out from the chasm into the flats with me fly fishing close to the cliffs and Annette just downstream spin casting in the open. A sow with an 18-month old cub comes wandering up our side of the creek and the two get uncomfortably close, less than 50 meters downstream. At this point they cross the creek (right photo) and we continue fishing. The cub goes wandering in the Lyngby's sedge (*Carex lyngbyei*) while mom walks the side of the river, fishing. With her away from us and concentrating on her own fishing, our anxiety level drops significantly. She spots an attractive salmon and without pouncing, sweeps her left arm down into the river and comes up with a 1 meter long sockeye stuck in her claws, and then stands up. The cub spots her with the writhing fish and runs straight towards her. I'm sure it's thinking "easy eats". Just as the cub arrives, the sow turns so her right side faces the cub and just as the cub jumps up to grab a bite of the fish, the sow swings her right arm straight for the cub and smacks it on the jaw with a force that causes the cub to fly back and roll three times away from her! She then sits down and leisurely eats the prime parts of the salmon, with junior trying to figure out what just happened. She leaves the rest on shore before fishing some more and junior heads for that.

I tell Annette that "There's a mother who knows how to mother!" If the cub doesn't learn to fish—especially since this cub will be abandoned by the mother in late October or early November—it will not survive. This was an incredible "National Geographic moment" for sure!

After hearing about seeding brown bear along the shoreline of Admiralty Island— xóotsnoowú, the "fortress of the bear"—and mistaking the "brown bear rock" for a bear many times, it wasn't until May 16, 2013 for me to see my first. Captain Gary Judkins spotted it first and slowed the boat down to a near stop as we very slowly approached the shoreline, but remaining about 150 yards of so as not to spook the bear. It was feeding on fresh Lyngby sedge growing just above the high tide line. Being mostly interested in feeding, the bear rarely lifted his head up to survey the surroundings and us in the boat out on the water.

Order Cetacea Brisson, 1762 ***whales, dolphins, porpoises***

see-TAY-see-uh, American often see-TAY-shuh Ancient Greek κῆτος *kētos*, whale. Derived from Greek mythology when Perseus defeated the great sea monster Κητώ, *Kētō*. The word came to mean any large sea creature.

There is a bit of messiness when it comes to what one calls "whales". The broadest classification includes whales, dolphins and porpoises as they are all in the same order and is what I follow here. Since they are generally related, this seems a logical arrangement. Some prefer to segregate out the dolphins, porpoises and whales as three convenient and distinct groupings. While convenient, these are not "natural" in a phylogenetic sense.

Cetaceans are the most highly adapted mammals to the aquatic environment. They retain the mammalian feature of hair but highly modified in many into a probable sensory organ contained in an outward growth called a tubercle. Females produce milk for their young, adapted to their aquatic life to be about 50% milk fat making it immiscible in water. Their fusiform shape allows for efficient movement through water, far more viscous than atmosphere. Their forelimbs are efficient flippers or paddles for acrobatic maneuvering in their submarine habitat. Their hindlimbs have been reduced to vestigial pelvic bones not connected to the vertebral column. Their nasal openings and passages have migrated to the top of the head allowing ease of breathing while remaining submerged. Their earbones are isolated from the skull and have developed into highly sensitive organs attuned to an amazing assortment of sounds. All of these adaptations come from divergence from terrestrial mammals from the early Paleogene period (66–23.03 million years ago) and are closely related to ungulates, mammals with hooves, and perhaps closest to hippopotamus.

Suborder Mysticeti Cope, 1891 ***baleen whales***

miss-tih-SEE-tee Etymology uncertain. It could be from ο μυστικητος, apparently a conflation of ο μυς το κητος from Aristotle's *Historia Animalium*. It is often said to be derived from the ancient Greek μυσταξ *moustak*, moustache + κῆτος *kētos*, whale, referring to the baleen plates.

Mysticetes are whales without teeth, replaced by ranks of baleen composed of keratin, the same as fingernails and hair. Baleen is often called "whalebone" but is not actually bone. Teeth occur in all living mysticetes for at least part of their embryonic stage. Fossil mysticetes have teeth. This represents a dramatic change in feeding behavior from direct predation to filter feeding. Living mysticetes gulp-feed in the Balaenopteridae (rorquals), skim-feed in the Balaenidae (right whales and bowhead whale), and bottom plough in the Eschrichtiidae (gray whales). The Neobalaenidae only contains the pygmy right whale. If considered more broadly to include fossils, the name Cetotheriidae is used.

Family Balaenopteridae Gray, 1864 **rorquals**

Old French *balaine,* whale, whalebone; from the Latin *ballaena*,whale; from the Greek φάλαινα *phalaina,* whale.

Rorqual comes directly from the French *rorqual*, which derives from the Norwegian word *røyrkval*, furrow whale, presumably from the baleen rows. [http://iberianature.com/britainnature/miscellaneous/etymology-of-mammal-names-in-english/]

The nine living species are found in two genera, *Megaptera*, with only the humpback whale; and *Balaenoptera* with the torpedo shaped minke, sei, fin and blue whales. All have ventral pleats or throat grooves that allow the mouth to open an enormous cavity holding thousands of gallons of water that can be filtered for small sea life such as krill and small schooling fish.

Megaptera Gray (1846)

meg-APP-tur-uh Greek μεγάλος *megalos*, great, large, mighty + πτέρυγα *pteryga*, wing; literally "big wing" for the very large pectoral fins.

In 1846 John Edward Gray (1800-1875), Keeper of Zoology for the British Museum, determined the baleen whales (then considered to be in the all-encompassing genus *Balaena* Linnæus 1753) were different enough to warrant division and he created the new genus *Megaptera*, using the Latin word for "big wings" in reference to the largest pectoral fins of any whale in the sea. Indeed, the whales uses these fins as "wings" for some incredibly acrobatic underwater maneuvers when feeding in Alaskan waters. The genus is monotypic, containing only the humpback whale.

Megaptera novaeangliae (Borowski, 1781), humpback whale, yáay

Latin noh-vee-ANG-li-ee, American no-vuh-ang-glee-aye   New England, from where first scientifically described.

Taxonomy

1756: The first name given to the humpback whales in a scientific setting was by Mathurin Jacques Brisson (1723-1806) from his *Regnum Animale* of 1756 calling it in his in native French *baleine de la Nouvelle Angleterre* with the English meaning "whale of New England". It is not clear if he observed the animal here, but many of his era had, especially the whalers.

1781: Georg Heinrich Borowski (1746-1801), German naturalist and professor at the University of Viadrina in Frankfurt, converted Brisson's French into the new form of naming in Latin invented by Carolous Linnæus in 1753 as *Balaena novaeangliae* Borowski 1781.

1804: Bernard Germain de Lacépède (1756-1825), French naturalist who was for a time the curator of reptiles and fishes at the *Jardin des Plantes* where he wrote *Histoire naturelle des poissons*, moved the whale from Balaenidae into the new family Balaenopteridae. This required that its genus be renamed so he created the name *Balaenoptera jubartes* Lacépède, 1804. *Balaenoptera* means "looks like a baleen whale" and *jubartes* is a French word for whale.

1846: John Edward Gray (1800-1875), Keeper of Zoology for the British Museum, determined the genus *Balaena* had whales different enough to warrant division. He created the new genus *Megaptera* and gave it the name *Megaptera longipinna* Gray, 1846. He left the bowhead and right whales in *Balaena*. The epithet means "long-feathers", a curious misapplication of a Latin word.

1932: Remington Kellogg (1892-1969), naturalist and director of the United States National Museum reverted the name to *Megaptera novaeangliae* (Borowski, 1781) under the principle of priority using the oldest name.

The common name, humpback whale, is a bit misleading as the whale doesn't have a humped back! When sleeping, their backbone is nearly straight and only the rather small dorsal fin rises above it. When cruising the "hump" is slight at best and certainly not much different than any other whale. It is when the whale dives that it lives up to its name as it arches the back from the dorsal fin to the flukes in a mighty hump as it prepares to propel itself to the depths of the sea.

Current Status of Humpback Whales

Economic Status

The economics of humpback whales has historically been measured by consumption from the value of the products of the carcasses of dead whales. With the ban on whaling of humpback whales and the development of whale a watching industry, the value of whales can now be calculated in a very different way. During the Juneau cruising season from the first week of May to the last week of September, nearly a million people visit Juneau. If 5% of them take a whale watching tour and the typical person pays $150 per trip meaning 50,000 go to see whales, that's a whopping $7,500,000 addition to the local economy. If there are around 300 whales in Juneau waters that means each whale is worth $25,000. The whales provide a tremendous advantage as an economic resource as they keep coming back to Juneau each spring for another season of whale watching! It doesn't seem like a huge stretch to conclude that the economic value gained through humpback whale conservation and ecotourism is huge. It is certainly greater than the value of whaling, which, of course, kills the animals. These numbers are largely guesses but they make the point that live, healthy whales are worth serious money.

International Status

Humpback whales are found in most of the worlds' oceans; they only miss the high arctic. The International Whaling Commission "best estimate" of their worldwide population is 114,480 with data from 1997-2008. The *Report of the Scientific Committee Annual Meeting 2013* [http://iwc.int/scientifc-committee-reports]includes updates only the Southern Hemisphere and Arabian Sea humpback whale stocks. The most recent estimate, 2007, for the North Pacific Ocean is 22,000 individuals [http://iwc.int/estimate]. Pre-whaling estimates are especially difficult to determine, but the North Atlantic is now believed to have a population greater than 100,000 based upon genetic modelling, or about the world's current total population.

Ruegg, K, H.C. Rosenbaum, E.C. Anderson, M. Engel, A. Rothschild, C.S. Baker, S.R. Palumbi. 2012. *Long-term population size of the North Atlantic humpback whale within the context of worldwide population structure*. Conservation Genetics 14 (1): 103.

Humpback whale hunting began in the 17th century with small takes. The invention of the explosive harpoon in the 19th century greatly increased the number harvested, reaching its peak in the early 20th century of some 200,000 animals. This reduced the population of humpbacks by some 90% of previous stocks and the particularly hard-hit North Atlantic population dropped to a mere 700 individuals.

Breiwick J.M., E. Mitchell, & R.R. Reeves. 1983. *Simulated population trajectories for northwest Atlantic humpback whales 1865–1980*. Fifth biennial Conference on Biology of Marine Mammals, Boston Abstract. p14.

In 1946 the International Whaling Commission was created to preserve the whale by creating restrictions and rules on hunting.

> The International Whaling Commission is an Inter-Governmental Organisation tasked with the conservation of whales and the management of whaling. It is set up under the International Convention for the Regulation of Whaling signed in 1946. The Commission has a current membership of 89 Governments from countries around the World. [http://iwc.int/iwcmain]

In 1986 the IWC completely banned whaling. Since then, Japan, Norway and Iceland—nations that actively whale—have urged ending the ban. Subsistence hunting of humpback whale is currently allowed by indigenous people on Bequia Island in St. Vincent and the Grenadines and Greenland. Greenland's authorization was for three years, ending in 2013. At the time of the ban, the world-wide population of humpbacks plummeted to a mere 5,000 individuals [1]. In 1986 Japan agreed to dramatically decrease their take of whales and is currently allowed to take 50 humpback whale a year under an IWC provision for scientific research. Japan has not taken advantage of this provision and no humpbacks have been taken since 1986. [http://iwc.int/permits]

[1] Baker, C.S., A. Perry, J.L. Bannister, M.T. Weinrich, R.B. Abernethy, J. Calambokidis, J. Lien, R.H. Lambertsen. 1993. *Abundant mitochondrial DNA variation and world-wide population structure in humpback whales*. Proceedings of the National Academy of Sciences 90 (17): 8239–8243.

United States Status

Whaling continues in the United States by nine indigenous peoples in Alaska for about 50 bowhead whale a year. Their catch is regulated by the Alaska Eskimo Whaling Commission [http://www.bluediamondwebs.biz/Alaska-aewc-com/] under the auspices of the National Oceanic and Atmospheric Administration. For 2015 a maximum of "75 strikes" are authorized by the IWC, NOAA and AEWC for Alaska Eskimos. No humpback whale are taken.

Marine Mammal Protection Act of 1972

Humpback whales are fully protected in United States waters out 200 nautical miles under the Marine Mammal Protection Act of 1972 that...

> ...prohibits the ***TAKE*** of all marine mammal species in U.S. waters. ***Take*** means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill," and harassment means "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild; or has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to migration, breathing, nursing, breeding, feeding, sheltering." ***TAKE*** includes feeding or attempting to feed a marine mammal in the wild. Some exceptions are made for authorized scientific research and subsistence hunting by Alaska Natives.

The Alaska Regional Office of the National Marine Fisheries Service has created these "Marine Mammal Viewing Guidelines and Regulations", here edited to include only whales[http://alaskafisheries.noaa.gov/protectedresources/mmv/guide.htm]:

Marine Mammal Viewing Guidelines and Regulations

The humpback whale approach regulation has been in effect since July 2001 and requires that you:

- Not approach within 100 yards of a humpback whale.
- Not place your vessel in the path of oncoming humpback whales causing them to surface within 100 yards of your vessel.
- Operate your vessel at a slow, safe speed when near a humpback whale.

VIEWING MARINE MAMMALS - A CODE OF CONDUCT

Federal law prohibits pursuit of marine mammals.

- Remain at least 100 yards from marine mammals.
- Time spent observing individual(s) should be limited to 30 minutes.
- Whales should not be encircled or trapped between boats, or boats and shore.
- If approached by a whale, put the engine in neutral and allow the whale to pass.

Even if approached by a marine mammal:

- Offering food, discarding fish or fish waste, or any other food item is prohibited.
- Do not touch or swim with the animals. They can behave unpredictably and may also transmit disease.

HOW TO OBSERVE MARINE MAMMAL BEHAVIORS AND MINIMIZE YOUR IMPACT

Whales, Dolphins, and Porpoise:

- Changes in swimming. . . such as rapid changes in direction, speed; erratic swimming patterns. Escape tactics such as prolonged diving , underwater exhalation, underwater course changes, or rapid swimming at the surface. Female attempting to shield a calf with her body or by her movements.
- Surface displays. . . like tail slapping or lateral tail swishing at the surface.

HOW TO CONSCIENTIOUSLY VIEW MARINE MAMMALS FROM A BOAT

Whales may surface in unpredictable locations.

- Breaching and flipper-slapping whales may endanger people or vessels.
- Feeding humpback whales often emit sub-surface bubbles before rising to feed at the surface. Stay clear of these light green bubble patches.
- Noise may help whales know your location and avoid whale and vessel collisions. For example, if your engine is not running, occasionally tap the side of the boat with a hard object.

If you need to move around a whale, do it from behind the whale.

- Vessels that wish to position themselves to allow whales to pass the vessel should do so in a manner that stays fully clear of whale's path.

Marine mammals are more likely to be disturbed when more then one boat is near them.

- Avoid approaching marine mammals when another vessel is near.
- Marine mammals should not be encircled or trapped between boats, or boats and shore.
- Always leave marine mammals an escape route.
- When several vessels are in an area, communication between vessel operators may reduce the potential for disturbance.

Limit your time with any individual or group of marine mammals to 30 minutes.

- Your vessel may not be the only vessel in the day that approaches the same animal(s). Please be aware that cumulative impact may occur.

Vessels traveling in a predictable manner appear to be less disturbing to animals.

- Pursuit of marine mammals is prohibited by law.
- Never attempt to herd, chase, or separate groups of marine mammals or females from their young.
- Avoid excessive speed or sudden changes in speed or direction in the vicinity of whales.
- The departure from a viewing area has as much potential to disturb animals as the approach.

"Regulations Governing the Approach to Humpback Whales in Alaska" are published as a "final rule" beginning on page 29502 of the Federal Register, 66(105), Thursday, May 31, 2001. [http://alaskafisheries.noaa.gov/frules/humpbackapproachfr.pdf]

Endangered Species Act of 1973

The humpback whale is considered *endangered* under the Endangered Species Act of 1973. This is defined as *any species which is in danger of extinction throughout all or a significant portion of its range* (Sec.3.6, Sec.4.a [2]). This act provides additional protection for the humpback whale.

When John Moran of NOAA was asked about the possibility of hunting the whales after delisting during the 2009 NOAA Naturalist Training, his emphatic answer was "No way! Too many people now love them." If the Endangered Species Act is to mean anything at all, it must be based upon science. Science has methods to deal with uncertainty. When science is used for endangered species, it can work to actually save the species. The delisting of the Bald Eagle on August 8, 2007 was a great victory. It came under protection early enough for the population, with human help, to recover. The same is happening with the North Pacific population of the humpback whale. With protection, that population rose from perhaps as few as 1,000 individuals to a current estimate of 26,000. There are currently no real human threats to this population (not so for the Western Pacific population). If the law is to mean what it says, when an organism is no longer endangered, its status should change to reflect that, regardless of its "charismatic" character. I've watched the Juneau population grow with new babies every year joining the other. I predict that this population will be downlisted to "threatened", but I'm of the opinion that this also is an overstatement of the actual status. But as John Moran said, there will be no additional whaling allowed under other laws and regulations as there is just too much public pressure to allow it. I think the fishermen who have initiated the delisting process want is relaxed regulations on them when actively fishing when humpbacks are in the vicinity. This seems to be he unspoken position of the State of Alaska as well.

On August 29, 2013 the National Marine Fisheries Service issued a "90-Day Finding on a Petition To Delist the North Pacific Population of the Humpback Whale; Notice of Status Review":

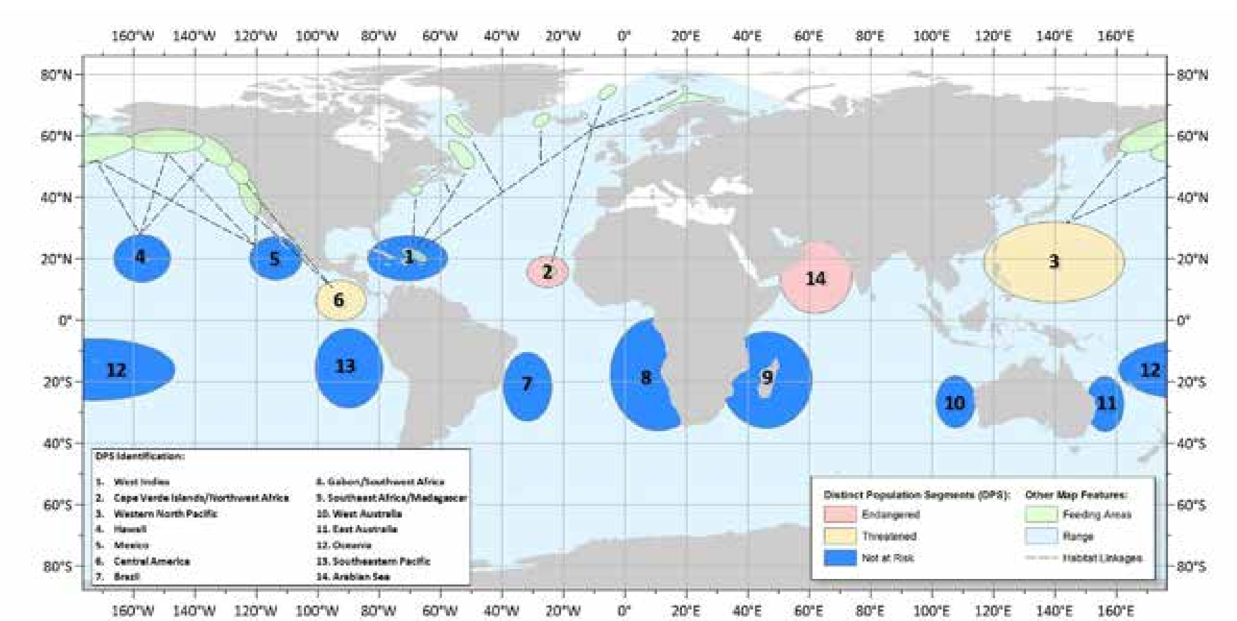
> We, NMFS, announce a 90-day finding on a petition to identify the North Pacific population of the humpback whale (*Megaptera novaeangliae*) as a Distinct Population Segment (DPS) and delist the DPS under the Endangered Species Act (ESA). The humpback whale was listed as an endangered species in 1970 under the Endangered Species and Conservation Act of 1969, which was later superseded by the Endangered Species Act of 1973, as amended (ESA). We find that the petition viewed in the context of information readily available in our files presents substantial scientific and commercial information indicating that the petitioned action may be warranted.
>
> We are hereby initiating a status review of the North Pacific population of the humpback whale to determine whether the petitioned action is warranted. To ensure that the status review is comprehensive, we are soliciting scientific and commercial information pertaining to this population from any interested party.

During 2015 the status of humpback whales is changing. The National Marine Fisheries Service determined the petition of the Hawaii Fishermen's Alliance for Conservation and Tradition Petition in 2013 was found to be "without merit", but the State of Alaska Petition to Designate the Central North Pacific Stock of the Humpback Whale (*Megaptera novaeangliae*) as a Distinct Population Segment (DPS) and Remove the DPS from the List of Endangered and Threatened Species under the ESA of February 2014 was found to be "with merit".

> We, NMFS, have completed a comprehensive status review of the humpback whale (*Megaptera novaeangliae*) under the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1531 et seq.) and announce a proposal to revise the listing status of the species. We propose to divide the globally listed endangered species into 14 distinct population segments (DPSs), remove the current species-level listing, and in its place list 2 DPSs as endangered and 2 DPSs as threatened. The remaining 10 DPSs are not proposed for listing based on their current statuses. This proposal also constitutes a negative 12-month finding on a petition to delineate and "delist" a DPS of humpback whales spanning the entire North Pacific and a positive 12-month finding on a petition to delineate and "delist" a DPS in the Central North Pacific (Hawaii breeding population).
>
> At this time, we do not propose to designate critical habitat for the two listed DPSs that occur in U.S. waters (Western North Pacific, Central America) because it is not currently determinable. In order to complete the critical habitat designation process, we also solicit information on essential physical and biological features of the habitat of these two DPSs.

A public comment for this proposed rule period expires July 20, 2015.

The rationale for this proposal is based on hard science. The fourteen distinct population segments that have been identified are shown on the NMFS map below. DPS 2 (Cape Verde Islands) and 14 (Arabian Sea) would remain as endangered. DPS 6 (Central America) and 3 (Western Pacific) would be uplisted to threatened. The remaining 10, including, our DPS 4 (Western Pacific), would be delisted. DPS4 dropped to some 1,000 or fewer individuals in the 1960's and was in extreme threat of extinction, but has rebounded to some 26,000 today. There are no significant threats to this population currently and the population is growing at more than 3% per year. Without threats and a growing population, this population is no longer in any immediate danger of extinction, nor under any significant threat at all, it should be removed from the Endangered Species List if the list is to represent science and real endangerment.



My first year with humpback whales

My first humpback. Despite trips to Cordova in 2005 and Juneau in 2007, well within the range of humpback whales, my first sighting had to wait until August 2, 2008. We are headed south in the Gastineau Channel on our way to Sweetheart Creek for some serious sockeye salmon fishing. Not far north of Point Bishop, daughter Bess spots a blow about 200 yards off our port side. It's raining steadily and I remain inside the covered cab of the boat and snap three photos through the plastic windows. Now why didn't I step outside for a better photograph of my first humpback? The result is this rather poor photograph. However pathetic, it remains important to me as my first sighting and a portent of things to come. These first reports are from an excited novice guide, experiencing whales up close for the first time just as our guests do every day.

In 2009 I took a job as a naturalist guide with Gastineau Guiding and a major part of this company's program is whale watching with *Alaska's Whales and Rainforest Trails* adventure.

May 7. My first humpback sighting of the year is from the shore just east of Point Salisbury on my hike with guide Dan Hopson. While looking for a spot along the rocky beach to eat lunch, Dan is the first to hear a spout but I think I was the first to spot the whale, about 100 meters off shore, swimming from the west to the east in the direction of Bishop Point where it went out of sight, but turned around and came back westward and headed off into Stephen's Passage.

May 14. My next whale encounter is the greatest whale experience of my life up to this date—but with many more are to come! I'm out on the *Navigator* shadowing guide Richard Stokes on a Whales and Trails trip for my first time on the water with Gastineau Guiding. Because I was not leading, I had the opportunity to take some photographs with my Canon 10D with a 70-200 mm lens with the 2× extender.

As was so often the case for later trips, the first sightings were of dorsal fins and the backs near them of whales cruising just below the surface of the water. I took probably fifty or a hundred shots of the fins, only to delete the vast majority of them when I looked at them on my computer and found them to be so distant and tiny as to be worthless! But a few were worth keeping, like this photo which shows a cow and calf cruising south along the west side of Shelter Island in Saginaw Channel.

Our humpbacks are arriving almost daily from their winter journey to Hawai'i and many are cows with calves. The cows are large, about 40 feet long and a similar number of tons. The calves are about a quarter the size of the cow and remain quite close to it when the two are near the surface. As the cow has gone several months without feeding, when she gets to Alaska she has only one thing on her mind: food! This means plenty of diving in order to find and eat 1.5 tons of krill and fish a day!

When I got home I learn the fun of comparing my whale tails to the two catalogs. I process these two fluke shots and compared them to the *Juneau Humpback Whale Catalog.* I was not able to identify "my" whales. Both patterns seem quite distinct and easily compared with the 108 on the website at the time, but none of them matched. I e-mailed the photos to Suzie Teerlink saying my eyes must not be so good as I can't ID these flukes. She answered me within a day and said my eyes are just fine as these are "new" whales, not in the catalog. She requested permission to use the photos, which I gave her. This is a pretty cool way to get started in the whale-watching business, find new whales for Juneau!

Whale UASE_ID_7825_Temp. This whale has one of the most distinctive tail shapes and patterns I've ever seen and I've not seen it since this day nor are there any other reports of sightings. What happened to this whale? Was it just passing through our waters on its way to its "home" waters in Alaska? Is it still alive? Answers to these questions are impossible and help add to the mystique of watching and studying these leviathan.

Whale 2264. When I took this photograph on May 14, 2009 it remained unidentified as it wasn't in either catalog. It entered the catalog the winter of 2009-2010 with a photograph that John Moran of NOAA took with the note *Date First Seen, November, 2009*. My photograph pre-dates this by some seven months! The series of eight photographs I took that day remain evidence of my only encounter with this whale. The same questions I have for my first new whale come to mind with this whale as well. What this means for me as a naturalist observer of these creatures is that I take photographs of every whale tail I can, every time I'm on the water. I compare them to the catalogs in an attempt to identify them, but I'm now accumulating a set of historical records of whale occurrences in Juneau waters. These can be used to provide information on how often whales return to our waters and exactly where they go. It also means that periodically I must remember to go back through my now extensive collection of "unidentified" whale tails and revisit them with the catalogs. Each time I do this, I'm able to add another identified whale to my collection.

May 25. The whales continue to be very active and easy to find nearly every day. But one morning Captain Gary Judkins and I were out on the first trip of the day—before 8 a.m.—and we were looking for whales for 1 hour and 45 minutes before we found a dorsal fin and a few spouts! I was worried that day about our guarantee of $100 per person if we don't see a whale! That has been the only nervous day of my entire career with Gastineau Guiding.


Pectoral Slapping and Spy Hopping. My nervousness proved to be totally inappropriate. It didn't' take long for us to witness some very exciting antics of a juvenile whale. Whale behavior is included in its own section of these note.


Breaching. It's only my fourth day out on the water and I already get to enjoy the antics of a breaching juvenile, here in the waters off the south end of Shelter Island at the northern end of Stephens Passage.

I was out on the waters around Juneau leading 61 whale watching trips in 2009 and never tired of the experience. It is nothing short of amazing and fantastic to be able to be out on the water watching these leviathan eat and play. The privilege working for Gastineau Guiding to be able to do this 61 times is nothing short of gracious. How many people in the world get to see this sort of thing, let alone 61 times in one six month period? I've one thing left to do to complete my humpback experience: I need to head to Hawai'i and witness them in breeding behavior and see them breach in large number. If I never do, this magnificent experience will suffice for at least a lifetime.

Humpback Whale Behavior

Even the most casual observation of humpback whales leads to questions about their behavior. On every water trip I get asked "why do they do that?" The answer to this seemingly simple question comes with great difficulty and I couch my responses with uncertainty. Most of what I "know" comes from my accumulated observations supplemented with what I read. I try mightily not to anthropomorphize, that is, ascribe human attributes—especially behavior—to other animals, based largely upon my experience with human behavior. These animals are not humans and to ascribe human attributes is at best naïve and at worst a great disservice to a very intelligent animal. I've done a great deal of research on humpback whale behavior and have come to the conclusion that most of what we "know" is little more than speculation (forming an idea, conjecture, or theory without firm evidence). The vast majority of references I've found simply describe illustrate and name the behavior. In what follows, I attempt to go a bit beyond that and give some detail of my own observations with specific research I've been able to find for that behavior.

The single best reference I use is notable for how well it distinguishes what we know based upon evidence from what we would like to know, and gives great emphasis on the vast amount that we should learn about these magnificent creatures. It doesn't hurt that most of the photographs were taken by my friend Flip Nicklin.

Darling, J. 2009. *Humpbacks: unveiling the mysteries*. Granville Island Publishing, Ltd., Vancouver, BC.

The Pacific Whale Foundation of Maui, Hawai'i, gives this caveat as a preface to illustrating humpback behavior:

> The following behaviors, most visible from boats and shoreline lookouts, are high energy activities that may serve a number of social functions. They must be interpreted in the full context of the season and location in which they occur to understand their significance and purpose. [http://www.pacificwhale.org/documentSetting/UserFiles/File/WhalewatchGuide.pdf]

Much of what we "know" about humpback whale behavior comes from research in Hawai'i. Large numbers of whales congregate there, especially off the island of Māui, from November through March. Mating and calving of both North Pacific and South Pacific populations occurs in Hawai'ian waters. The tropical water there is clear enough to allow extensive observation and filming of underwater behavior. Yet with decades of observation and filming, the act of copulation has never been observed, let alone filmed. It seems these animals value their privacy!

Our Alaskan waters are so close to opaque from the incredible plankton bloom that observing underwater behavior is virtually impossible. I am limited to what I see near the surface, at the surface and above the surface. This is but a tiny fraction of the behavior these magnificent mammals exhibit; I just can't see what they do under water. Take all of what follows with the severe caveat (a warning of limitations) that even sources of information that many consider reputable are not based upon "hard" (evidence-based) science. The depth of our ignorance of these animals is immense and much of what we "know" we don't.

I have found little agreement on the classification and naming of humpback whale behavior. What follows is based upon my own observations with the terms I use along with other descriptive words used by many sources. Pick the one you like!

Cruising and Spouting


By far the most common behavior I see is cruising and spouting. I can truthfully state that I see this every time I'm on the water. When we leave Auke Bay and are searching for whales, spouting is what the captain and naturalist are looking for above the surface of the water. Spouts are nearly always the first thing we se and on all but "split pea soup" fog days are easily seen at distances of about five miles or less. That being said, it takes vigilance and extensive use of one's peripheral vision. It helps to be "out of the gate" after whale watching boats have already left. On a tour in 2009 Captain Gary Judkins and I went an hour and 45 minutes before spotting a whale!

Cruising and spouting is the one behavior I can be virtually certain about what I see: the whale is simply swimming from here to there and breathes with each surfacing. The normal pattern is a rise of the blowhole to just above the surface with a blow followed by submerging. The dorsal fin emerges with the backbone exhibiting a gentle arc, then it submerges. The sequence repeats itself over and over again as long as the whale is travelling. The time between blows is often less than 30 seconds, but can be much longer. There is no mystery here.

The shape and size of the blow can be a great help at identifying the whale species being observed. The spout of a humpback whale is quite distinctive from other whales. It is a nearly vertical column shaped like an ice cream cone, narrow at the base and broad at the top. It can easily reach 3 to 12 meters above the water surface. Surface winds can affect the orientation of the blow and the vertical blow is with calm conditions. I must admit to absolute joy when the spout of a whale wafts through the open windows of the boat. The smell is definitely unpleasant, but at the same time exciting. It makes me wonder what sort of microorganisms live within the lungs of these leviathan and if breathing them in might lead to some pathology!


Humpbacks have two nostrils located on the highest part of the skull as a splendid adaptation to their aquatic environment. They are separated by a septum made of both bone and hyaline (nearly transparent) cartilage. When open, a bowl forms above each that can hold more than a quarter liter of water. Much of the spout is made of this water that is vaporized upon exhaling. As the whale dives, a single external valve closes both nostrils simultaneously so no water enters. These two photos were taken less than a second apart showing the closing of the valve!

Since the blowhole is above the surface for mere seconds, it requires that some 90% of their lungs be exhaled and then inhaled in a very few seconds. It is estimated that the speed of a humpback's breath is more than 300 kmh [http://humpbackwhale.homestead.com/Humpback-Whale-Blows.html], easily enough to vaporize the moisture in their lungs as well as the water in their nostrils.

Logging

Also called sleeping. At times we'll come upon a whale, usually alone, that remains nearly motionless for some five to ten minutes (the longest I've observed before moving off). It seems reasonable to assume that the whale is sleeping. It will often sink slightly under the surface of the water for a few moments to a few minutes then slowly rise until the blowhole is exposed then exhale and inhale. These breaths are much less forceful, based on the size of the spout and the sound of the rushing air, than those when cruising or involved in some active behavior.

Little is known about large whale sleeping and I have found that of studies of captive dolphin and small whales—

> While sleeping, the bottlenose dolphin shuts down only half of its brain, along with the opposite eye. The other half of the brain stays awake at a low level of alertness. This attentive side is used to watch for predators, obstacles and other animals. It also signals when to rise to the surface for a fresh breath of air. After approximately two hours, the animal will reverse this process, resting the active side of the brain and awaking the rested half. This pattern is often called cat-napping. [*How do whales and dolphins sleep without drowning?* http://www.scientificamerican.com/article.cfm?id=how-do-whales-and-dolphin]

—have been used to make some extravagant conclusions about larger whales and it seems to be commonly accepted that all large whales utilize unihemispheric sleep. Animal Planet gives this as a (unsupported) fun fact about humpback whales that I have not been able to confirm or refute:

> Humpback whales breathe voluntarily, unlike human beings. Since they have to remember to breathe, researchers believe humpback whales sleep by shutting off half of their brain at a time. [http://animal.discovery.com/tv-shows/wild-kingdom/about-animals/humpback-humpback-facts.htm]

The only scientific observations on large whales that I've found comes from a single gray whale calf that was rehabilitated at SeaWorld in San Diego in 1998. The researcher's conclusion is tentative:

> These findings suggested that, similar to other studied cetaceans (mostly Odontoceti), Mysticeti whales: (1) can sleep both at the surface and at depth; (2) likely have unihemispheric, slow-wave sleep and; (3) might have a small amount of paradoxical sleep, which occurs without pronounced muscle hypotonia and intensive jerks and twitches.

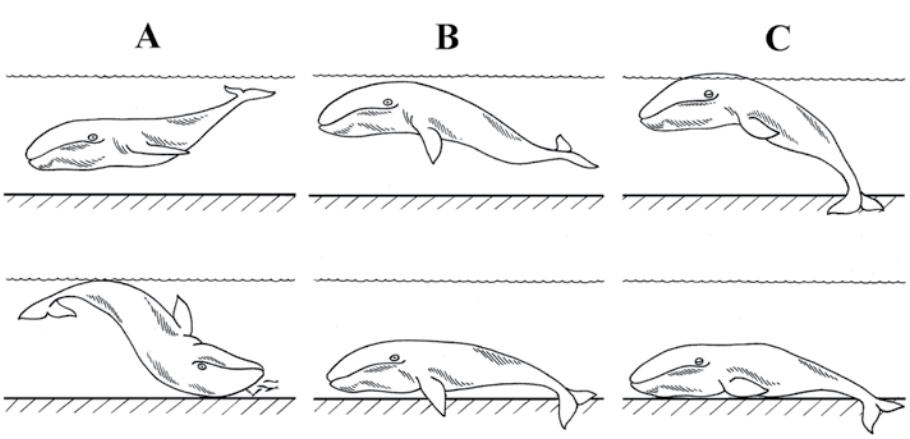


Figure 1. Main swimming styles and behavioral stages observed in JJ. (A)—swimming and feeding (stage 1, active wakefulness); (B)—quiescence at the surface and at the bottom (stage 2, transitional); (C)—rest at the surface and on the bottom (stage 3).

Lyamin, O.I., L.M. Mukhametov, J.M. Siegel, P.R. Manger, & O.V. Shpak. 2001. *Resting behavior in a rehabilitating gray whale calf*. Aquatic Mammals 27.3, 256–266.

Their extensive bibliography includes no studies on large whales except for a passing reference to a fin whale.

Unihemispheric slow-wave sleep (USWS) is the ability to shut down half of the brain for sleep while the other half remains alert. It is only known from a small number of aquatic mammals [1] and fewer than a dozen species of bird. *Paradoxical* sleep is usually called rapid eye movement (REM) sleep and is part of the "normal" sleep of humans and most mammals. It gets its name from the curious fact that neuron activity is very similar to waking periods.

We don't know if humpbacks shut down half of their brain. Humpbacks (and all other large whales) have never been in captivity and never had electroencephalograms measured on them. Any assertion that they have USWS is an extrapolation for the few animals that have been found to exhibit this behavior. To extend this to large whales, including our humpbacks, is simply an assumption. Based solely upon my own observations of logging, I'm skeptical of USWS to the point of thinking they are about as asleep—in paradoxical sleep—as most mammals with all but the autonomic nervous system being in control of the rising and sinking and coordinated breathing. This system in higher mammals controls much physiology at the subconscious level including heart rate, digestion, respiratory rate, salivation, perspiration, pupillary dilation, urination, and sexual arousal. Watching a large whale slowly rise and sink in exactly the same spot for five to ten minutes seems to me a behavior that could be controlled by the autonomic nervous system. If I watched a similar behavior in a very slowly swimming whale I'd have to serious revisit my thinking. *I have not seen this behavior.* This is based upon observation of many whales logging.

A line of thinking that seems to support my observations is with whale strikes. While strikes are nearly always with older whales, if the whale is "half" asleep, shouldn't their "awake" nervous system recognize the approach of a boat? In 2014 two humpbacks were killed by boat strikes in Alaska. One in the Lynn Canal [2] by an unidentified boat and one near Kodiak Island by an Alaska Marine Highway ferry [3]. Both suffered massive blunt force trauma indicative of large masses striking them. "Between 1988 and 2012, there were 100 documented large whale ship strikes along the California coast". [3]

If they were in unihemispheric sleep, they should have been "awake" enough to sense the presence of these large boats and move away. Since they did not, this seems, and least coincidentally, as support for a state of unconsciousness. As a human of 65 years maturity, I do acknowledge that reduced brain efficiency could account for missing the sound of a large boat. That being said, I doubt that the ferry Kennicott could be missed by any animal in the vicinity. It is a large boat with large engines that make a loud noise.

From all this, I find it an *unfounded assumption* that humpbacks must be at least partially conscious to rise to breath. How could I prove this? Difficult at best.

[1] The only animals ever to be measured with USWS are the Amazon river dolphin (*Inia geoffrensis*), Beluga whale (*Delphinapterus leucus*), Bottlenose dolphin (*Tursiops truncates*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Pilot whale (*Globicephala scammoni*) and Porpoise (*Phocoena phocoena*).

Rattenbourg, N.C., C.J. Amlaner & S.L. Lima. 2000. Behavioral, neurophysiological and evolutionary perspectives on unihemispheric sleep. *Neuroscience and Biobehavioral Reviews* 24 (8): 817–842. doi:10.1016/S0149-7634(00)00039-7.

Rattenborg, N.C. 2006. Do birds sleep in flight? *Naturwissenschaften* 93 (9): 413–425. doi:10.1007/s00114-006-0120-3.

[2] Kelly, D. 2014. *Alaska whale, a grandmother of 3, was killed by ship strike, scientists suspect*. Alaska Dispatch News. http://www.adn.com/article/20140712/alaska-whale-grandmother-3-was-killed-ship-strike-scientists-suspect

[3] _____. 2014. *July Humpback Death Likely from Kennicott Collision*. KMXT News Blog, Public Radio News for Kodiak, September 10, 2014. https://kmxtnews2012.wordpress.com/2014/09/10/july-humpback-death-likely-from-kennicott-collision/

[4] _____. 2015. *Reducing Ship Strike Risk to Whales*. National Ocean Service, National Oceanic and Atmospheric Administration. http://sanctuaries.noaa.gov/protect/shipstrike/welcome.html

Diving

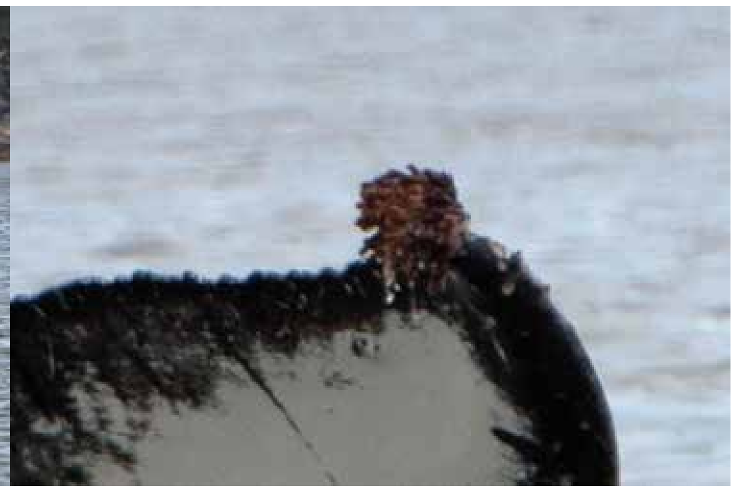
This approaching diving sequence of Juneauite, whale 1447, from July 26, 2010 is typical of most dives in Juneau waters.

This unidentified black tail dove away from us at a slight angle in Favorite Channel on May 19, 2012.

Diving is second only to cruising and spouting as the most common behavior I see in Juneau waters. Virtually every guest wants to see a dive since it means the flukes rise out of the water and they "get some tail" in Alaska as the joke goes. The near ubiquity of Pacific Life Insurance Company's advertising using their iconic humpback whale has created an unrealistic expectation for humpback whale behavior. Diving is very close to an everyday observation and it is a rare day that I don't see at least one whale dive. Some days they are a long way off, but most days we get multiple dives by multiple whales with lots of opportunity for fluke shots.

While cruising with a blowhole-dorsal fin-blowhole-dorsal fin pattern, there is a slight hesitation slowing or even stopping of forward motion. This is what I tell my guests to watch for to prepare for a fluke shot photograph. The hesitation is followed by an aching of the back centered at the dorsal fin. Presumably the head has moved downward at a steep angle, but I've never been able to see this. While remaining essentially in the same place in the water, the back rolls forward like a slinky, from one step to another, until the flukes reach the surface. The flukes arise in the same arc as the back usually parallel to the surface of the water, but sideways or off-center dives are common. As the flukes sweep in this arc into the air, water streams off them in a shower back into the ocean. The body of the whale is now presumably in a near vertical position in the water and the tail is lifted straight out for the dive. At about the halfway point of fluke submersion, most dives include a little back flip of the tail to the dorsal (backbone) side before slipping under the water. The last photo in both sequences shows this little back flip.


Variations on this theme include “skim dives” (left photo) where the flukes just barely lift out of the water and skim the surface and “high tail dives” (right photo) where the peduncle and flukes are lifted high out of the water. Because the angle of descent is shallow, nowhere near the vertical of a high tail dive, I presume skim dives are shallow. When treated to lots of diving whales, I enjoy making a game of “scoring” the dives on a scale of 1 to 10. Skim dives get a 1 and high tail dives get a 10 if the ventral (belly) side is facing me.

Note on each side of both these pair of flukes there is something red at the final trailing edge. I’ve looked very closely at my photographs to determine what it is (photo right). Nearly every whale has an assortment of barnacles on the tail, and several have this orangish, blood-red “growth”. These are the feeding legs or cirri of the barnacle.

Side Fluke

Also called half fluke or lateral fluke display, I see this more commonly with juveniles than adults. The left photo is of an unidentified first-year juvenile taken June 12, 2012 and represents the normal pattern early in the season. The right photo is of an unidentified full adult taken on September 21, 2012 illustrating the opposite pattern by adults. The simplest explanation for this behavior is that the whale is swimming on its side very close to the surface to part of the fluke extends above the water. Most of the time this sideways swimming only lasts a short time, just a few minutes. I cannot correlate it to any pre- or post-diving behavior and it simply seems to be something the whales occasionally do.

Australian Geographic in an article on their humpbacks make the comment that "resting humpbacks may gently slice the surface with their flukes" [1998. *Behavior Patterns*. October-December, Issue 52, p96.]. This may be true in the fall for our adult whales, but my observations of the very active juveniles in the spring and early summer doing this lead me to a very different conclusion. I think the juveniles are simply exploring the motions their bodies can make and swimming on their side is just one of them. I don't have anywhere near enough observations of adults doing this to come to any serious thought explaining this behavior. It is just something the whales do!

Backstroke

Also called inverted posture or belly up. Here whales 1879, Sasha (left) and 2070, Barnacles (right), are doing some impressive backstroking. As with the side fluke, it is most easily explained as swimming upside down. Full adult humpbacks give an impressive show when swimming on their backs close to the surface lifting their 15-foot long pectoral fins out of the water. Swimming this way is always short-lived, usually less than five minutes and often no more than a minute. I interpret this brief behavior as evidence that it is not the preferred method of swimming. The question of why the whale would do this is entirely open and every reference I have found uses sheer speculation to explain it. I prefer just to describe it and enjoy the action when I see it.

Here, 1538's 2013 calf is doing the backstroke on July 2. Comparing how this juvenile does with the adults is dramatic. The pectoral fins just barely rise out of the water and almost never straight up. The left photo shows the left fluke so the baby is actually swimming on her side. The right photo shows part of the side. The simplest explanation of this behavior is that the youngster simply hasn't developed the skill to do the backstroke yet and is exploring what its body can do.

Barrel Roll

Also called just a roll. Seeing a humpback do a full roll in the water is a rare event and I've only seen it twice. These photos of an unidentified whale from July 2, 2010, show the pectoral at the body and indicate the amount of effort involved in rolling this 40+ ton animal, even in the water! Judging by the size of the pectoral fin, this is a juvenile. Sometimes the whale simply rolls and the pectoral fins quietly slip into the water. Other times they make a large and noisy splash. I have found no explanation for this behavior and will not even hazard a guess. It is very fun to watch and I'd like to see it more often!

Pectoral slaps

Also called flippering or flipper slap. This sequence is of whale 2070, Barnacles on the back side of Douglas Island in Stephens Passage on September 18, 2010.

More often that barrel rolling, our humpbacks do straight pectoral slaps. They swim on their backs, just under the surface with none of the belly above the water, then lift a pectoral out of the water and with a strong enough motion to bend the flexible fin, slap it onto the surface of the water. It results in a large splash and a loud noise. They usually do it more than once, but only rarely will they do more than five or six without rolling over and doing a shallow dive and cruising to another location where they will often repeat the process. Darling notes that in Hawai'ian waters it can occur 20+ times in a row. I've never seen anywhere near that number of repeats in Juneau waters. When not barrel rolling, they slap the pectoral in the same place each time, raising it up and slapping it down. They will often hold the pectoral fin high out of the water for many moments, waving it about, before slapping it to the surface. Occasionally the fluke is lowered so slowly that it simply slides into the water and doesn't make a splash. Some call this a *pectoral wave*. I do often comment to the folks on the boat when the whales do this that they are "waving" at us.

The fact that the slap results in a visual splash plus a loud noise has led to much speculation on this behavior means. Some think it might have something to do with herding their prey of small schooling fish, perhaps encouraging them to swarm in a larger school that would be easier to gulp. Watching the fish finder for "herring balls" is the only method I have for "seeing" underwater and I've never noticed an increase in the size of "herring balls" with pectoral slapping. Some think it may be a method of inviting other whales to join in some joint or cooperative behavior. I see this with solitary whales where this might make some sense, but I also see it in groups of whales that are already together. Here, the slapping might be a signal for the other whales to move away in a marking of some territory. I remain very skeptical about this interpretation as I've never seen other whales move away or leave the slapping whale.

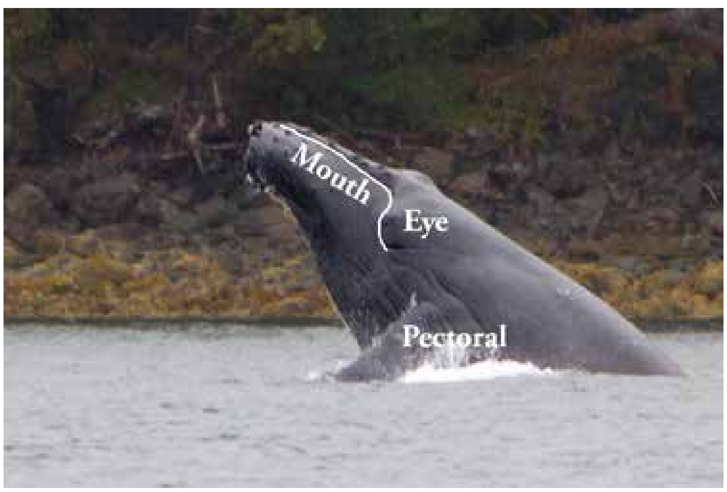
This seems to be a very common behavior in Hawai'i associated with pre-mating activity as nearly every whale watching company web site includes photos of it. Perhaps the whales do it here, less frequently, to keep in practice? Like the Humpback Whale Research Foundation of Bermuda [http://www.whalesbermuda.com], "it seems as if the whales are communicating to other nearby whales when they do this". To say more is reaching beyond the evidence.

Spyhop

Also called a head rise. What happens in a spyhop is the whale rises vertically out of the water to an elevation where they eyes, and often the point of attachment of the pectoral fins, are above the surface. What distinguishes this behavior from an upward lunge is that the whale remains in this position of some time, often up to a minute, almost like a human treading water. The whale maintains its same orientation while above the water without turning or rotating.

The physiology of humpback vision may help illuminate what this behavior means.



- Humpback whale eyes are located just above where the jaw drops downward and just ahead of the pectoral fins. This placement provides them with a wide peripheral vision but poor forward binocular vision. This is evidence that when they rise in a spyhop they have a commanding near 360° field of view.

- The lens of cetaceans in almost spherical, which allows for the most efficient gathering of dim light. At the surface, even on overcast days, the light cannot be considered "dim" by any standard. It is also designed for an environment with a refractive index of 1.35 and a cornea with a refractive index of 1.37. Since air has a refractive index of 1.0, this means the whale should be myopic, or nearsighted, where distant objects appear blurred and nearby objects are in focus.

  Miller, S. 2006. *A whale of an eye*. Veterinary School, University of Wisconsin http://www.vetmed.wisc.edu/pbs/dubielzig/pages/coplow/PowerPoints/A%20whale%20of%20an%20eye.pdf

The very name of this behavior implies an interpretation of the behavior. Some think the whale surfaces and holds it position with its amazing sense of buoyancy rather than by using its flukes, but I'm at a loss to think of how someone would determine this in our opaque Alaskan waters. It may be observed in Hawai'ian waters and inferred the same method is used here. The holding of the position gives many the impression that the whale is observing its above-water environment. Gary Crockett of Humpback Whales Australia says "humpback whales spy hop to get a better view of where they are or to look at the people on a whale watching vessel. They really do like to look at us as much as we like to look at them". I am at a total loss at understanding how he comes to this conclusion other than sheer speculation.

Headstand

Also called tail extension. The opposite of a spyhop, here the whale is nearly vertical in the water with head down and tail out of the water. It seems many only consider it a headstand when a large portion of the peduncle is held out of the water so the genital area is exposed. The tail is often held straight up high out of the water for some moments or is slowly moved about without rising or sinking. With the opacity of our water, I cannot see if the pectoral fins are used to maintain this position. A quick search of headstand photos produces images such as mine with only one underwater where the pectoral fins are held out away from the body at a slight backward angle.

I've only seen one adult whale do a headstand in our waters, and the top right photo taken July 13, 2011 in the waters of northern Stephens Passage at south Shelter Island. The unidentified whale held this position for nearly two minutes before sliding back into the water and moving off. The lower photos are of an unidentified juvenile from September 9, 2009 as part of a sequence of nine photos I took over a period of one minute. No tail slapping was involved with this headstand. The top right photo is from September 6, 2009 in Favorite Channel near the southeast corner of Shelter Island. This juvenile is engaged in some very special behavior. The flippers to the right are from a juvenile Steller sea lion. The two are involved with what I can only call "play", a very anthropomorphic term. The sea lion swims to the area of the flukes of the whale, the whale flips its flukes up and throws the sea lion in the air. The whale then does the handstand. The sea lion comes back and the whale throws it in the air a second time! I'm so stunned by what I'm seeing I take very few photos and so don't have the throws documented.

This begs the question of "why do they headstand?" Since their eyes are below the surface, ruling out observing the above surface environment can be completely ruled out. Does the vertical position give them a panoramic view of the sub-surface environment? Probably, but since I cannot see but a few yards in the plankton-rich water, I assume the whale has a similar limitation to its sight. This seems to rule out the idea the whales are looking about their aquatic realm.

Once again, with juveniles, my fallback position is they are exploring their bodies and learning what they can do with them. Since adults already know how to do this, it would be sheer speculation for me to hazard any guess as to why they do headstands.

Most headstands I've seen are by juveniles, and the vast majority of them are part of a short interlude in a series of tail slaps. This single adult did no tail slaps and only this single, rather short, headstand.

Tail Slapping

Also called tail lobs, lob tail and fluke slap. Whale 1538, Flame, already famous for high tail dives that expose her beautiful white flukes, does a set of aggressive tail slaps on August 25, 2010 near Eagle Reef in Favorite Channel. She places herself into a shallow dive position with her peduncle and tail out of the water and water streaming off her flukes just like she's going to dive. Except she throws her flukes forward so the remaining water is thrust forward instead of washing off the back. She then very quickly reverses the motion and using the pivot point of fluke attachment to the vertebral column, slaps the water with great force.

This unidentified juvenile starts a series of tail slaps with some low tail rises on September 5, 2011 in Favorite Channel near Aaron Island. After a couple of these, the youngster gets far more athletic and raises not just the peduncle but all the way to forward of the dorsal fin. With this leverage, the splash is larger and the sound louder.

Here 1538's 2013 Calf shows a variation on a theme with the slapping being done with with dorsal rather than the more common ventral side in Saginaw Channel just east of Point Retreat on July 6, 2013.

Why tail slap? The noise could mean some sort of communication such as an invitation to join or a warning to stay away. The noise could be to stun small schooling fish or make them school tighter so as to be easier to eat. This is probably not the case with the calf as it is still nursing. The impact could be to dislodge either barnacles or sea lice (I've seen both on baby whales when they arrive here in May). Testing these ideas would be difficult and they remain speculation.

Peduncle Throw

Also called rear body throw, tail throw.

The first sequence of three is of an unidentified juvenile in Favorite Channel near Eagle Reef on May 8, 2012 and the second is an unidentified adult in North Pass on July 31, 2013.

The Hawai'ian Islands Humpback Whale National Marine Sanctuary: "A whale throws its tail out of the water and in the process, slaps its peduncle (name for the body part connecting the tail) on the surface". It differs from a tail slap in that much more of the body is involved with much more energy expended. It is often interpreted as being "aggressive" or "defensive", but this simply may be a projection of human attitude based upon the extreme forcefulness. The juvenile was alone and the adult near perhaps a dozen more whales. The juvenile's is a "classic" flat slap, while the adult's is an oblique or sideways slap. Logic suggests a flat slap produces more sound so is an oblique slap "less aggressive?" Nothing in the behavior of these two whales leads me to find either word especially helpful in interpreting the behavior. The only definitive conclusion is that a great deal of physical effort on the part of the whale is required to do a peduncle throw. Since Juneau waters are for eating, often cooperatively, and Hawai'ian waters are for mating, perhaps the same behavior means something different here.

Chin Slapping

This is sometimes called a head lunge. Some may consider this a form of breaching, but I make the distinction that if less than half of the body rises out of the water and the motion is forward with a thrusting down of the head while the tail remains in the same plane as the rise out of the water and the back is arched upward, this is a chin slap. I think this name best describes this behavior. Chin slapping is perhaps the rarest behavior I see as I've only recorded it on eight days with four individual whales.

Here Barnacles, whale 2070, does a classic chin slap on a rainy June 20, 2014 in North Pass. I photographed her doing a chin slap on May 6, 2014 as well. She is often a very active and acrobatic whale, often doing the backstroke and barrel rolls with her pectoral fins held high out of the water. On this very rainy day she was the only whale in North Pass and was very active with two very strong chin slaps and a series of high back breaches as she worked her way to the south end of the pass.

This juvenile (I'm not able to match it up with a mother) was extremely exuberant on August 8, 2015 in North Pass. As we rounded the shoals at the north end of Shelter Island, I could see a small whale breaching near the south end of the pass and began counting. Here it illustrates my definition of a chin slap perfectly. While a powerful slap, when the size of the splash is compared with Barnacles, the more than double size of the adult produces a much bigger one.

So why do they chin slap? These photographs simply illustrate the behavior, one a full-grown female and one an eight month old juvenile. In neither of these cases can I determine any evidence to support any interpretation. Barnacles was by herself, so it seems there is no communication intent with any other humpback, unless the sound travels a long distance under water and she's calling to other whales. Since humpbacks are generally solitary, this seems unlikely. We are the only boat with her this day, and well outside the 100 yard limit and are probably not bothering her in any way. The juvenile is having an extremely active physical day (doing 53 breaches along with barrel rolls, pectoral slaps and this chin slapping). North Pass is populated with eight whales, one other a juvenile, but this one stayed by itself. This exuberance makes it difficult not to interpret this behavior as youthful vigor.

This same day, Spot, whale 1534, moved off to the east side of the pass and was logging (taking a nap) for about 15 minutes. Another whale swims near him to his left and he immediately does two very powerful slaps. Immediately I interpret those as an aggressive move directed at the other whale. I think Spot was saying, "Didn't you know I was sleeping? Why are you bothering me? Get away and leave me alone!" This is very anthropomorphic, but seems to account for Spot's sudden behavior.

Breaching

The Hawai'ian Islands Humpback Whale National Marine Sanctuary describes breaching as "An acrobatic display where the humpback uses its tail to launch itself out of the water and then lands back on the surface with a splash". I consider it a breach when I see a whale launch at least 50% of its body out of the water in an upward motion that concludes with an explosive splash ahead of the launch site. I have never seen the entire body of a whale out of the water, and the only times I see the flukes out are at the splash or just afterwards.

Breaching is uncommon in Juneau waters and scattered through the time the whales are here. My photographic record of days with breaching whales (a rather small sample of 18 days from 2009 to 2015) has May with 2, June with 5, July with 6, August with 3 and September with 2. In 2013 I did not record a single breach! Breaching by adults (11 days) narrowly eclipses that be juveniles (9 days). Breaching by juveniles is more common in early summer and by adults in late summer and fall. From my own record, it should be obvious that breaching is not expected to be seen on very many whale watch trips.

I do not have a good written note record of breaching and there are days when I've seen breaching but not able to get a photograph. I believe adding these days will change the record and pattern I've developed with photography.

What follows are descriptions of the variations on breaching. Interpreting any meaning follows.

Back Breach

This is the classic back breach by an unidentified adult in Stephens Passage just north of Scull Island on September 18, 2012. This 40 foot plus whale forcefully propels itself out over the water at about a 45° angle so the whale is out of the water well past the dorsal fin. Its belly is to the sky and back to the water . The pectoral fins are held slightly out and back from the sides and roughly parallel to the water surface. The whale falls to the water and makes a very large splash. This is what most think of when talking about whales breaching.

A "classic" back breach happens when the horizontal plane (from pec to pec and across the flukes) of the whale is aligned with the surface of the water and the whale lands perfectly flat on its back with its belly up.

Pirouette Breach

Twisting back breach—a pirouette—by a juvenile, I think 1703, Bullethole's 2015 calf, in North Pass on August 8, 2015.

With this variation of a breach, the whale makes an obvious rotation along the axis of its body, just as an ice skater does a pirouette. Often the twist will reach, or slightly exceed 180°. Very curiously, all of my observations of the pirouette breach has the whale rotating to its right. Are humpback whales right-handed?

The angle of launch is nearly always vertical front to back but with a bit of a lean side to side of the whale. The pectoral fins usually begin held out from the belly roughly perpendicular to the axis of the whale. As the whale rises, the pectorals move with the one opposite the angle of lean being held out sideways and the one in the direction of the lean being moved forward into the lean. From this angle, they look something like airplane propellers.

Belly Breach

Whale 1879, Sasha, belly breaching off Lena Point in Favorite Channel on September 2, 2010.

The primary distinction between a belly breach and a forward lunge is the amount of the body out of the water and is really rather arbitrary. On the day this sequence occurred, Sasha did 42 breaches in a row and alternated between back and belly. Since she raised her body out of the water to well behind her pectorals, along with the back breaches, and that the splashes were spectacular, I call these belly breaches.

Whale 1879, Sasha, back breaching off Lena Point in Favorite Channel on September 2. 2010.

From this single observation, it appears that it is far easier for humpbacks to propel themselves out of the water backwards than forwards.

Why do whales breach?

With breaching being so fascinating, people always want to know why whales do it. Here is what Suzie Teerlink says:

> These behaviors are often sporadic and difficult to interpret. While the purpose of these behaviors is largely unknown, some speculate they could be used for: social interactions, communication, looking above the surface of the water, sloughing barnacles and dead skin fragments or as play behaviors.

Taking each of these on their own, here are my thoughts, based on my observations of the whales doing these acrobatic maneuvers, with what I don't consider realistic first and those I find more plausible last.

- *Looking above the water*: this seems unlikely since they are upside down and only out of the water for two or three seconds which means their vision is extremely limited and their spherical lenses function far more efficiently in water than in air. How functional could this brief vision be?

- *Sloughing barnacles*: with my experience walking on barnacles on the beach and kicking and prying at them, I don't see how even the force of a 45 ton whale could dislodge a barnacle from its skin as their glue is extraordinarily sticky. Most Juneau whales have dozens to many hundreds of barnacles. A photographic study in Ecuadoran waters demonstrated that some do come off with intense activity [Félix, F. et al. 2004. *Epizoic barnacles removed from the skin of a humpback whale after a period of intense surface activity.* Marine Mammal Science,22(4): 979–984].

- *Sloughing skin.* There are many reports of skin sloughing off, so this is a definite possibility:

  > A Humpback whale sheds it's skin every 36 hours. When swimming in the wake of a whale the sloughed skin often appears like "snowfall" in the water. [http://www.worldoceans.com/Whales/whl-main.htm]

  - The author of this, Steve Alexander, is a Ph.D. oceanographer, so this statement must be taken with some authority (even if I find no scientific reference and .ll;'

  - p[6 hours seems extremely fast to me). It does not mention breaching and implies this happens while swimming. If the whale breaches to slough, this it seems to indicate there is a conscious effort that would be provoked by some discomfort to the animal, like itching. With a 1 cm thick skin with few nerve endings and ~15 cm of blubber to the closest organ and nerve array, I don't think they feel their skin, at least in the way we humans do. My thinking is that the sloughing occurs to them the same way dandruff does to us: we don't feel anything. If so, this is no reason to breach.

- *Social interactions*. This is such a broad statement as to be either so irrefutable or self-apparent as to be a useless statement. Anything can be labelled as a "social interaction". I saw nothing that would lead me to think this was a behavior designed to interact with any other whale. Every breach I saw was of a single whale, usually not within a mile or so of any other whale. The only social interactions I saw were of "escort" whales and bubble feeding. The whales were simply in the same area at the same time in my view.

- *Communication*. That the landing from a breach makes a loud noise is irrefutable. Even from a mile away we hear the splash. I'm sure whales a long distance away can hear it as well through the far denser water that carries sound waves more efficiently than air. Just what would the splash communicate? A whale mature enough to do a breach and thus an α male or female? Since most of the breaches I saw were of calves and juveniles, it seems an inverse relationship. Is it as simple as "I can do this!" or "I am here!"? This seems a rather extreme behavior for such a simple proclamation that could be more easily done with the audible sounds that humpbacks are famous for.

- *Play behavior*. After pretty much discounting all of the previous, this leaves me with this hypothesis. I find it both an enticing and difficult conclusion. I've plenty of personal experience with that animals like to play such as dogs and cats. Since humpbacks seem to be a very intelligent animal, why wouldn't this be an appropriate conclusion? Anthropomorphism is my worry. Because we humans play, do we conclude they play? The idea that one can propel their entire body out of the water and splash down seems, on the face of it, to have no specific purpose. If it doesn't—and I've outlined why I think each of the other hypotheses aren't likely—it leaves play (or something I've not thought of). We just don't know for sure, but playing seems the favorite interpretation of our guests—and me too! It is just so highly appealing that all intelligent animals should play, but that is the main reason I feel reluctant to accept it. More research is needed!

Using the principle that animals expend energy only when necessary, perhaps breaching energy could help understand this behavior. Breaching requires a great deal of energy in a spurt of activity. Whitehead [1] calculated this for humpback and sperm whales at 617 kcal, which propels 80% of the whale to 22 kmh out of the water at a 35° angle. While a single breach is only a tiny fraction—0.075%—of a whale's daily energy expenditure, a series of breaches can add up quickly.

The vast majority of breaches I've witnessed here have been singular to sequence of just several. These then do not require a significant expenditure of energy, and do not help us interpret the behavior other than to include the possibility that the whale does it for reasons of its own and is not concerned with how much effort it takes.

[1] Whitehead, H. 1985. *Humpback whale breaching*. Investigations on Cetacea. Berne, Switzerland. 17: 117-155.

Feeding Behaviors

Lunge feeding

Bubble net feeding

This almost a southeast Alaska exclusive, "It has been observed and documented in the literature in populations in Alaska, the Northeast Coast of North America, and the west coast of South America" [http://www.alaskawhalefoundation.org/education/bubble_net/bubble_net_feeding.html]. It is here in Alaska where the behavior is commonplace in July and August. I've read several reports that this is a two week phenomenon. I saw it nearly every trip out on the water from July 2 until the end of August, so I can state with some authority that it is a mid-summer activity, at least here in Stephen's Passage.

The first article describing bubble net feeding was by Charles Jurasz in 1979 [http://www.juneauempire.com/stories/071306/loc_20060713008.shtml] yet people have been watching whales here for over two centuries. How could this behavior have been missed? The Tlingít have a word for the big bubbles from a whale, kúkdlaa, so they at least knew about them. Jurasz began whale watching in Juneau in the mid-1960's, [http://www.fakr.noaa.gov/newsreleases/2007/humpback.htm] so he must have seen this. Did it take repeated observations to figure out what the whales were doing? Guide Kenneth Moriarity is said to have been out on a photo safari on his first year with Gastineau Guiding and all of a sudden a group of whales erupt from the sea and he had no idea what he was seeing! It is an amazing behavior, and without an underwater view or someone explaining what is happening, it is nearly inexplicable from the surface. It probably wasn't missed, simply misunderstood. This *always* makes me think just how much of what I'm seeing I'm misunderstanding!

What follows is a description of what I've seen with my own eyes. We come upon a group of whales, as few as six and as many as a couple dozen. The whales swim near the surface, dorsal fins porpoising up and down. In calm water the captain puts out the hydrophone to listen for any calls. Without any call, the whales begin to dive with the typical high arch followed by the flukes. Often whales will dive in groups giving us a view of what many on board called synchronized swimming.

The whales remain under water for a time, usually more than five minutes, often 15. After a while of watching a whale free surface, the hydrophone will pick up a single call that sounds something like a series of whoooooop - whoooooop - whoooooop—where the ending ooop rises sharply—that gets louder and more intense as it progresses. The last call has a very distinct and sharp "p" ending. Within a few seconds the surface of the water explodes with the group of whales rising vertically with their mouths agape and buccal cavity distended by thousands of gallons of water. They don't splash back into the water but simply glide back down into a horizontal position. Very often pectoral fins are visible (3rd photo left), particularly the white underside.

In the moment before eruption, the water (if calm) roils with some bubbles reaching the surface and is a good clue that they'll be rising there. The large assortment of gulls is also a good clue where to look as they can see the bubbles from above. Our vantage point on the Voyager and Navigator boats is so low to the water that bubbles are not easily seen. When the gulls see the bubbles, they fly *en masse* to that spot. Many times they miss however, leading Captain Collin Pilcher to regularly say "never believe a gull!" As the whales emerge, herring and other small schooling fish often leap from the water and are clearly visible, even from 100 meters or more.

The whales then swim around again, porpoising until they dive and do another bubble net set. Early in the season the sets were 15 to 30 minutes apart, at the peak I saw some sets repeat in as little as five minutes!

Were I not aware of this behavior (daughter Bess got some photos of it last summer and told Annette and me about what happens) and now trained and well-read, how would I interpret it? The key observation are the herring which is a major piece of evidence that this is a feeding behavior. With the buccal cavity engorged with water, this clearly is in the physiological norm for this animal in feeding. That the animals do it in a group implies some sort of group behavior and thus inter group communication. The particular call we hear only when the whales are bubble feeding (now called a feeding call) is further evidence of a social feeding pattern. With the poor view of bubbles, it would simply be a guess that they use them in some herding strategy.

With some underwater and aerial (2nd photo right by J. Olson of the National Marine Fisheries Service) photography , we have some more information to describe this process. A single whale (only one call is made) communicates with the other whales and somehow gives them information on what to do and when to do it. A single whale dives well below the school or group of schools of herring and begins swimming in an ever decreasing and rising spiral while emitting basketball sized bubbles from its blowhole. Other whales remain around the column of rising bubbles while the calls are made. It seems the herring recognize the whales as a threat and attempt to swim away. The bubbles form both a physical and acoustic wall that drive the herring into more dense schools. Do they know they can swim through the wall since it really isn't a barrier at all? I don't know. The whales on the outside must serve as some sort of warning that if they swim through they'll be eaten by the visible threat.

When the herring are in a tight ball in the column, a last blast of bubbles is released directly underneath the school that drives them toward the surface. With the final "whoooooop" the whales all quickly dive, make a U-turn and propel themselves vertically toward the surface. They unhinge their lower jaw and open the mouth into a giant gape, the buccal folds expanding with the entering water (visible in all my photos). As the whales enter the school of fish their buccal cavities are filled with thousands of fish. At the surface, with a mouth full of fish, they close their mouths, slip back underwater, and force the water out through their baleen plates and swallow their large meal.

There at least two difficulties that hinder underwater research in southeast Alaska: the cold temperature of the water and the high turbidity caused by the huge plankton bloom reducing visibility to often just a few feet. Photographs taken here are very easily located when compared with those taken in the very clear waters of Hawai'i. On several whale watch trips we'd find a NOAA research boat out observing, photographing and getting far closer to the whales than any of the commercial boats.

Single Whale Bubble Net Feeding

On Thursday, May 21, 2015 we come upon a single whale along The Breadline just north of Tee Harbor and find it lunge feeding. What is most curious is the way the whale turns on its side and thrusts its peduncle and flukes toward the shoreline then makes a sudden lunge. Making this even more interesting is that just a few days before, Douglas Island Pink and Chum (DIPAC) released about 40 million chum salmon fry at Amalga Harbor, about four miles north. It seems likely the whale was taking advantage of these unwary little fish! The shoreline is nearly vertical at the Breadline, dropping to 25 fathoms (150 feet) just 50 yards offshore. The whale is clearly using the wall as part of his strategy in getting the salmon into enough of a ball for it to lunge feed.

On Friday I return with another group and find the same whale, this time feeding very differently.

The whale makes a shallow dives in an arc, here to the right. Shortly after bubble appear on the surface and make about three quarters of a complete circle. The whale's pectoral fin rises out of the water and it slaps it down hard in the area where there are no bubbles. A moment or two later, the whale lunges upward in the classic bubble net feeding form, swallowing his own ball of fish. We watch the whale do this about a half dozen times, sometimes making the bubble net to the left. Each time, whatever section of the circle without bubbles was slapped two or three times with a pectoral fin before the upward lunge. This is the only time I've seen a single whale bubble net feeding.


This whale never showed the underside of its flukes so the only visual information I have to make an identification are these two photos. The dorsal fin isn't very distinctive and the upper side of the flukes are jet black, the right ventral seems to have some diffuse white near the trailing edge and the left trailing edge is remarkably smooth. I've heard from guide Theresa Soley that she's seen single bubble netting at Point Adolphus (Chichagof Island, directly south of Gustavus), so this may be one of those whales. I do not recognize any part of this whale and think it is not a part of our regular Juneau whale group. I have not recognized the whale since and none have been hanging around The Breadline.

It seems that not just whales find this a great place to fish as the cliff got it's name from the "bread" or money made by fishing along its walls.

Identifying Individual Humpback Whales

Juneau Douglas High School biology teacher Charles Jurasz and his family spent a great deal of time on the waters of the Juneau area in the 1960's and noticed that they could identify individual whales by their tails. They began taking photographs of the tails in 1966 but it took some convincing of the established science community that this indeed could be done. His photograph of NMMLID 229 from 1972 was used to identify the same whale in the waters both of Maui and Alaska in 2006 making it the current record holder for the longest re-sighting time. [http://alaskafisheries.noaa.gov/newsreleases/2007/humpback.htm]

Individually Unique Characters

Every humpback has many unique characters that can be used to make an individual identification.

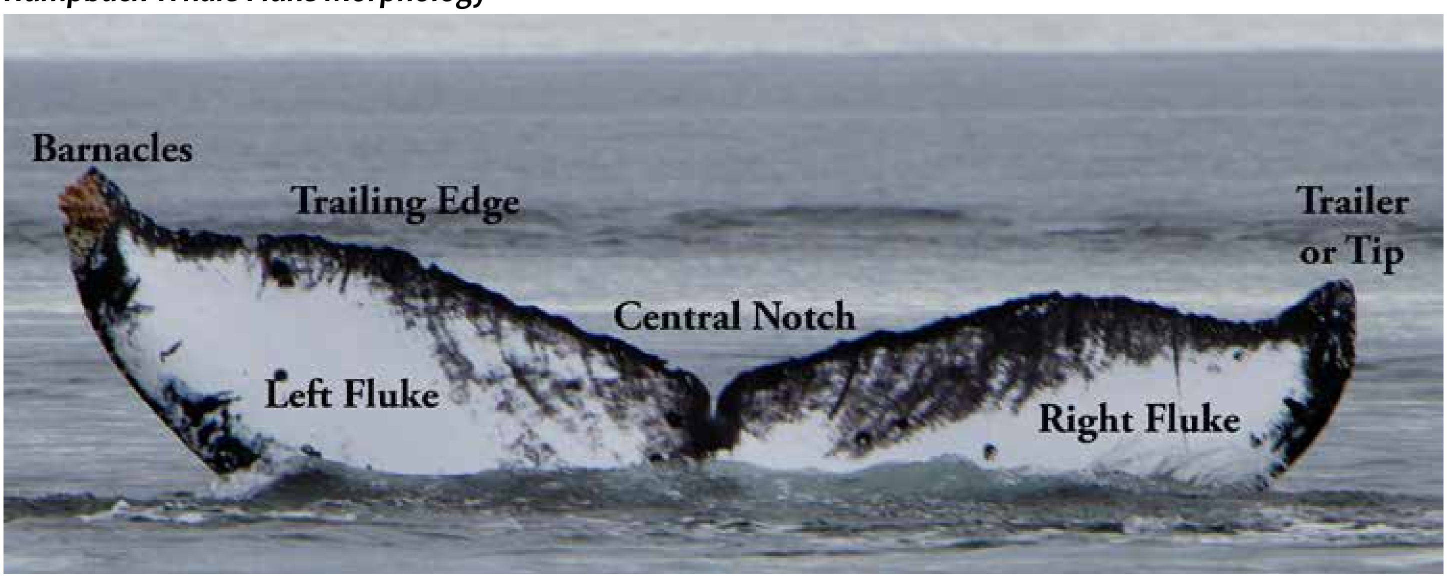
Dorsal fins are visible every day that whales are in Juneau waters. Most first-time whale spotters rejoice in this simple sight and take many photographs. I did the same thing! Once one has a couple thousand dorsal fin shots, is there a reason to add another to the collection? For me, yes, only if I've been able to identify the whale and now want to learn another character for that whale. There is an amazing variety of shapes and coloration of dorsal fins and I can recognize a very few whales with just a glimpse.

Pectoral fins, while not often seen, are most likely recognizable to an individual with practice. I am not one with enough practice and experience to make even a most tentative identification this way. It strikes me one needs to be in the water with the whales to observe their flukes and with the very cold and mostly opaque southeastern Alaska waters, this is not a real option.

Flukes are totally unique among all individual whales. Since humpback whales are great divers and usually lift their flukes high out of the water, and since the shape, edges, trailers and color are so varied, flukes have become the primary tool to identify individual whales.

Tail photography is a sure way to document the location and identity of humpback whales over time. It has the great advantage of being completely harmless to the animal. It is also great fun! *A photograph is far more powerful a tool than a visual observation.* Unless there is some character that is so unique and visually obvious, it is usually difficult to identify whales on site without a great deal of experience with the whales. A photograph provides an unmoving view of the tail that can be compared to the catalogs of whales.

Humpback Whale Fluke Morphology



Fluke Shape

Is the tail narrow and thin?

Or is the tail broad and thick?

Central Notch

Is the central notch very thin or narrow?

Or is it broad and open?

Trailers or Tips

Are the trailing edges sharp and well defined?

Or are they rounded and not obviously pointed?

Trailing Edge

Is the trailing edge smooth?

Or is the trailing edge highly serrated (jagged or saw-like edge)?

Dominant Color

Is the ventral side mostly white?

Or is it mostly black?

Scarring

White tails scar black, here with a unique pattern most recognize as AK.

Black tails scar white, here with a set of nearly perfect circles.

Humpback Whale Fluke Identification

There are two catalogs that cover the waters of southeastern Alaska with photographs of the ventral (bottom or belly) side of the flukes:

Juneau Humpback Whale Flukes [http://www.juneauflukes.org/juneau-catalog.html] maintained by the Suzie Teerlink with the University of Alaska Fairbanks School of Fisheries and Ocean Sciences covers the whales that frequent the Juneau area.

Humpback Whales of Southeastern Alaska [http://www.alaskahumpbacks.org/] maintained by Jan Straley of the University of Alaska Southeast Sitka campus, covers all the whales of southeast Alaska.

When I spot a whale that I don't immediately recognize, I use a suite of characters to help me make an individual identification. This set of photographs illustrates what I look for when trying to identify a whale. Of course recognition means remembering all of the unique characters and that is a real challenge for those whales without some very obvious character. I often have to head to the catalog to find a whale I've already encountered.

181

Juneau humpback 181 goes nameless. First seen in 2009, that's when I first encountered this whale on June 27 in Saginaw Channel on the west side of Shelter Island. In Juneau Flukes this whale has the "privilege" of being the last whale in the organization of mostly white to mostly black. This is indeed a very black tail. Identification characters are limited to the pattern of the serrations on the trailing edges, particularly comparing the relatively smooth left fluke with the more prominently serrated right fluke.

The large shot is the final in this diving sequence. Note the rather strongly scalloped peduncle that really gives this whale a "Nessie" look as the hump forms for diving.

The only other time I've seen this whale was on July 19, 2012 in North Pass.

204, Stamp

I've only recognized Stamp this one time on July 20, 2012 where Saginaw Channel meets the north end of Stephens Passage at the Sand Spit of Shelter Island. The prominent scallop—that looks like the profile of a spoon—near the midpoint of the left fluke makes this almost entirely black whale easy to recognize. The central notch is deeper than most. The circular scar near the middle of the right fluke is not on the catalog photo and illustrates that new scars can be added to the tail. The white on the trailing edge is an artifact of sunlight reflection on this wonderful day.

The tail shot is a crop of this scenic view of the Coast Range and the Sand Spit. I don't know who the other whale is but it has a mottling on the proximal side of the small dorsal fin that could be diagnostic.

229

This whale's tail is deceptively diabolical for identifying! When I learn a new whale, I tend to focus in on a single character because it is easier to remember. This whale has a W-shaped central notch. Compare it with whale 252 and they are *very* similar. They are so similar that I've had to carefully go through all my photos and rename many of them as I've got some 229's in 252 and 252's in 229! So, what do I now need to look more carefully at? First is the general color of the ventral side. 229 is almost entirely black while 252 has lots of barnacle scars. That's an easy thing to remember.

The next thing to examine is near the trailing edge of the left fluke where there is a shallow U-shaped notch next to a "tooth" next to a broad V-shaped notch. This is visible in both of these rather far shots and is distinctive enough for identification with only the trailing edge visible as in the left photo.

While first recorded in 2008, I have no record of sightings until 2014 when it seemed to be out every time I was on the water from late June through early August. Always with a group of whales, that almost every time were bubble netting.

237, Dike

I've only recognized Dike this one time on July 24, 2012 in Handtrollers Cove off the northwest end of Shelter Island. The very small patches of white at the far end of the flukes near the trailing edge look like someone lightly sprayed paint on this otherwide solid black tail. The central notch is a broad "U" and the right fluke is strongly serrated with two prominent ridges next to a prominent broad scallop near the middle of the fluke.

The NOAA tail site notes this whale is "Regularly seen in Glacier Bay National Park. Known male. Nicknamed 'Dike' by Chuck Jurasz" and was first seen in August of 2004.

Note the almost W-shaped central notch and compare it to 229 and they are *very* similar. Don't use this single character to identify! Two other characters do make 252 easily identified: note the very prominent deep U-shaped notch near the left fluke tip; and, note that white barnacle scars are almost perfectly scattered throughout the entire ventral side of the flukes. There is a line of solid white scars near the leading edge near the tip of the right fluke with a circle scar just above to their left. Below the U notch is a line of three solid white scars near the leading edge with the left one elongated.

First seen in June, 2004, it is "often part of bubble net feeding groups". I've no records of it before 2014, but then encountered the whale just about every time I was out on the water.

On July 29, 2014 a group of about 15 whales were repeatedly bubble netting near the sand spit of south Shelter Islands (note it and the windmill in the lower left photo). This whale's tail showed up many times as they did sets, as with the juvenile in the bottom left photo. All of a sudden, it did a very fast and low breach, headed almost directly at us, not far away from us. My photos not sharp as the action was very fast and the lighting very poor. No matter, a breach is always exciting!

It seems that 2014 was a big year for new sightings for me as no other year has as many since my first year of 2009. This whale showed up on August 15 and I have no other records for it. It was a very yucky Friday with poor visibility so this is a very severe crop of a long shot (lower right) east of Aaron Island not far off the mainland.

Sea lions are playful in the foreground with the mainland just north of Tee Harbor in the background. As weather goes, this is a pretty typical day in the SEAK temperate rainforest.

292 SE ?

This identification is tentative from the SEAK catalog (hence the SE after the number) as this tail is not in Juneau Flukes. Note that the notch is U-shaped at the bottom but flares to the side into a broad opening at the trailing edge. There is a small white line just inside of the trailing edge just out from the notch on thee right along with a similar line near the leading edge about halfway out and a white dot just a bit inside of that a bit further out. There is a smudged line of three dots near the center on the left.

I've only spotted nameless 292 this one time on August 11, 2012 in North Pass with the Faust Rock bell buoy visible in the background. Not finding the whale in the old NOAA tail catalog, I wandered through the much larger Humpback Whales of Southeast Alaska catalog and found what is very close to it there among the "0% White Flukes, Wide Notch" on page one. The smooth and broad but shallow scallop on the right fluke along with the very neat and lightly flared "U" notch. There are some hints of white that show up: a single short line parallel to the trailing edge on the right fluke close to the notch and two spot near the leading edge, the inner one being a bold line and the outer one a slight teardrop.

This is the uncropped view of the photo above.

453, Notcho Libre

First seen in September, 2007, this whale is unmistakable. It took me until August 6, 2010 for my first sighting and my second and last was on September 15, 2011 (lower right photo). The central notch is very complicated and appears to almost have a lopsided pentagon sticking out tail-like at an angle from the left between a wide notch on the left and a narrow one on the right. Which one is the actual central notch? The shape of the flukes is like a lanceolate leaf and a bit narrower than most. The white is particularly bright with strong contrast with the black and tucked tightly against the trailing edge of both flukes. Note a leading edge of white on the right fluke. The horizontal diving shot shows just enough of the odd central notch to make a positive identification on the lower right photo.

"Notcho" surely refers to the central notch but what about "libre"? The word from Latin to both French and Spanish means "the state of being free". Does it refer to the "free form" shape of the central notch? That's my best guess. Or does it refer to the awful 2006 comedy "Nacho Libre"?

545, Rubberlips

Rubberlips is such a comical name, every time I say it I wonder just how the Alaska Whale Foundation gave her that name. Other names include "Friendly Fred" and "Lumpy" but I only hear "Rubberlips" out on the water. It is just too fun to say!

This whale is instantly recognizable in our waters. I've never seen another whale with anything like the profile of the trailing edge of its flukes. The central notch is extremely broad, about 10% of the entire breadth of the flukes, and a bit "lumpy". The general shape of the flukes are broad, but what shows up the best, even at great distance, are the prominent scallops near the ends with the corresponding rise that equals the trailers. This shot overemphasizes the white patches as they are often not as prominent.

This diving sequence illustrates that the angle of view affects our perception of color on the flukes. It is only when the tail is vertical and parallel to our viewpoint that the white shows well. Sequence taken September 15, 2011 in Favorite Channel near the rocky mainland.

Rubberlips' profile is so marked that it is instantly recognizable at a distance even when jut a single fluke is visible.

547, Cimmerian

Nicknamed by Alaska Whale Foundation and a member of the core bubble netting group, Cimmerian was first seen in August of 2007. There are two possibilities for the meaning of this whale's name. Less likely to me is the fact that Cimmerians in history were an Indo-European people living near the Caucasus around 1300 BCE. More likely is what Captain Collin Pilcher told me, Cimmerians are the people from the homeland of the fictional Conan the Barbarian created by writer Robert E. Howard in 1932. Note the shallow scallops with just a hint of white.

I'd seen Cimmerian only three times until 2014. The first was June 27, 2009 in the photo with the boat in Saginaw Channel. Next was June 7, 2012 for the large fluke shot in Halibut Cove in Favorite Channel. My last was August 30, 2012 near Eagle Reef in Favorite Channel with the snow-capped Coast Range in the background and another whale diving on a sunny day with abundant gulls. In 2014 he became almost common from June 16 through mid July (this writing) in bubble netting groups, especially around South Shelter Island and Young Bay.

569, Rake

Rake is something of a "famous" whale in SEAK yet I've only seen him thrice. The first time was June 27, 2009 near Eagle Reef. July 23, 2012 when the photo above was taken. The third was July 16, 2014 with the photo below. Rake clearly got his name from the scars on his right fluke that represent an attack by something with very sharp and widely spaced teeth. There is only one species in the range of humpbacks that can do this, so it is pretty clear that these are evidence of an attack on this whale by *Orcinus orca*. I must admit to an almost incredulous feeling, just how could an orca even think of attacking a full grown humpback? If there is ever an example of little versus big, this would be it.

I can't help but wonder why I haven't seen him more. The left flukes are so distinctive with all the circular barnacle scars and the "raking" of the teeth on the right are so distinctive, they should be recognized on sight every time the whale is seen. I take this a evidence this whale has a range that includes lots of other places than Juneau. Not every whale returns to the exact same place every year like I tend to do.

580 burst upon the Juneau scene the summer of 2012 and has been a major player ever since. I first spotted the whale on July 7, 2012 near Eagle Reef in Favorite channel where the whale debuted its high-tail dive habit. The broad, black tail sports something of a division sign on the right fluke that is usually obvious. Scallops on the trailing edge near the tips are often the only obvious features at a distance on a rainy day while a closer view shows the edge full of small, open and rounded scallops with two large but shallow on the left fluke and one deep but small "U" on the right fluke. The central notch is a small, diverging "U". The tips, while not pointed, are elongated and prominent in nearly any view.

The whale is a major player in bubble netting and many of my photographs include other whales as the group dives in their search for schools of herring. Being a high-tail diver, it often visually dominates the other whales in the group and I accuse it of being a "camera hog"! It can be found in all of our waters. In early July of 2014 it was with a group of 7 to 11 whales actively bubble netting in Young Bay where the large photo was taken on July 11, 2014. In 2012 it was here all of July and August; in 2013 it was only here in June; in 2014 June and July (as of this writing in mid-July).

875 SE

This whale is not in Juneau Flukes but is in the SEAK catalog (hence the SE after the number). This very broad tail with that curious dingy coloring to much of its white shows up on July 2, 2014 in Handtroller's Cove along with 996 and 1441 to do several bubble net sets while we watched. This is my only record of this whale (unlike the other two) and I suspect that it came in from the Lynn Canal to join the bubble net group, then headed back out to wherever it calls its summer home. Since it is well within what I consider "Juneau Waters" and socially feeding with "Juneau Whales", I include it here. I often see whales I don't know out in the Lynn Canal and consider them someone else's, probably Hoonah or Glacier Bay.

924, Crater

There are a few whales out here that are utterly unmistakable, and Crater is one of them. First seen in 2006, she's been seen in our Juneau waters for more than two decades with this amazing scar. The scar is so obvious I doubt many even look at the diffused white patches and the spots on her flukes.

So just what is this scar? It is very difficult for me to determine from my photographs. It appears that the lesion does not extend very deep into the viscera of Crater's peduncle. From a distance it has the appearance of a "crater" and this is probably what gives the whale its name. But a close up view shows the reddish material is not "meat" or muscle and that it is a raised up patch of scar tissue just like the white scar tissue surrounding it. Was it stained by being cut deeply when the damage occurred? I have no idea. Crater has a fairly unique dorsal fin. A largish mound above the vertebral column ends with a small, pointed fin with white highlighting the rear curved surface.

954, Jesus Fish

I call this "Jesus Fish" because the black pattern on the right white fluke bears a strong resemblance to the "fish" symbol of the early Christian church. At a distance, the tail appears strongly white and black, but getting closer in reveals that much of the black has white markings of just about every geometric pattern conceivable. I assume that the broad areas of white are congenital and most of the rest represents scarring. Note the very broad central notch, so broad it almost doesn't have one.

These photos are from Lynn Sisters along the Chilkat Peninsula of the Lynn Canal on September 15, 2011. Out here is where I see whales that don't seem to be part of the regular Juneau crowd. But today we have 954, first seen in Juneau in 2006 and 1441. There are others in a group of six whales that did not show their tails to identify. This is my only sighting of 954's very unique tail.

996

996 is easily identified with its very deep black ground color and quite bright white markings. This strong visual contrast shows up in just about any weather, even when visibility and contrast is nearly nonexistent (note the right photo below). The pattern of white on the left fluke always remind me of a cornucopia, a horn of plenty. Here, the narrow part of the horn sneaks its way almost to the tip of the fluke and spills out all of its goods toward the center. With this strong visual clue, I've never paid much attention to the shape of its trailing edge serrations or the central notch. It is a super easy whale to learn.

Until 2014, I was suspecting that this whale was an every-other-year Juneau visitor as I've records for it in 2009, 2011, and 2013. In 2014 it came for the entire month of July, joining in many bubble net sets, then disappeared. Most of my records show it a July whale with some in late June and early August.

Big, black and broad tail with brilliant white tips make this an easy spot, but the clincher is the long—2/3 the width of the fluke—straight line white scar on the right fluke. The central notch is a deep and very narrow U. Serrations on the left fluke are fine and coarse on the right. The trailers are prominent.

First seen in Juneau waters in 2006, I've only seen this whale once on September 15, 2011 out at Lynn Sisters on the Chilkat Peninsula in the Lynn Canal. This is a place where I have lots of unidentified whale shots, but this one is very easy to identify. On this day, the group included 453, 545, 954, 1443, and two unidentified whales I call Black 01 and Milky Way.

1234

1234 is unique with its sequential number, but also with its white markings closest to the leading edge of the flukes, opposite of just about every other whale I see. The white is bolder on the right fluke than the left and there are a few circular barnacle scars on the black ground color. This bold pattern makes for quick identification even on yucky days. Note the deep U-shaped central notch, but that it flares out right at the trailing edge. There is a prominent somewhat broad U-shaped notch about midway on the left fluke. Serrations on the left fluke are sharper and more prominent than the right fluke.

First seen in 2009, this whale often joins in bubble net groups. I've seen it every year since 2011 and in 2014 it was a major player in the July bubble netting. The earliest I've seen it is June 7 and the latest I've ever seen it is July 30 so it clearly comes to Juneau for the herring!

1391

Big, broad, black, but with a very lopsided and asymmetrical central notch, this is an easy whale to learn. Further, the trailers are long and pointed and visible in any light. There are some other marks to observe: the left fluke has two white scars just inside the trailing edge with the left one a thin arc and the right one a set of squiggly lines; and, almost midway out the right fluke is a vertical short white line that tapers to a thin line on the proximal side. When I took this photo on June 12, 2013, the whale had quite a compliment of barnacles on each trailer.

These distance shots illustrate just how much the wide, lopsided central notch shows up. First seen in 2009, I've noted the whale in 2012, 2013 and 2014, nearly always a part of a bubble netting group. It seems to arrive in mid-June and be gone by the end of July, another whale tuned into the herring feeding here.

1434, Spot

It doesn't take much imagination to see how Spot got his name. He does have another one, but I've never heard anyone call him "Curious George" since Spot is so totally "him".

First seen here in 2006, Spot can be counted on for a good show in mid- to late summer, and has been seen here as late as December. Boat Captain Jeff Worthen sees Spot regularly in the winter in Maui and has watched him pursue females during the mating games that take place there. I've photographed spot since 2010, somehow missing him in 2009. Here he dives with an unidentified juvenile in the waters of North Pass on July 31, 2013 on one of the glorious days from that incredible summer.

With experience, other views give just enough information to be able identify Spot.

1435, Colon

“Colon” is my name for this whale with the “colon” made of black dots on the ground of white on its right fluke. The white on this whale is bold and bright next to the deep black center. The trailers are pointed at the end of obvious scallops on the trailing edge, with the right scallop more pronounced that the left. There is an obvious broad U-shaped notch 1/3 the way out from the central notch on the left fluke.

First seen in 2007, I first saw it in 2010 and for three years always in late August mostly after the bubble netting. It was with 1538 and 2066 on August 25, 2010 when 1538 went on a tail slapping craze. On July 25, 2011 it was part of a six whale bubble net group off South Shelter Island. Then in 2014 it showed up just south of North Pass for one day at the end of May with 1447 , not to be seen again.

1441

The four different sized black dots on the left fluke remind me of a solar system. They are only visible close-up or with an extreme crop (as this image has suffered). Most of the time just the larger and top dots are visible (as in the photos below). The white on 1441 is brilliant, but there is sometimes a slight cast of orange in the white of the right fluke. The central notch is a very broad and shallow U with a smaller very broad U immediately to its right. The trailers are particularly sharp and elongated.

First seen in 2006, my first sighting wasn't until 2011 when I saw it only once in a bubble netting group off South Shelter along with 580, 996 and 1476. Skip to 2012 when I see it diving without bubble netting in North Pass along with 204, 1234, and 1391. Skip to 2014 when it was very active with the incredible July bubble netting group that worked Saginaw Channel, South Shelter and the southern end of Favorite Channel. This group did days of multiple short sets and included 229, 580, 996, 1391 and 1703. My first sighting was July 2 and last the 26th.

1443, Dot-Spot

First seen for Juneau in 2008, I didn't "spot" this whale until September 15, 2011 near Lynn Sisters in the Lynn Canal along with a group of bubble net feeders that I did not recognize. With a mostly white tail, it is easily found. The clear black separation of the flukes is obvious, along with the white-dotted black spot a third of the way in on the right fluke. I began calling this whale Dot-Spot. A black slash coming in from the leading edge a third of the way out from the center is also prominent.

The double dive is with 954 in the Lynn Canal. I'm reluctant to claim whales in the Lynn Canal as "Juneau whales", but 1443 shows up in July 2014 as part of a group of "regular" Juneau bubble netters, especially in Young Bay and South Shelter, as the only white tail.

1447, Juneauite

I've known Juneauite since August of 2010. She was first seen in 2006, but Jay Beedle notes that she's been around since 2005. He also calls her "Poisson", the French word for fish, but I've never heard anyone use that name.

All black tails can be very difficult to identify. I use three clues that usually show up quickly to identify her: her central notch is a narrow "U" with the right side a bit taller than the left; her tail is very broad; and, there is a pretty prominent point midway out on the right fluke.

These shots illustrate how the right mid-fluke point can be used as sure identification for Juneauite, even with an angled or dorsal (top) view.

For 2013 she was the first whale of the year that I was able to identify as coming back to Alaska with a new calf. Jay Beedle notes that she had a calf in 2007. If she went six years between calves, that seems like a long time. Perhaps the small whale behind her in the far right photo from August 7, 2011 is her calf? Pure speculation on my part.

In 2013 I first spotted her on June 10 and she stuck around until the end of September.1447, 2013 Calf, "Notcho"

1447 Calf 2013, Notcho

The first calf I was able to positively identify in 2013 is this one of Juneauite. It took a while to get any photos of the calf and its flukes have been particularly well hidden. The white markings along the dorsal fin appear to be whale lice, but it is too far away to be sure. This dorsal is distinctive enough to recognize with the little bit of notch on the trailing edge that makes Captain Jeff Worthen call it "Notcho". I took this photo on a very wet August 30, 2013.

The young one shows its tubercles. While the word simply mens "bumps", those located on the rostrum are really an expanded hair follicle. Inside is a single hair called a vibrissa (after all these are mammals, and mammals have hair). These probably serve as a sensory organ, perhaps to measure waves of water pressure from animals around them. Humans are almost unique amongst mammals in that we lack these sensory hairs. The word vibrissa comes from the Latin for "nostril hair". Think about a cat's whiskers and how they use them and we might have a clue about the humpback's use of them.

1465

This broad, black tail has "misty" white patches near the trailers that are unusually clean and vibrant which makes them visible at long distances and poor lighting. The leading edge of both flukes, but especially the right, is almost a clear white that wraps a bit down to the ventral side. The serrations are sharp and irregular. The central notch is a deep U, narrow at the bottom but flaring out a bit to the left side. The trailers are long but almost blunt at the tips.

First seen in 2006, I first noted it in 2006 and have missed it only in 2010 and 2013. The first sighting included 569, 587, 996 and an unidentified juvenile that did two breaches for us. I only saw it once in 2011 with an unidentified juvenile. In 2014 I saw it twice, both times in a bubble netting group during that years massive July herring kill.

1478, Scuff

Scuff clearly got her (a known female) name from the "scuffed-up" looking flukes. She apparently was born with an almost entirely black fluke (there is just a bit of white on the leading edge of both flukes) and the only white coloring on the ventral surface are from various encounters she has had with sharp objects. I look for the long diagonal on the right fluke. The central notch is a deep U that strongly flared at the trailing edge. The serrations are sharp and nearly even.

First seen in 2006, my first sighing was with her and a juvenile (hers?) cruising down Saginaw Channel on June 26, 2011. On August 6 she was with 2006, another known female, with a juvenile. So who's was it? She was high tail diving with UAF-20130812-962 and 1434 in North Pass on August 29, 2013. I missed her completely in 2014.

1538, Flame

With her big, white tail, Flame is a favorite. Easily recognized by the smudge of gray and black along the trailing edge of her right fluke (that gives her the less-used name "Smudge"). I look for the black block that narrows from the peduncle (end of the backbone at the tail), the small black dot on the left fluke and the black line on the right fluke.

First seen in 2007, she's seen every year in the waters surrounding Shelter Island where I've seen her everywhere. I've never seen her in a bubble netting group nor have I seen her breach. She does dive very gracefully.

On August 25, 2010 she does three tail slaps near Cohen Reef showing the unique form while flipping up her tail, ready to slap it on the water. Flame is doing it from the ventral (front) side as most adults do. Most of our adult humpbacks have rather squared-off or blocky dorsal fins. Flame has a sharply pointed one, like a mini-racing fin. Flame comes in second in the number of photographs I have of identified whales.

1538 Calf 2013, Spark

I thought this was the first "baby tail" I shot on July 2, 2013 until Suzie Teerlink emailed me with Sasha's baby that she re-sighted on July 22, 2013. This is the my third definite identification of a cow and calf for 2013. When a cow and calf pair arrive here in April and May, the little ones only seem to know how to swim straight. After all, they just swam 3000 miles from Hawai'i! When the pair gets here, mom is only interested in feeding. This means junior spends a great deal of time at the surface and, I'm sure, figuring out just what all those extra body parts (the pectoral fins) are good for. Diving isn't something they seem to know how to do instinctively and spend at least a couple of months learning how to do it as well as mom. Here, 1538's baby does a nice dive in exactly the right position for me to catch its ventral side for an identification shot that should stand for some time.

The calf decides to do some pretty serious tail slaps, all throwing its dorsal (back) side to the surface of the water for maximum splash. I'm presuming it is doing this in an attempt to strengthen the muscles that operate the flukes from the weak side. When the flukes hit the water, the peduncle (base of the spine at the tail) is rather tightly bent. While doing its slaps, I note in this photo a very circular hole in the right fluke that appears to go all the way through. My first inclination is to think that this is the result of an encounter with an orca where one of the ice cream cone shaped and sized teeth made a good crunch on the fluke. I emailed this photo to Suzie Teerlink who responded that she's not sure what causes these holes and that it could be orca, but it is probably some other natural phenomenon that causes them.

1640, Betsy

Betsy's tail is over 90% white, but about a third of that has the orange cast. There are a few scars here and there, with the most obvious being a narrow triangle of black piercing the white from the proximal side very near the center. The peduncle ends as a very black triangle in the flukes. The trailers are narrow and smooth with scallops on each side before. The serrations are both sharp and blunt.

First seen in Juneau in 2014, I managed to get these shots then on May 11 for my only sighting. This whale entered the SEAK catalog on August 11, 2004 so it's been around at least a decade and perhaps therein lies the origin of the name "Betsy".

1703, Bullethole

So, just how did "Bullethole" get its name? There does appear to be a hole some 2 cm in diameter in the left fluke just below the squared-off second serration left of the central notch. It is visible only when the background is very light and even then not really visible in real time out on the water. I've only found it examining my photos. An alternative explanation lies with the central notch as it is so perfectly U-shaped it could be a gun sight. It is not as deep as many others, but it is easily seen in all light. Note the nearly perfect semicircle notch just to the left of the bullet hole. Serrations are prominent and sharp halfway out and show up well. The slightly curved white scar on the right fluke shows up too. This trailing edge is unique enough to identify from either side as the photos below show: left ventral view and right dorsal view.


First seen in Juneau in 2006, Bullethole is a whale I almost expect to see when I head out on the water. In 2014 I photographed 1703 on 20 days! Bullethole usually shows up in May and doesn't leave until October after the whale watching season is over, making it a whale that Juneau can truly claim as "our own". Somehow I missed it in 2009 but have seen it many times every year since and it ranks number three in the number of photographs I have of individual whales.

1707

This black and white tail is distinctive with its beehive-shaped white areas, but most obvious is the bold black streak penetrating the white of the left fluke. It comes in from the center as a nearly level line with the horizon. The serrations on the trailing edge look like they're leaning toward to outside of the right fluke. The scallop near the trailers is very small but prominent.

First seen in Juneau in 2009, I've only seen it twice, both in 2014, both times between Faust Rock Buoy and Handtroller's Cove. It was with familiar whales 547, 580, 1234, 1391, 1441, 1465, and 2171 at Faust Rock on June 16. They were not bubble netting, but this was the first day of bubble netting in 2014.

Suborder Odontoceti Flower, 1869 ***toothed whales***

Family Delphinidae Gray, 1821 **dolphins, orca, pilot whales**

"What's the difference between a dolphin and a porpoise?" This is a common question on Whales and Trails adventures. Dolphins heads have a beak (sometimes quite long or short in orca); large dorsal fins; large in size (in comparison to porpoise); and, cone-shaped teeth. The dolphin family is the most diverse of all cetacean families and includes 19 genera, two of which are represented only by fossils, and 40 species with two from the fossil record.

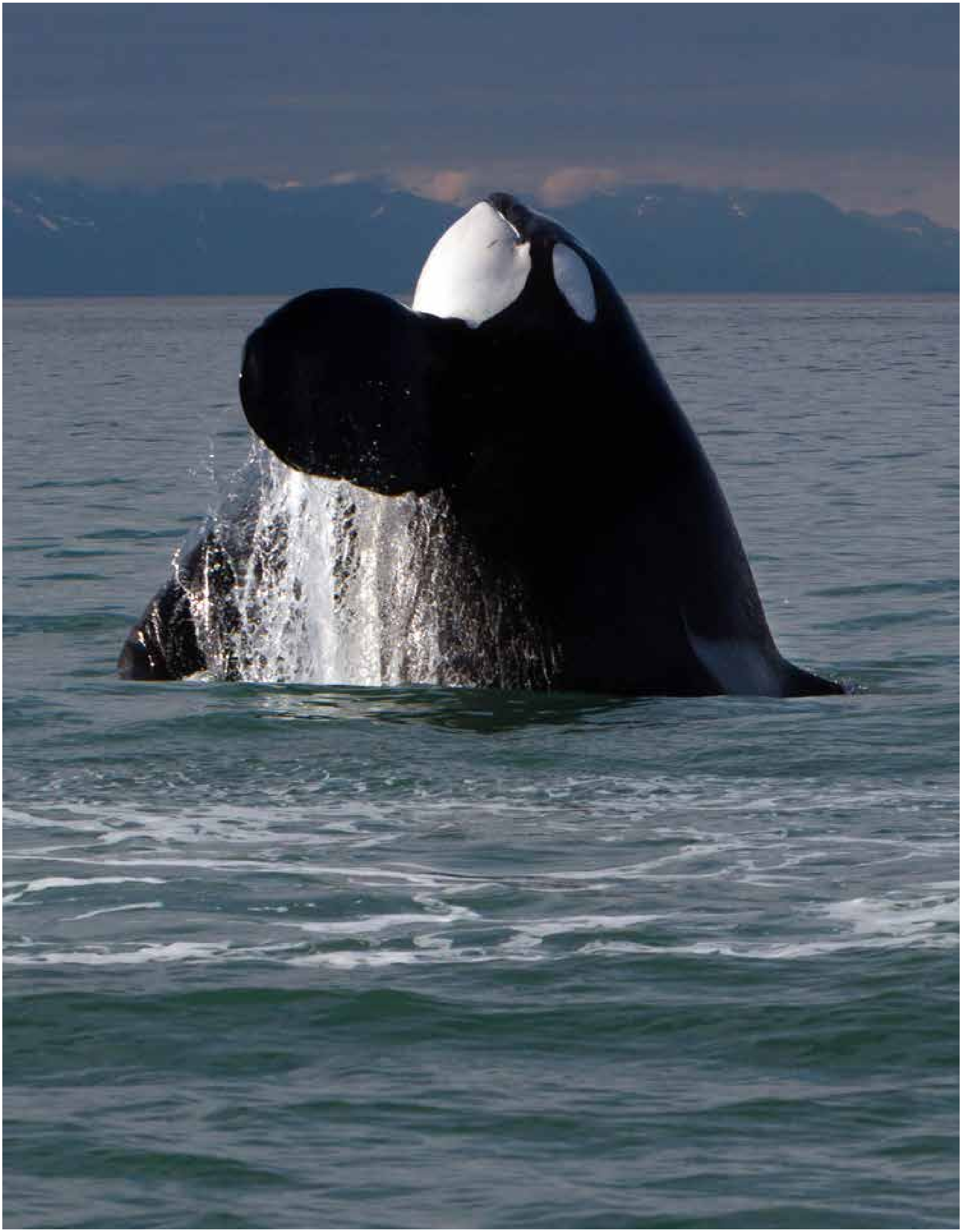
Orcinus Fitzinger 1860

or-SIGH-nus Latin *orcinus*, "of the kingdom of the dead", or "belonging to Orcus", the god of the underworld.

Taxonomy:

A monotypic genus. When named *Delphinus orca* Linnæus 1758 it's obvious the "whale" was considered a "dolphin" but very distinct from *Delphinus*.

Synonyms:
Orca Gray, 1846. Generic name preoccupied by *Orca* Wagler, 1830 (=*Hyperoodon*) and thus unavailable and invalid
Ophysia Gray, 1868. Type species *Orca capensis* (=*Delphinus orca*)
Gladiator Gray, 1870. Type species *Orca stenorhyneha* (=*Delphinus orca*)
Grampus Iredale and Troughton, 1933 (not Gray). Type species *Delphinus grampus* (=*Delphinus orca*)



Orcinus orca (Linnæus, 1758), orca, killer whale, KW's, B&W's, little guys, oreos, kéet,

OR-kuh   Latin *ōrca*, whale.

In amazement I learn something researching for these notes what I've held as truth turns out not to be! The name orca is *not* of native origin, at least from the Pacific Northwest. Linnæus originally gave the animal the name *Delphinus orca*, using the ancient Greek word for dolphin for the genus and the Latin word for a ferocious whale for the epithet (which may have been borrowed from the Greek ὄρυξ). While related to dolphins, they are not close enough to bear the name dolphin. *Orcinus* might be derived from Orcus, a god of the underworld and punisher of broken oaths when became "of hell" or "hellish"; or "a combination of two Latin words and means 'like a whale'"; [1] but it also may be a variation of the epithet made to fit a generic name. Orca is simply an old Latin word for whale.

I find the common name "killer whale" pejorative at best, offensive at worst and scientifically confused. I use the name orca.

There is only one record of an orca killing humans in the wild and it is by no means certain. The Jackson–Harmsworth Expedition to Baffin Island reported that on May 12, 1894 a midshipman was "dragged from an ice flow by a black whale" and was never seen again. [2] There are only six reported non-fatal "attacks" of orca with humans in the wild. There have been four fatal "attacks" by captive orca on humans. There is no consensus if they were accidental or purposeful.

With these facts, "killer" seems a fanciful and inaccurate name, at least with regard to humans. They certainly are the apex predator of the ocean and kill prey to survive. From the viewpoint of large fish and marine mammals, "killer" is an appropriate description. "Whale" is an appropriate name only if applied to all cetaceans and only then can be scientifically supported. Most people distinguish the dolphins and porpoises as being different from what they consider "whales". What people conjure in their minds when they hear the word are the large to huge swimming mammals of the ocean, "There go the ships: there is that leviathan, whom thou hast made to play therein." Psalm 104:26, KJV, in the public domain. Leviathan, **לִוְיָתָן**, is usually translated as "whale" but is perhaps more accurately rendered as "sea monster".

[1] Gotch, A.F. 1979. *Mammals—Their Latin Names Explained*. Blandford Press

[2] Jackson, F.G., A. Armitage, R. Koettlitz, H. Fisher & W.S. Bruce, 1898. *Three years' exploration in Franz Josef Land*. The Geographical Journal 11 (2): 113–138.

Taxonomy: orca morphotypes

Synonyms:
Delphinus orca Linnæus, 1758. Type locality European seas
Delphinus serra Borowski, 1780. Type locality Spitzbergen
Delphinus Gladiator Bonnaterre, 1789. Type locality Spitz. bergen
Delphinus Duhameli Lacepede, 1804. Type is description of animal from France
Delphinus grampus Blainville, 1817. Type locality North Atlantic
Orca Capensis Gray, 1846. Type locality Cape of Good Hope
Delphinus victorini Grill, 1858. Type locality Capetown, South Africa
Orca Sehlegelii Lilljeborg, 1866. Type locality Norway
Orca magellanica Burmeister, 1866. Type locality south of Buenos Aires, Argentina
Orca Esehrichtii Reinhardt in Eschrich, 1866. Type locality Faeroe Islands
Orca ater Cope in Scammon, 1869. Type based on description of animals from Oregon to Aleutian Islands
Orca rectipinna Cope in Scammon, 1869. Type based on description of animals from California
Orca stenorhyneha Gray, 1870. Type locality English coast
Orca latirostris Gray, 1870. Type locality coast of Essex, North Sea
Ophysia pacifica Gray, 1870. Type locality North Pacific?
Orca pacifica Gray, 1870. Type locality coast of Chile
Orca africana Gray, 1871. Type locality Cape of Good Hope
Orca tasmaniea Gray, 1871. Type locality Tasmania
Orca minor Malm, 1871. Type locality Sweden
Orca antarctica Fischer, 1876. Based on drawing
Orcinus nanus Mikhalev et al., 1981. Antarctic waters
Orcinus glacialis Berzin and Vladimirov, 1983. Type locality Indian Ocean sector of Antarctic.

With a world wide range (except for polar waters), orca have evolved into a number of forms that are visually distinct from one another leading to this list of synonyms. There are eight to ten morphoptypes recognized today and given some sort of name. Three antarctic forms were recognized in 2003. [1] A comprehensive genetic study in 2010 recommends three be elevated to species (but does not do so) and consider the remaining five to be subspecies. Full species status would go to our North Pacific Transient, and two of the southern types, the Antarctic B and Antarctic C. Correlating these with the synonyms above is fraught with peril. It's clear that quite a number of folks were seeing the very different morphotypes long ago and felt them worthy of their own name. While geography can help, it is not the only character.

Our mitogenome data also indicate that the North Pacific Transients should be considered an independent species. Not only are they ecologically and morphologically distinct from other high-latitude killer whales, but genetically they are the most divergent type, diverging from all other killer whale types ;700,000 yr ago. [1]

Their recognized morphotypes and location are represented with this map: [1]

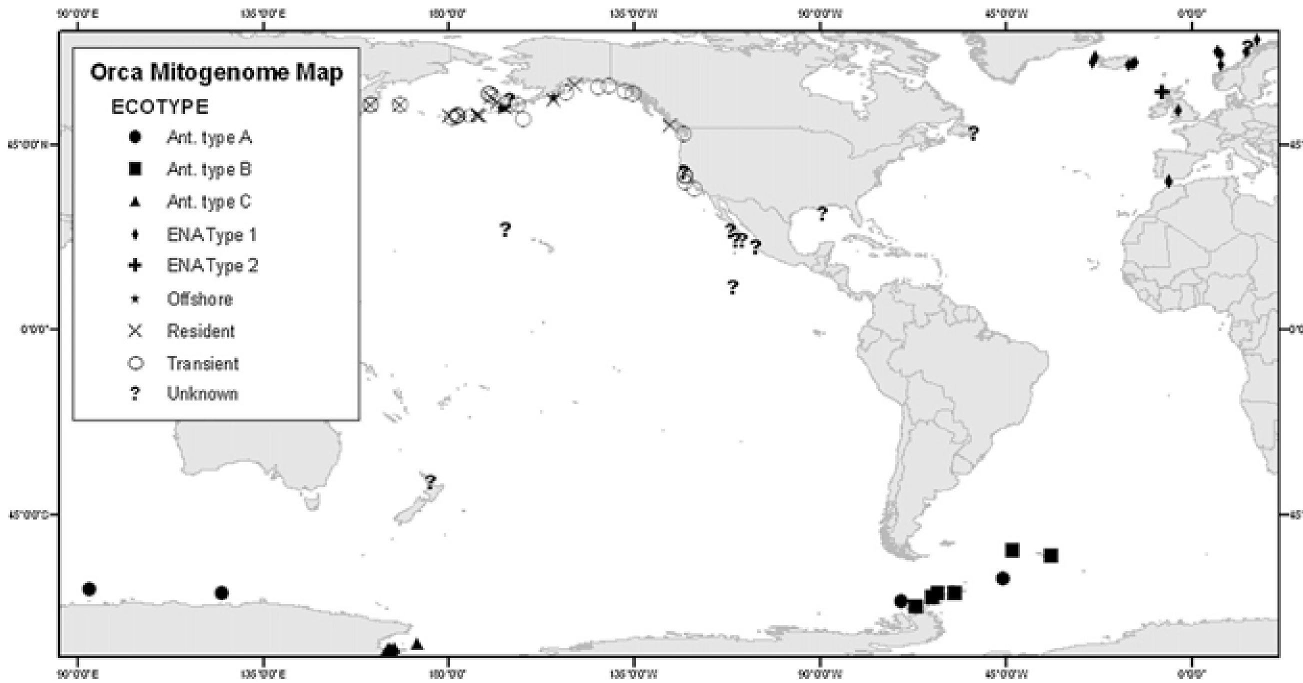


Figure 1. Sample collection locations with indication of type when known.

<u>Current orca morphotype taxonomy</u>

Antarctic type A (*Orcinus nanus*)	Eastern North Atlantic type 1
Antarctic type B (*Orcinus glacialis*)	Eastern North Atlantic type 2
* large type B (pack ice killer whale)	Offshore
* small type B (Gerlache killer whale)	Resident (North Pacific)
Antarctic type C (Ross Sea killer whale)	Transient (Bigg's)
* Antarctic type D (subantarctic killer whale)	

* Antarctic type B are sometimes split into the pack ice killer whale (large type B) and Gerlache killer whale (small type B) and subantarctic killer whale as Type D for a total of ten morphotypes. The pack ice type is now famous for their unique method of hunting seals by creating waves to wash over and roll the pack ice. [3] Gerlache killer whale are named for their occurrence in the Gerlache Strait off the western Antarctic Peninsula. They are a smaller type B with a large eyepatch that is slightly slanted downward; travel in large groups in the open water away from pack ice; eat mostly penguins, usually just the breast meat. [4] Subantarctic have a tiny eye patch and very bulbous forehead. Their phylogenetic tree strongly supports eight morphotypes.

Antarctic B was been given the full species name *Orcinus nanus* Mikhalev et al., 1981 but is a *nomen nudum* (lacking a description) and thus illegitimate under the International Code of Zoological Nomenclature. Antarctic C was described as *Orcinus glacialis* Berzin and Vladimirov 1983. Neither name has enjoyed much traction and the vast majority currently continue to use *O. orca sensu latu*. We all seem to be awaiting a comprehensive study of all ecotypes before accepting a new scientific name for any of the morphotypes. Morin, *et al.* came very close, but we're still not quite there.

[1] Pitman, R.L. & P. Ensor. 2003. *Three forms of killer whales* (Orcinus orca) *in Antarctic waters*. Journal of Cetacean Resource Management 5(2):131–139.

[2] Morin P.A., F.I. Archer, A.D. Foote, J. Vilstrup, E.E. Allen, Wade,P., J. Durban, K. Parsons, R. Pitman, L. Li, P. Bouffard, S.C. Abel Nielsen, M. Rasmussen, E. Willerslev, M.T.P. Gilbert & T. Harkins. 2010. *Complete mitochondrial genome phylogeographic analysis of killer whales* (Orcinus orca) *indicates multiple species*. Genome Research 20: 908-916 doi:10.1101/gr.102954.109.

[3] Pitman, R.L. & J.W. Durban. 2011. *Cooperative hunting behavior, prey selectivity and preyhandling by pack ice killer whales* (Orcinus orca), *type B,in* Antarctic Peninsula waters. Marine Mammal Science, 28(1): 16–36.

[4] http://www.whaleresearch.com/#!about-orcas/c1qa8

Current Status of Orca

The best estimate for the world-wide population of orca is about 50,000 with the note that "It is likely that the total abundance is higher, because estimates are not available for many high-latitude areas of the northern hemisphere and for large areas of the South Pacific, South Atlantic, and Indian Ocean". For our area there are about 216 residents and 314 transients. [1]

The are no records of humans hunting orca for food. Humans have a long history of capturing live orca for human pleasure. There are records of 1,477 taken in Japanese waters between 1948 and 1972, mostly for captive use. [1] The history of taking for marine parks is checkered with horror and crowd-pleasing cheers. The first captured orca, Wanda, came from Newport Beach, California. She was caught by a crew from Marineland of the Pacific and transported to the park where she repeatedly crashed into the walls and after two days in captivity, died.

> Upon being placed into the 100 by 50 by 19 foot oval fish tank at approximately 10:00 PM, the whale initially struck her snout a glancing blow on one of the walls. She then commenced to swim slowly around the confines of the tank, her behavior being similar to that of newly-introduced smaller delphinids. The following morning, the whale was observed holding a newly-killed ocean sunfish in her mouth. This fish was not consumed, however, and during the remainder of the day many attempts were made to induce feeding. Marineland divers attached lines to bonita, and "worried" the killer whale with these as she slowly encircled the enclosure. The animal made several attempts to bite the food and it was at this time that the worn condition of her teeth was first observed. At 8:30 AM on 20 November, the whale became violent and after encircling the tank at great speed and striking her body on several occasions, she finally swam into a flume way, convulsed and expired. [2]

The history of captive orca hardly improves. The Southern Resident population lost 48 of its members to captivity leaving on 80 in the wild. [3] Wild capture for commercial use reached a nadir with the capture of seven individuals from the L-25 pod in August 1970 at Penn Cove, Puget Sound. Mortality was extreme with five dieing. Public opinion changed drastically with the uncovering of the purposeful sinking of the dead animals. This single incident had much to do with the U.S. passing the Marine Mammal Protection Act of 1972. [4]

[1] _____The IUCN Red List of Threatened Species(tm) 2014.3. http://www.iucnredlist.org/details/15421/0
[2] Estes, J.A. 2007. *Whales, whaling, and ocean ecosystems*. University of California Press, Berkeley. ISBN 0-520-24884-8.
[3] _____. *"Newport Specimen" November, 1961* http://www.marinelandofthepacific.org/animalcollection/killerwhales.html
[4] Heimlich, S. & J. Boran, J. 2001. *Killer Whales*. Voyageur Press, Stillwater, Minnesota.
[5] Price, E.P. 2008. *Since first orca capture, views have changed*. Published Wednesday, January 16, 2008 at 12:00 AM by The Seattle Times Company.

International Status

With the taxonomic status of *Orcinus orca sensu latu* being uncertain but with the near certainty that at least some of the morphotypes will be given subspecific or even species status, the International Union for Conservation of Nature (ICUN) changed their official rating from "Insufficiently Known" (Groombridge 1994) to "Data Deficient ver 3.1, 2008". They recognize that some of the morphotypes face such threats that a "combination of potential declines driven by depletion of prey resources and the effects of pollutants is believed sufficient that a 30% global reduction over three generations (77 years; Taylor et al. 2007) cannot be ruled out for some 'groups' that may be designated as species". [http://www.iucnredlist.org/details/15421/0]

United States Status

All marine mammals are protected under the Marine Mammal Protection Act of 1972 (see notes under humpback whales). This covers all of the orca within the 200 mile U.S. Exclusive Economic Zone (EEZ).

Additional protections has been give to two populations. The southern resident population of Puget Sound with 80 to 90 individuals was "endangered" under the Endangered Species Act of 1973 in November 2005 with a "critical habitat" declared in November 2006. After a "five year review", boats were limited to a 200 yard approach (76 FR 20870).

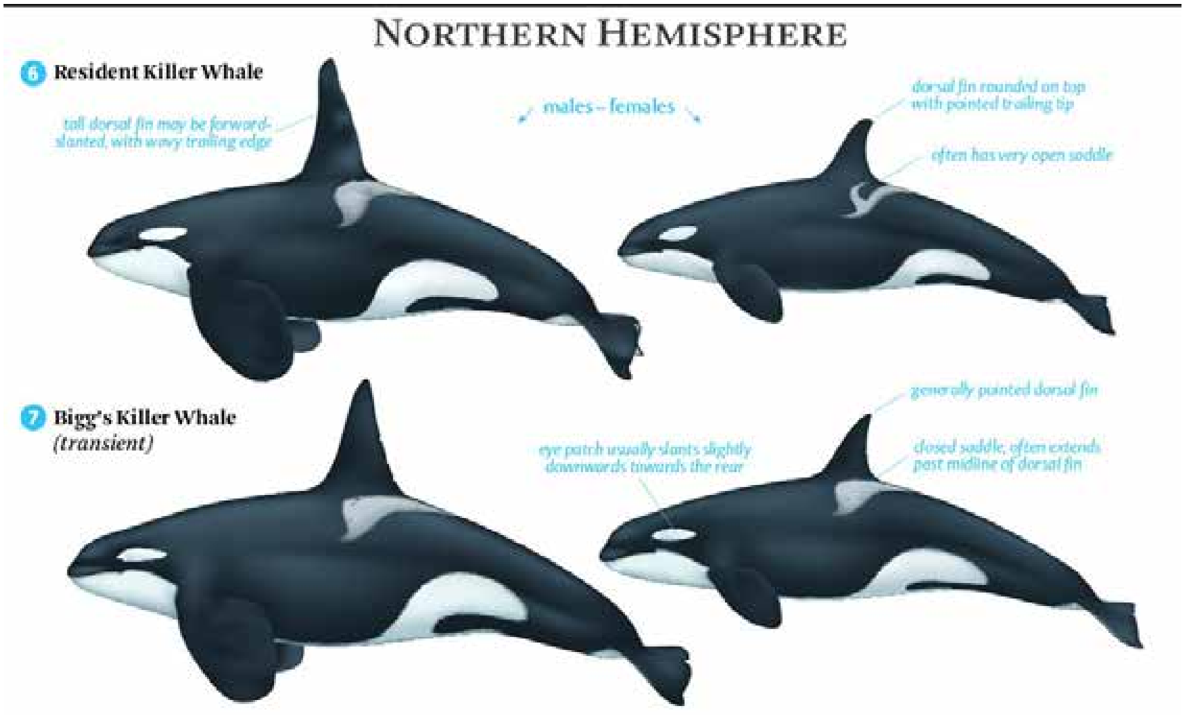
The AT1 Transients in the Prince William Sound area are considered "depleted" under the Marine Mammal Protection Act of 1972 as a result of the Exxon Valdez oil spill.

_____ *Killer whale* (Orcinus orca). NOAA Fisheries. http://www.nmfs.noaa.gov/pr/species/mammals/whales/killer-whale.html.

Juneau Area Morphotypes

Our Juneau waters are home to two fairly easy to distinguish morphotypes, the North Pacific Transient (Bigg's) and North Pacific Resident. This was not known until the aftermath of the Exxon Valdez disaster of March 24, 1989. Some Prince William Sound orca were dramatically affected while others were not. It turns out that the resident pods eat mostly fish, an organism only lightly affected by the spill, where the transients eat mostly meat of sea lions, seal and the like that were greatly affected. Transient pods tend to travel in small groups of a dozen or less where resident pods can be as many as two dozen animals, probably all forming a complex family groups that is matrilineal. Transient pods lost a large number of the most reproductive females and this population was headed toward extinction. They have significantly recovered as I saw many females and calves. (I learned this from Bonita Nelson, a NOAA research biologist at Auke Bay Laboratory at the Naturalist Training day). Determination to type can be fairly certain if observation of ***at least three of these characters*** are present in the animals being observed.

North Pacific Transient (Bigg's)	*North Pacific Resident.*
few in number (fewer than 5) *not reliable by itself!!*	larger in number (more than 5) *not reliable by itself!!*
female dorsal fin sharply pointed to rear	female dorsal fin rounded
female saddle patch sold gray or white	female saddle patch often open and usually gray
saddle patch often extends forward if dorsal fin midline	saddle patch usually behind midline of dorsal fin
eye patch rising behind they eye	eye patch horizontal or falling behind the eye
male dorsal fin angled on both sides	male dorsal fin nearly vertical on front side
male dorsal fin straight	male dorsal fin with wavy front edge
meat eater (sea lion, dolphin, etc.)	fish eater (salmon and others)



Cropped to our local forms from: Pitman, R.L. undated. Orcinus orca *a diversified portfolio: Killer whales: ecotypes and forms*. National Oceanic and Atmospheric Administration swfsc.noaa.gov/prd-killerwhale

All morphotypes are sexually dimorphic. Males are larger (to 9.5 m) with a tall (to nearly 2 m) dorsal fin that is narrowly triangular and vertical. Females are smaller (to 8 m) with a shorter (to just under 1 m) dorsal fin that is falcate, or back-swept and curved toward the rear. Juveniles of both sexes have falcate dorsal fins and sex determination from boats is nearly impossible. Very young orca have a distinct orangish tinge to all the white areas that seems to last about a year and may be related to nursing milk from its mother.

Orca sightings on our whale watching trips are unpredictable. If I kept better notes I could say exactly how many times I saw them, but it seems like I see them on about 10% of my on the water trips. More often than not, as we head out of Statter Harbor the captain already knows about them, either by just having seen them or by chatter on the marine radio. The boat captains have developed a code language for many things out on the water so the passengers don't know exactly what's going to happen to prevent any disappointment. Orcas are usually called "kw's" or "black and whites". So as we head out I listen to the talk and get an idea of what we might see on that trip.

My first wild orca experience!

My first live orca experience was at Miami Seaquarium in Miami, Florida, in 1986. My entire family was splashed by the orca in the aquarium (we had seats very close to the front!) which thrilled us all to "the max". Fast forward to 2009, 23 years later, and I see my first orca in the wild. A short essay at the end of these notes on orca gives my thoughts on captive versus wild orca.

On June 14 I'm privileged to go on the "farewell cruise" for the U.S. Coast Guard folks who were about to leave Juneau. The entire Juneau Sector and their family were invited and my "Coastie" son-in-law had me along with my daughter. The cruise is on Allen Marine's catamaran St. Philip to Tracy Arm. Unfortunately for us, Tracy Arm was clogged with ice so the captain headed up Endicott Arm all the way to Dawes Glacier. On the way back to Juneau, just out of Holcomb Bay into Stephens Passage we came by a pod of 12 orca. The captain stopped the boat and four the orca swam about us just as close as just a dozen meters.

Individual orca are identifiable, but it takes very careful observation and is extremely difficult "in real time". I made these identifications in January of 2015 when editing these notes. When I saw them I had no idea they could be identified to individual or that there were eight to ten different forms of orca around the world. It turns out this is the AF22 matriline, named after AF22, Echo, who was born in 1948 and died in 2007. Note how just in this small sample the reliability of the saddle patch is not so good, at least for those with solid saddle. The best that can be said is an open saddle patch is a sure mark for residents. Closed saddles *must* be accompanied by other characters in order to make a sure identification.

AF4 Inian (1961). The highlight is the mom and calf. The upswept eye patch, open gray saddle and large number indicate these are residents. But not the mom's dorsal fin isn't exactly "rounded" and in the right photo looks pointed. There is a bit of an under curve near the apex, but it is so subtle as to escape notice while observing. The calf is small, only about 6 feet long compared to mom's 20. Note the orangish tinge to its eye patch and chin. It had no trouble keeping up with mom as they swam about our boat and then off into the wilds of Stephen's Passage.

AF47 Lituya (1996). This is a mature female, easily told by the raked dorsal fin with at least some scallop on the distal side. I've been trying to figure out just how it might have gotten the notch, was it in a fight with a male when she had a young calf (like the third photo)? Since orca remain in family unit pods, this seems unlikely unless this pod came in contact with another, foreign, pod. The captain of the St. Philip came out to the back deck to watch and said he was reasonably certain—because of this notch—that this is a transient pod. If so, it could be re result of an attack by sharks or a shark defending itself when the orca attacked it to eat.

AF26 Tidal (1989) (left) and ***AF65 Espuibel*** (1997) (right). The differences are obvious in the shape of the top of the dorsal fin. Tidal is nearly vertical while here is a subtle rake to Espuibel's. Note that both have eye patches that rise to the rear but both have solid saddle patches that extend at least to the midline of the dorsal fin illustrating that these characters are not firmly fixed.

It was here that I learned to tell the males from the females. Inian and Lituya have short, stocky dorsal fins that have a decided rake to the rear. Tidal and Espuibel have very tall and narrow dorsal fin that are nearly perfect triangles (but can have a bit of a rake as in Espuibel). At this point I have no idea of the different morphotypes or the ability to identify them as individuals. These things just never entered my mind as I was so excited for a brand new wildlife experience. My interest and knowledge has grown tremendously as I now make an attempt at identifying orca at least to transient or resident if not to individual.

The catamaran now powers up, the whales head off as Espuibel does below, and we head back up Stephen's Passage to Juneau.

Orca Behavior

Cruising

By far the most common behavior I see is orca simply swimming. Many times all I see are the dorsal fins and a teasing of the saddle patch as in these photos. When out here in the big waters of the Lynn Canal they can be very hard to spot at a distance. Even when we have radio reports of their presence, it usually takes stopping and searching the surface with binoculars to spot them, and are successful about half the time. Out here, it seems the orca are *en route* to someplace as they're nearly always moving, often at 10 knots, rarely stopping or even slowing. I've never felt that they were paying any attention at all to our boats out here. This seems equally true for both residents and transients.

Other times the orca "porpoise" as they swim, raising their head nearly out of the water exposing their eyes and the arching their back as they drop back under water as the large unidentified female resident (note her open saddle) does here in front of the Shelter Island lighthouse in Favorite Channel on May 6, 2010. In these more inland waters, it appears the orca might be searching or foraging for food as their speed and direction usually varies. Perhaps this is why here is the only place I've ever felt they were paying attention to us at all.

These four transients approached our boat in a straight and steady track on a very sunny May 25, 2011. The lead orca dives shallowly under water just 3 meters off our starboard side and swims with us at about 5 knots for a few minutes, even turning on its left side as if it is looking at us. Then off they go, speeding up substantially on their way to some unknown southern destination.

While cruising, they can come remarkably close to us as this female on the left is doing on August 8, 2012. Note she has a downward slanting eye patch with a very round dorsal fin thus making a resident or transient identification impossible! She is almost equidistant between us and our sister boat, the Navigator.

This large male transient ("The Big Guy") on the right is approaching us with his α female and a juvenile. They stay off to his right and go behind us, but he stays his course and dives right under us as we sit still. He surfaces on our port side about 50 meters north and continues on his way. Our presence seems to make absolutely no difference to him and he seems to know we are on the surface with lots of room underneath. This seems at least circumstantial evidence that this orca has previous experience with boats and knows they don't extend far under water. While unidentified as he never showed his saddle patch or a lateral view, his tall dorsal fin has an obvious tip curve to his left.

Breathing & Blowholes

It's a trick question: "how many nostrils does an orca have?" Like all mammals they have two. What they do have is a single external orifice that serves the twin nostrils. It is valved, like all marine mammals, and is completely closed when the animal is under water.

How long can an orca remain under water? There is little scientific evidence for this and there are answers from 10 to 20 minutes. The actual time is probably within this range but is unknown. I've never timed the underwater periods of orca I've seen and just as an "off the cuff" guess would say that the average time underwater is in the neighborhood of four to five minutes. Their lungs take up a large portion of their visceral cavity so they can remain under water for a significant time.

> Transient killer whales have been recorded diving for up to 11.2 minutes. Transient whales in the eastern North Pacific often stay submerged for more than 5 minutes and occasionally for more than 15 minutes in a single dive. Transient killer whales have been recorded diving for up to 11.2 minutes. Transient whales in the eastern North Pacific often stay submerged for more than 5 minutes and occasionally for more than 15 minutes in a single dive.

SeaWorld Parks & Entertainment, http://seaworld.org/animal-info/animal-infobooks/killer-whale/adaptations/

The pattern of the spout isn't particularly distinctive amongst cetaceans other than in calm weather it is perfectly vertical as these two photos illustrate. As with all cetaceans, they don't exhale water. The spout is made of a small amount of water captured in the blowhole depression as the orca rises above the surface and air that is nearly saturated with water vapor that is expelled with great force. As the air expands and cools, the water vapor condenses and makes "fog". When I've been close enough to smell, there is only a faint fishy odor that it not in the least objectionable, distinctly different from humpback whale breath!

The question of whether cetacean breathing is voluntary or autonomic remains unanswered. It is clear that these animals can voluntarily control breathing, just as we humans can when conscious, it is unclear if they must think to breath when sleeping. From captive animal studies it seems clear that orca use hemispheric sleep (one half of the brain sleeps while the other remains awake). Which side of the brain controlling breathing has not yet been determined yet many references indicate this fact is well known and documented.

Spyhop

Also called a head rise. What happens in a spyhop is the orca rises out of the water to an elevation where they eyes, and often the point of attachment of the pectoral fins, are above the surface. What distinguishes this behavior from an upward lunge is that the orca remains in this position of some time, often up to a minute, almost like a human treading water. The orca maintains its same orientation while above the water without turning or rotating. As this collection of photos illustrates, they come up almost equally leaning backwards and forwards.

As with whales, it is unclear why orca spyhop. The easy conclusion is that they are looking around, and there is evidence to support the idea. Unlike their large cousins, much is known about the vision of orca. Captive orca are able to discriminate between items both in and out of the water with a 92% success with two objects and 82% with three. What they are "looking at" (shape, size, color) is not known. Their spherical lenses and eye muscles are very strong allowing them to bend to accommodate the change in refractivity in and out of the water.

http://seaworld.org/animal-info/animal-infobooks/killer-whale/senses/

Tail Slapping

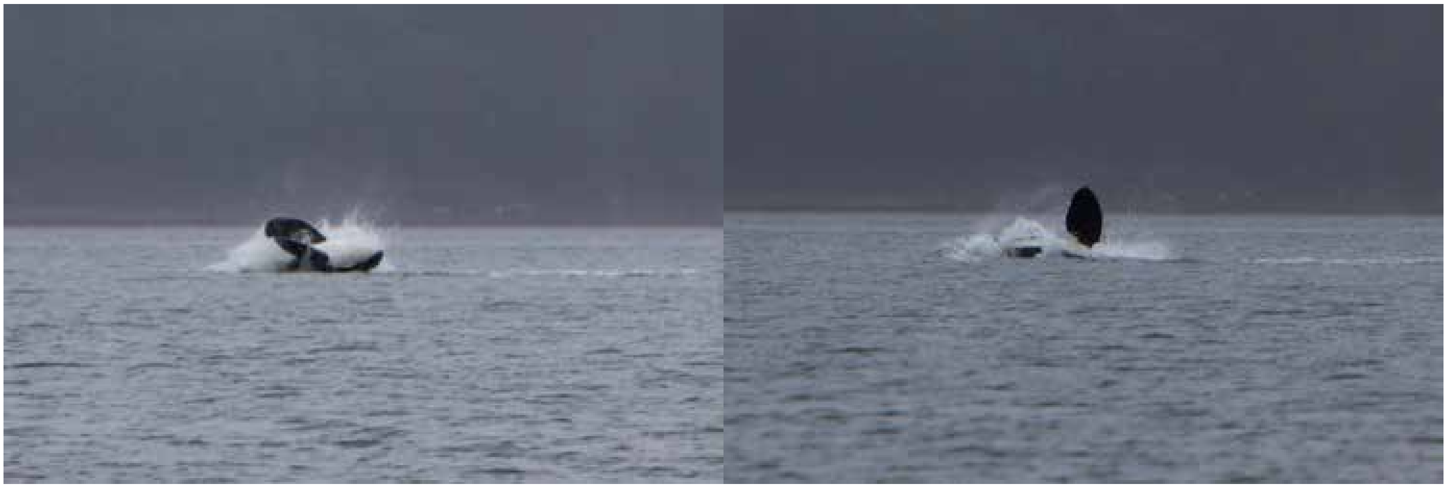
A large resident (note the open saddle patch on the forward orca that identifies these as residents) female lifts here tail and does more of a tail lift splash than a downward slap to the water surface. Taken September 13, 2014.

A probable transient (based upon the sharp dorsal fin) does a traditional tail slap. Taken May 29, 2011.

The pure white ventral side of the flukes are clearly visible with these photos. There is a wand of bull kelp caught on the slapping tail visible in the right photograph. Taken July 1, 2012.

This is also called lobtailing. Just as with humpback whales, we really have no scientific explanation for tail slapping. I've only seen is six times. The two consistent observations I've made is that the pod is always cruising when the slap was made and the tail is lifted up and then held up almost stationary before being slapped to the water. If this is for some sort of communication to the rest of the pod, what is it? Since they are all together it couldn't be a signal for food. Is it danger? Are they concerned with the presence of our boat? Since their other behavior seems not to change with our presence, this seems unlikely. At the present time we just have to say we don't know why they do it.

Breaching



I have only seen orca breach twice and so have limited experience to judge this behavior. The first here is a very large and unidentified transient male who does a single back breach as he and his two female companions are chasing a Dall's porpoise.

The second experience is a spine tingling late afternoon on a mostly cloudy July 17, 2010. We're headed out of Auke Bay and heading toward Lena Point when we come upon a solitary dorsal fin. It's "The Big Guy". We pull up alongside of it and cruise for about 200 yards when it dives out of site. Captain Rich cuts the engines and we sit, waiting for what we hope is another view. To our surprise, his dorsal comes up out of the water south of us and he's headed straight for us. About 30 meters from the boat he dives under and apparently goes under the boat. We sit awaiting again. Expecting him to come up off the bow, I move there and a beam of light streams on us and almost at exactly the same time he erupts out of the water, belly facing the sun, with both huge paddles coming out of the water. He arches on his right side and splashes into the water with nearly all of his ventral white patch exposed and is back under water. These four frames were exposed in less than one second, so it happened very fast. He comes up about 150 meters ahead of us and we move slowly to catch up. He makes one arching porpoise that exposes most of his saddle. It is unique in that it extends almost to the forward end of the dorsal fin, yet I've not been able to identify him. Exciting and intriguing at the same time, did our presence have anything to do with his decision to breach? If so, how would we determine that.

Copulation

It is a simply glorious day with full sun and crystal blue skies on May 29, 2011. We've headed up Favorite Channel to Bridget Cove just south of Mab Island. A pod of five resident orca active. The pod is composed of the α-male, two almost exactly the same size adult females, and two juveniles, one of which is much younger than the other. We park the boat and let the orca do what they do. And do they!

Here the adult females and juveniles are cruising south in a very tight group, adults in the lead. The male is out in front by about 10 meters. Spouts show up very well in the bright sunlight and one of the juveniles decides to make a bit of a spyhop, coming our of the water at and angle of about 20°, showing its slightly upturned eye patch. None of the females has an open saddle patch but they all have the rounded dorsal fin characteristic of residents.

The male dissapears and the pod of four continues their southward cruise. Up from the water comes the male, head first rather than dorsal fin first and approaches the pod and swims up to the rear of the broader-finned adult female. He makes a shallow dive right rollingin front of her genital slit. She lifts her tail out of the water while he rolls on his side to the left until he's upside down. His bright pink penis extends out of his genital slit.

Even though we are just 25 meters away from the action, it is difficult to determine if the male was successful or even if the female was receptive. Since I've not seen this before (or since), interpreting what I'm seeing is difficult. It seems that since she's raising her tail out of the water and holding it there while making a slight roll to her left that she is indeed receptive. This is a day I wish I had an underwater camera to thrust down and record what's happening. Since all of us on the boat today want to see more orca, we're hoping the dalliance was successful and the female impregnated.

On this day we happen to have a family with two young "tweeners" that makes interpreting what we're seeing, well, complicated!

Little seems to be known about wild orca reproduction. Talking with fellow guides and captains, only those with long experience on the water here—a tiny handful—have witnessed this behavior. Of course that makes it even more special for me.

Orca reproduction is apparently not seasonal as copulation has been observed all year. Further, newborn orca are encountered throughout the year, female orca must be polyestrus, coming into heat several times a year. Gestation in the wild is unknown, but from captive breeding at Sea World it ranges from 15.7 to 18 months.

> Females typically gave birth to their first viable calf at 14.1 years of age (SE=0.050; range 10-21 years) and those that survived produced a total of 4.7 calves at mean intervals of 4.9 years (SE=0.18; range 2-11 years) over a reproductive lifespan typically lasting about 24 years. Older females exhibited reproductive senescence, with about 50% being post-reproductive by 38 years of age, and none reproducing after 46 years of age.

Olesiuk, P.F., G.M. Ellis & J.K.B. Ford. 2005. *Life history and population dynamics of northern resident killer whales* (Orcinus orca) *in British Columbia*. Research Document 2005/045. Fisheries and Oceans Canada Pacific Biological Station, 3190 Hammond Bay Road, Nanaimo, B.C. V9T 6N7.

Identifying Individual Orca

No two orca look alike. This allows individual identification. The differences in the characters to look for are often very subtle and require great care to compare and about as often as not I'm not able to identify they orca. I look first at the shape of the dorsal fin to determine if it is a male or female, then a resident or transient. Then I look at the saddle patch. These photos are severely cropped from much larger images for the sole purpose of identifying the individuals. It takes time, and I've spent more than an hour trying to identify a single photo!

Dahlheim, M.E. 1997. *A photographic catalog of killer whales*, Orcinus orca, f*rom the central Gulf of Alaska to the southeastern Bering Sea*. NOAA Technical Report NMFS 131.

Ellis, G.M., J.R. Towers & J.K.B. Ford. 2008. *Transient killer whales of British Columbia and southeast Alaska*. Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo.

Ellis, G.M., J.K.B. Ford & J.R. Towers. 2007. *Northern resident killer whales in British Columbia*. Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo.

______. 2011. *A catalog of killer whales of southern Alaska*. North Gulf Oceanic Society, Homer, Alaska.

Towers J.R., G.M. Ellis & J.K.B. Ford. 2012. *Photo-identification catalogue of Bigg's (transient) killer whales from coastal waters of British Columbia, Northern Washington, and southeastern Alaska*. Canadian Data Report of Fisheries and Aquatic Sciences 1241. Fisheries and Oceans Canada Science Branch, Pacific Region Pacific Biological Station Cetacean Research Program, Nanaimo, BC.

Orca pods and individuals are numbered by different folks in slightly different ways. Alaska transients are AT followed by a number. British Columbia use a single T followed by a number. They often append the number with a letter when whales are very closely related, as in brother or sister. Alaska residents are named with an initial A then the letter for the specific pod followed by a number. British Columbia use a single letter indicating the matriline or pod. Since orca form very tight knit family groups, if one animal in a pod can be easily identified, determining the others is greatly simplified. The year in parenthesis is their year of birth.

Juneau Orca Males I've Seen

AB24 Gilmore (19870)

AF19 Sergius (1980)

AF26 Tidal (1989)

AF42 Nipper (1993)

AF65 Epuibel (1997)

AG25 Berg (1994)

AT134

AT136

G45

T054 (1972)

T072 (1974)

T074 (1979)

Unidentified males

2009-07-17

2010-10-17 ("The Big Guy")

2011-08-16

2011-08-23

2012-06-22

2012-07-01

2012-09-19

2013-06-06

2013-06-06

2014-07-01

2014-09-13

Juneau Orca Females I’ve Seen


AF4 Inian (1961)


AF8 Steller (1970)


AF11 Gambier (1968)


AF23 Squaretop (1981)


AF28 Nunatak (1988)


AF40 Elfin (1992)


AF47 Lituya (1996)


AF57 Wavelet (1999)


AF67 Nevsky (2001)


AF77 Rienga (2003)

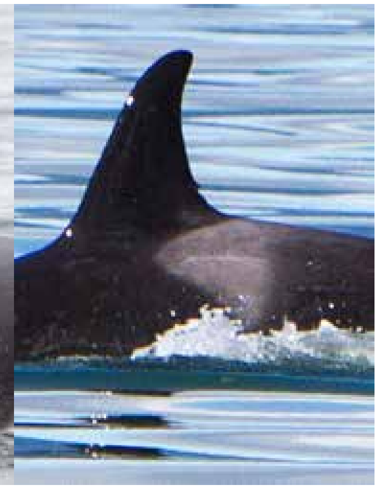

AF81 Bieli (2005)


AF85 Sunny (2006)


AF87 Avaaz (2009)


AG5 Lavinia (1969)


AG42 Chukle (2005)


AG44 Capacious (2008)


AT78


AT116


AT129 Calkins (2002)


AT145 (2006)


AT166


T034A


T035A


T038A

Unidentified females

2009-06-16

2009-08-07

2011-08-23

2012-07-21

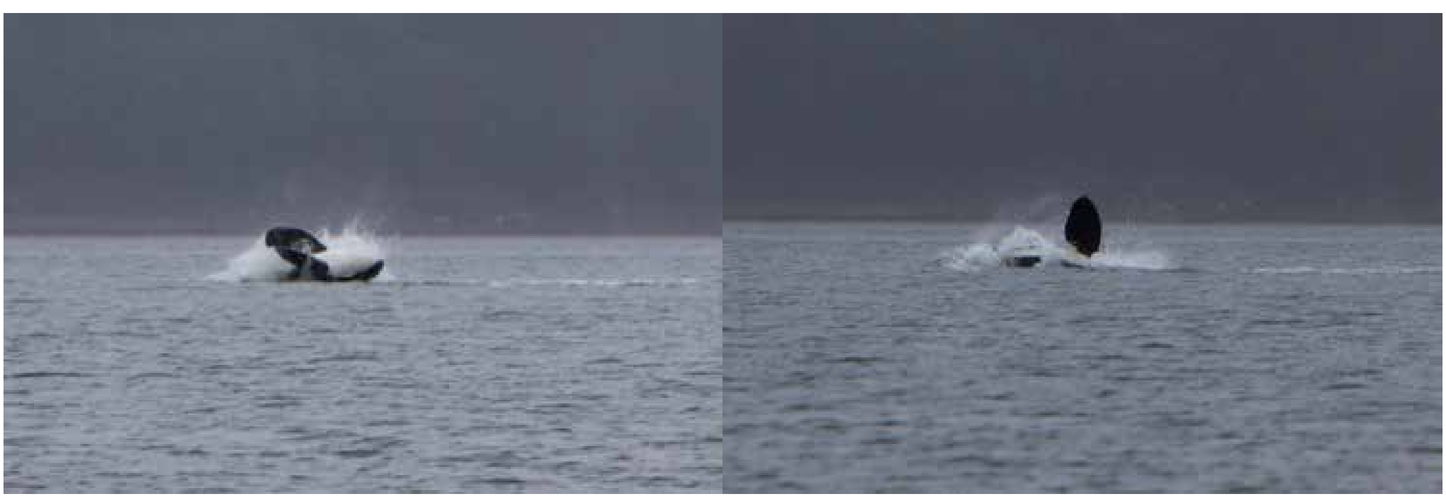
A time to live and a time to die.

No one knows what's going to happen each day as they wake up. I surely have no idea of what I will or won't see as I gather my guests and head out into the waters of Juneau. I do know that we guarantee a whale sighting. I do know that I have seen at least one humpback whale on every trip I've guided. I do expect to see whales. In July and August I expect to see bubble net feeding. I know that I see orca far less frequently and that most of the time I don't see much more than their dorsal fins. This makes their sightings far more exciting than most others. The rarer something is the more special it is seeing it. I've learned to take each day as it comes and enjoy the experience even it its only a humpback or two spouting and cruising with a dorsal fin or two out of the water. My job is to make this day the best day ever for my guests. I can truthfully say that I greatly enjoy watching a logging whale. This is what's in my mind each morning as I head to "work" (if this job could be called "work"!).

July 6, 2010 is just a yucky day, even by SEAK standards. Visibility isn't far as the fog and rain are going up and down. We're headed north as Captain Nat Kugler has some big guys (code for humpbacks) up Saginaw Channel. As we reach the Shelter Island sand spit he spots some "KW's" (code for orca) heading south and whispers that to me. He makes a broad turn to the southwest and we come upon a pod of three. A very large male, a very large female and a much smaller female. They are headed south "with a purpose" we don't know and we follow them at about 10 knots. As we approach the waters just off Symonds Point, they become curiously surface active in a manner I'd not seen before.

The male is a monster, very close to nine meters, with a tall, narrow and back slanting dorsal fin. His white saddle patch is very large, very bright and nearly reaches the front of the dorsal fin. His white eye patch drops below his eye line. Even with all of these unique characters, I'm not able to positively identify him, but I call him "The Big Guy". The large female has a very swept back dorsal that ends in a sharp point and the smaller female (in the right photo above with Shelter Island in the background) is very similar just smaller. Her eye patch is relatively short but definitely drops below the eye line. Everything says transient or Bigg's.

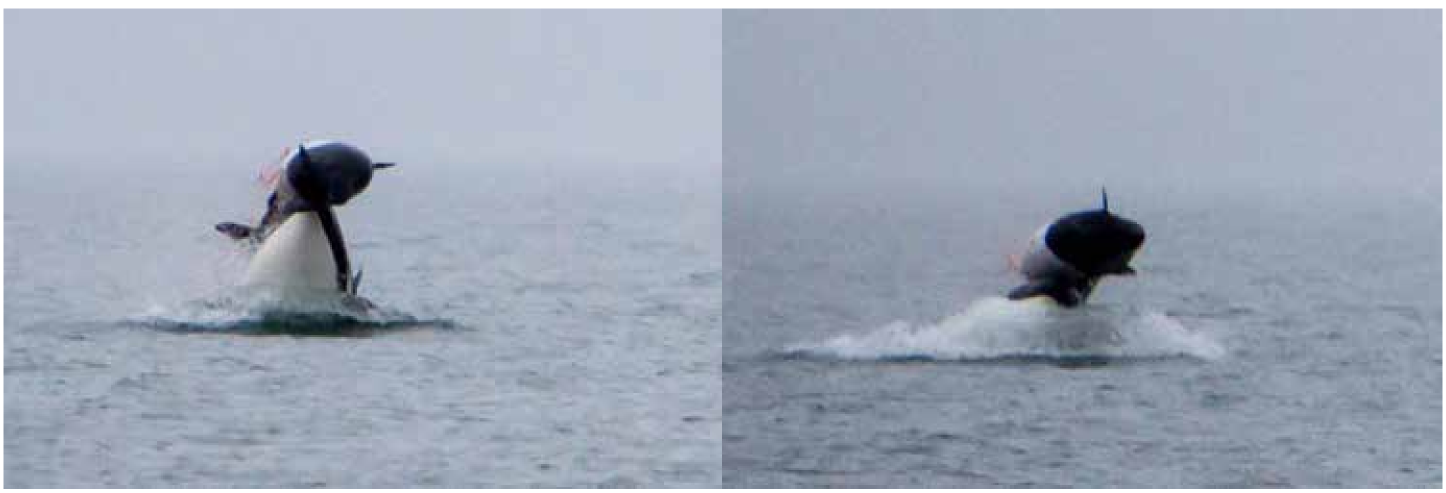
All three begin to swim in large, perhaps 200 meter diameter, circles with the two females going clockwise and the male counter-clockwise. They make at least three laps but add interest by doing some pretty amazing things. What is going on here? I'm asked that by a guest and have no answer. I ask Captain Nat, and he's clueless as well.



The male does some "breaches". This is new behavior for me to see. It's very much like a humpback by landing on his back, but always a bit off to one side. His huge "paddles" (the pectoral fins) are held out from the belly as he propels out of the water and arches backward. As he hits the water the separate with the left paddle slapping the surface. He dives out of view and remains under water, out of sight for some time.

The α female (the larger one) porpoises in and out of the water as she makes her circle. In the left photo she's almost fully out of the water headed away from us. The big male is coming toward her. What is going on here? I've never experienced anything like this and have no way to explain what's going on. Captain Nat has been in these waters much longer that I and he tells me he's in the same boat, literally! We're just astonished to watch this spectacle. It's only when I examine my photographs that I can find we had a bit of evidence of what was happening. The α female's tail and the males dorsal fin are just about to submerge, and headed their way, to the right is a Dall's porpoise.

All the animals are now under water. The mists are still hanging. We're in the boat watching and waiting and not knowing what we'll see, if anything. There is an amazing stillness and no one dares say a thing.



Suddenly the surface erupts in incredible violence as the α female rises vertically with the Dall's porpoise held tightly in her jaws blood squirting out. I'm shooting with my Canon 7D on continuous with my 20-200 mm f/2.8 lens and 2× converter for 400 mm effective focal length. All of this is taking place about a half kilometer away so we're seeing this at a distance. All of us, Nat, me and the 15 guests on board, are utterly silent and virtually still. We're watching, but we don't know what we're seeing. It's happening in real time, yet it seems as though it's slowed down. Reality hits when all the animals are back under water and we're left thinking, "what just happened?" I say out loud, "did we really see that?" I drop the camera down from my eye and begin to roll through the exposures I've made. When I come across the image, my jaw drops along with the camera. "I got it!" I say to the folks. It confirms we really did see what we saw.

Several weeks later, Jay Beedle asked me if I got any photos of that encounter. I asked him "what encounter?" "The kill" he responds. Jay was watching us from his home near the sand spit of Shelter Island and saw it from much further away. I sent him copies of my photos. They aren't very good as our boat was so far from the animals, but they do document that transients are meat eaters.

What do I think of that day? This is a very hard question to answer. It was a time to die. When asked (which has been far more often than I would have thought), I usually respond "It was a bad day for that Dall's porpoise!" Predator-prey relationships are violent. If successful from the predator's point of view, the prey dies and is food. From the prey's point of view, it's fright or flight. This Dall's porpoise, even though the fastest of it's clan, wasn't up to the speed of the orca. It gave up it's life as food for three orca. It was a day to live from the orca's point of view.

Watching something die is not pleasant for most of us, and something close to abhorrent for me. Most humans are omnivores that consume a large amount of meat from animals. Someone must kill it. I eat meat. I enjoy eating meat. I've never killed anything but fish that I've eaten. I've always been impressed with hunters who eat what they've killed as they seem inherently more honest than those of us who consume meat that some unknown has killed in an unknown place. Most of us prefer to distance us from any "unpleasantness". While one of the most incredible moments of my life, it will be forever in my mind with a myriad of mixed emotions. Do I want to see it again? Of course! Have I? No, but I've come close.

In July of 2012 I'm out on the water with Captain Gary Judkins. We're headed back to Auke Bay down Favorite Channel. Suddenly a female orca that we'd not seen before came up a third of her body length out of the water about 10 meters from the boat, mouth agape showing her white, cone-shaped teeth. In her mouth is a large—the size of two hams—chunk of bloody blubber from a sea lion the pod had just killed. There was an area of discolored surface water that we interpreted as blood from the kill. My camera wasn't up to catch any of this.

The world we live in is full of eat, or be eaten. This simple truth can be difficult to understand and even more difficult to watch.

On the joys of observing orca

I'm going to be accused by some of being elitist. There is great truth in this as there is a small group of folks who have been treated to the experience of watching wild orca and I am one of them. So be it. Now that I've accumulated substantial experience with these animals in the wild, I find the human captivity of orca to be repugnant. I look back to 1986 now with some horror. Not for me or my family, but for the orca. We had a most incredible experience. We were led to believe that the orca were having one as well. They cavorted to the whims and direction of their handlers. They jumped, dived and splashed as directed. We were duped. We were the patsy's. And we paid for it. Who benefitted? We deluded ourselves that we derived great benefit by seeing these magnificent creatures doing what by all accounts seemed to be enjoyable by them. After all, who doesn't have fun swimming, diving and cannon balling into a swimming pool! Of course the orca were enjoying themselves.

I now know that these are highly intelligent animals. I know they live in very close relationship with their immediate (transient) and extended (resident) families. They talk to each other in family specific dialects. When individuals are separated from their family they have special distress calls. They swim the ocean at will. Captivity removes all of these. Wanda seems to have killed herself, perhaps in an attempt to escape. Tillicum has killed three humans, for reasons we really don't know. What we do know is the behavior of captive orca is dramatically different than wild orca. The 1993 movie *Free Willy* resonated with most humans who saw it. The actor, Keiko, was actually released into the wild. The sad truth is that Keiko didn't fare well in the wild. His long exposure to warm and chlorinated water apparently reduced his capacity to fight off pneumonia as he died of it on December 12, 2003 at the age of 26—what should have been the prime of his life—in Taknes Bay, Norway. He was buried in secrecy in Halsa, but Norwegian children built a wooden cairn to mark his grave. What life would he have had living always free?

Family Phocoenidae Gray, 1825 **porpoises**

"What's the difference between a porpoise and a dolphin?" This is a common question on Whales and Trails adventures. Porpoises heads have no beak; smallish dorsal fins; smallish in size (in comparison to dolphins); and, spade-shaped teeth. The family includes seven genera, four of which are extinct and 13 species, seven known only by fossils.

Phocoena Cuvier 1816

foe-SEE-nuh Greek φώκαινα *phōkaina*, big seal, as described by Aristotle; this from φώκη *phōkē*, seal, later porpoise.

Taxonomy: Linnæus first named this *Delphinus p.* in 1758 but later in the same year he moved it into a new genus just for it, *Phocoena*. It wasn't fully described until Jean Léopold Nicolas Frédéric Cuvier published it in 1816. It includes four well-defined species including the critically imperiled vaquita of the Gulf of California.

Phocoena phocoena vomerina Gill, 1865, harbor porpoise, cheech

Latin vo-MARE-ih-nuh, American vo-mur-EYE-nuh Lain *vomer*, plowshare, referring to a bone in the nasal septum that divides the nostrils.

Taxonomy: As the worldwide population of harbor porpoise was studied, two subspecies were created, *P. p. phocoena* in the North Atlantic and our eastern North Pacific named by Gill in 1865. A third Pacific population is distinct but remains unnamed. *P. p. relicta* Abel, 1905 was named for the Black Sea population that is genetically identical to Aegean Sea animals and may not be distinct. Mitochondrial evidence indicates the Atlantic and Pacific populations have been separated for about one to five million years.

Wang, J.Y., D.E. Gaskin & B.N. White. 1996. *Mitochondrial DNA analysis of harbour porpoise*, Phocoena phocoena, *subpopulations in North American waters*. Canadian Journal of Fisheries and Aquatic Sciences 53:1632-1645.

Birkun Jr., A.A. & Frantzis, A. 2008. Phocoena phocoena ssp. relicta. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 28 January 2015.

There are five North American records of white harbor porpoise some thought hybrids with Dall's porpoise, but are apparently an anomalous color morph of the species. "In total, 34 records were found from the world seas: the Black Sea, North Sea, Baltic Sea, North Atlantic Ocean and North Eastern Pacific Ocean. According to these records, three patterns of pigmentation were suggested."

Keener, W., I, Szczepaniak, A. Ü, M. Webber & J. Stern. 2008. *First records of anomalously white harbor porpoises* (Phocoena phocoena) *from the* Pacific Ocean. Journal of Marine Animals and Their Ecology 4(2).

Tonay, A.M., S. Bilginc, A. Dedea, A. Akkaya, T. Yeşilçiçekc, Ö. Kösec, Y. Ceylan. 2012. *First records of anomalously white harbour porpoises* (Phocoena phocoena) *in the Turkish seas with a global review*. Hystrix, Italian Journal of Mammalogy. 23(2): 76–87.

Notes: This is not the animal that generates great excitement, for two reasons: the animal is quite common (world-wide estimate is 500,000 but very poorly supported) and very skittish. While found in the very same places as most of us humans, this porpoise is shy and intolerant of close approach. The most common sightings are of a porpoising animal with the plain black dorsal fin. They are easily identified with their all black back and small, triangular dorsal fin. Only once have I see any of the white underside as two almost breached on our port side off south Shelter Island in July of 2009. On September 6, 2009 while approaching Hump Island, the St. Philip comes upon four porpoise at our bow that remain for about six "porpoising" humps before disappearing for a most unique experience with this shy animal. In 2014 I did not see a single harbor porpoise!

With great intentions after learning about this species from Beth Matthews of UAS, I ended up not taking any notes at all on my sightings in 2009 and things haven't improved much over time. I probably see harbor porpoise about a dozen times a year. My first sighting was from the

Auke Village Recreation Area trail early in May of 2009 when three were "porpoising" about 200 meters offshore.

Beth's research shows that this common animal needs more study, but she knows this from what she's learned so far: 50% of the pups die and they only spend 3 to 6 weeks with their mother after birth in mid-May to June. There has been a decline in the population of Glacier Bay porpoises of 70%, probably due to increased predation by transient orca pods or an increase in the number of shark and Steller sea lion in the bay. The female reaches sexual maturity at 3 to 5 years of age, then has a single calf a year for the next 10 or so years until they reach the end of their normal lifespan at about 15. They eat small schooling fish, squid and octopus. The animals are not social and are very shy.

Phocoenoides Andrews 1911

Green φώκη *phōkē,* seal to Latin *phoca*, seal + Greek όιδες *-oides*, resembles, looks like.

Taxonomy: A monotypic genus. Frederick W. True of the United States National Museum, now part of the Smithsonian Institution, first considered it a *Phocoena* but Ethan Allen Andrews encountered a very unusual porpoise he thought new to science from Japanese whalers in 1910. He determined it was sufficiently distinct in 1911 to create the genus *Phocoenoides*.

Andrews, R.C. 1911. *A new porpoise from Japan*. Bulletin of the American Museum of Natural History, 30:31-52.

Phocoenoides dalli (True, 1885), Dall's porpoise, false killer whale

Honorific for William Healey Dall (1845–1927), an American naturalist, a malacologist (student of algae), and one of the earliest scientific explorers of interior Alaska.

Taxonomy: Two morphologically distinct populations exist but without great genetic distance. The western Pacific population was named *P. truei* Andrews 1911, but recent molecular research shows it no more distinct than forms included in the more widely ranging populations of *P. dalli*.

Escorza-Treviño, S, L.A. Pastene & A.E. Dizon. 2004. *Molecular analyses of the* truei *and* dalli *morphotypes of dall's porpoise (*Phocoenoides dalli*).* Journal of Mammalogy, 85(2):347–355.

Since about 1994, odd porpoises encountered in the coastal waters off British Columbia have puzzled observers. A carcass was recovered in the San Juan Islands of Washington's Puget Sound in 2011. Recent genetic study has provided evidence these animals are hybrids between *Phocoenoidies dalli* and *Phocoena phocoena*. In all cases studied, the father was a harbor porpoise and the mother a Dall's porpoise. As they appear to becoming more frequent, it will require a reassessment of *Phocoenoides* as a valid genus and a likely return of it into *Phocoena*.

Willis, P.M., B.J. Crespi, L.M. Dill, R.W. Baird & M.B. Hanson. 2004. *Natural hybridization between Dall's porpoises* (Phocoenoides dalli) *and harbour porpoises* (Phocoena phocoena). Canadian Journal of Zoolology 82: 828–834 doi: 10.1139/Z04-059.
First ever hybrid porpoise recovered in San Juan County, May 26, 2011, The Island's Sounder http://www.islandssounder.com/news/122622944.html

Notes: This is an exciting animal to see with its distinctive black and white dorsal fin, giving rise to the "false" name. While all the illustrations make them look large, when I see them they don't seem particularly large, slightly shorter than the average human at up to 2.3 meters . Built very stocky, to 200 kg in weight, they are not the image of streamlined dolphins I have in my mind. Their heads are remarkably tiny and seem out of proportion to the rest of their body, another feature that leads to identification at a glance if seen. Usually gregarious, I see groups of three to ten. The most common way I spot them is by their unique "rooster tail".

I've come across this statement frequently: "The rooster tail creates a hollow airspace in the water which allows the porpoise to continue breathing while swimming". The variations are extremely minor ("whilst" instead of "while"). It seems one of those "truisms" that sound good and develop a life of their own. None of them are attributed and the skeptic in me questions if this is so. When I watch them re-enter the water after porpoising, I do not see a "bubble" of air go with them that would allow them to breath under water. Out of water, well they're in the air!

While common, I don't see them but perhaps once every 10 or 12 trips out on the water. I've seen them in all waters we frequent. They make quick appearances then just as quickly disappear. For a stocky and small animal, they can really swim fast as the move out of sight in seconds rather than minutes. While harbor porpoise are not social, I've never seen a single Dall's porpoise but always a small group of 3 to 12 of them. Occasionally they will "play" with the waves our boats create. One one trip with Captain Jen, we revved the engines up and made about a dozen big circles and seven "surfed" in the waves. Jen called it a "porpoise party", a wonderful phrase I've adopted. Many accounts indicate this happens with fast boats and their waves. The bottom right photo from July 28, 2010 shows the fishing vessel Morgan Ann ploughing its way through the waters just offshore of Mansfield Peninsula in Saginaw Channel with two "playing" with the bow wake. The boat is only going about 8 knots, but its bulk is enough to create a fore wave the porpoise can exploit.

Dall's porpoise have two main predators. Humans represent the largest take by far. Japan has hunted the porpoise for more than a century and currently take some 5,000 a year (below their current quota of 14,055). "In just 50 years (1963-2010), more than half a million (594,028) Dall's porpoise have been removed from these populations. Although 2007-2011 has seen progressive quota reductions, catch limits remain at unsustainable levels..."

Less dramatic but with significant effect are those taken as bycatch from fisheries. "In the past bycatch rates have been significant - likely killing tens of thousands of Dall's porpoises in the 1970s and 1980s." "It was estimated that these fisheries killed 4,000 porpoises per year in the North Pacific until a UN moratorium banned driftnets in 1993." The good news is bycatch is apparently on a dramatic downward turn, but numbers are incredibly difficult to determine.

Baulch, S. & C. Perry. 2011. *Review of data available on the Dall's porpoise* (Phocoenoides dalli) *in Japanese waters*. International Whaling Commission SC/65a/SM11.

Their main, and perhaps only, marine predator is the orca. The bottom right photo shows an α-female transient orca rising out of the water with a mature Dall's porpoise in its jaws. I took this photo on a miserable July 6, 2010. For a full account, see my notes on orca. It is totally unknown how may porpoise are taken by Orca and estimates are close to useless.

Beth Matthews tells us that estrus occurs almost immediately after birth! So they can mate quickly and the females are pregnant for nearly their whole life of about two decades. They have a delayed implantation of 3-4 months after mating and gestation is something under a year but not exactly known.

Order Lagomorpha Brandt 1855*, rabbits, hares and pikas*

Greek λαγος, *lagos*, hare + μορφή, *morphē*, form

A sister clade to rodents, lagomorphs have a second set of smaller upper incisors (sometimes called peg teeth) that grow just inside the outer, much larger. Like rodents, they arose in the Paleocene just after the dinosaurs, but did not radiate and exploit as successfully as there are only two extant families, the Leporidae and the Ochotonidae.

Family Leporidae Fischer de Waldheim 1817**, rabbits and hares**

United by their elongated ears, very long rear legs and rounded tails, leporids include 43 genera, 31 from the fossil record.

Lepus Linnæus 1758

Latin LEH-pus, American LEE-pus Latin *lepus*, hare

Lepus is a genus of 32 currently recognized species in Africa, Eurasia, North America, and the Japanese archipelago. Hares differ from rabbits by spending all their time above ground, bearing precocious young able to fend for themselves shortly after birth, larger in size with usually much longer ears and are mostly solitary.

Lepus americanus Erxleben 1777, snowshoe hare, varying hare

um-mare-ih-cay-nus of or pertaining to the Americas; dall-ee Honorific for William Healey Dall (1845–1927), an American naturalist, a malacologist (student of algae), and one of the earliest scientific explorers of interior Alaska.

<u>Taxonomy</u>: "There is no evidence from the morphometric analyses for classifying populations into the 15 subspecies currently recognized." If recognized, ours falls under subspecies *dalli* Merriam 1900.

Nagorsen, D.W. 1985. *A morphometric study of geographic variation in the snowshoe hare* (Lepus americanus). Canadian Journal of Zoology, 63(3): 567-579, 10.1139/z85-083

<u>Notes</u>: 2011 proves to be my year for seeing this—supposedly common—hare around the Glacier for the first time ever. Daughter Bess tells me she sees them all the time, but that's mostly in winter. On a hike out to Nugget Falls I find a mostly white hare in the lichen-encrusted scrubby flats on the way back on May 13 and manage to capture it with my iPhone 4 camera. This photo is highly cropped from that image, but shows the molting pattern from white to brown. I spot them on two other trips to Nugget Falls and even Annette gets to see one when she and I hike out there on July 12 when I have the Canon 7D with me and capture the image of the hare in full summer brown. I'm fascinated by the black strip down the back of the hare, a feature I see in only a very few images of the summer pelt of this species. Is this a characteristic of the *dalli* subspecies in Alaska?

Order Rodentia Bowdich, 1821 ***rodents***

Latin, *rōdēnt*, gnawer; one who gnaws

Nearly everyone can recognize a rodent and I think there are two reasons for this: rodents are the most successful of all the mammals being found on all continents except Antarctica with by far the most diverse forms so all have experience with them; and, the have two continuously growing incisors in both the upper and lower jaws that are conspicuous. They arose in the Paleocene almost immediately after the dinosaurs on the supercontinent Laurasia. Somehow, they made it to other continents already separated by oceans, probably by rafting. Carleton and Musser (2005) in *Mammal Species of the World* include 33 families, 481 genera and 2277 species.

Family Castoridae Hemprich, 1820 **beaver**

A family of one extant genus with two species but a myriad of fossil animals that arose during the Eocene and reached giant (bear) size in the Pleistocene. While adapted to a semiaquatic life, the wood-chewing teeth developed late in their history.

Castor Linnæus 1758

KAS-tur Greek κάστωρ *kastōr*, beaver.

A genus of two species, ours and the European beaver, *C. fiber*. Very unique among rodents, their phylogeny has recently been clarified with their sister group being four species of tree squirrel from Africa!

> Around 54 mya (CI: 44–64 mya), a phylogenetic lineage leading to beavers diverged from its common ancestor with Anomaluromorpha (*Anomalurus* and *Pedetes*). Thus, beavers probably have a very long evolutionary history, which might explain their ecological and morphological peculiarities. ...
>
> Similar to the divergence of the family Castoridae, the divergence time of the two extant beaver species has not yet been estimated with much precision. The origin of the extant beaver genus *Castor* has been suggested to lie in Eurasia at some time between 9.7 and 5.2 mya based on the fossil record and similarities with Steneofiber. However, since there is overlap with the earliest appearance of *Castor* in North America (6.6 mya to 7.5 mya), the geographical origin of *Castor* remains uncertain.

Horn, S, W. Durka, R. Wolf, A. Ermala, A. Stubbe, M. Stubbe & M. Hofreiter. 2011, M*itochondrial Genomes Reveal Slow Rates of Molecular Evolution and the Timing of Speciation in Beavers (*Castor*), One of the Largest Rodent Species*. PLoS ONE 6(1)

Castor canadensis Kuhl 1820, North American beaver, s'igeidí

ca-nuh-DEN-sis Of or pertaining to Canada.

FEE-us Classic Greek φευς *phaeus* of the hue or color of twilight, in reference to the dusky color

Taxonomy: With a range of all the wooded lands of North America, our beaver has been divided up into 24 subspecies. If followed our is subsp. *phaeus* Heller 1909 whose range is poorly mapped but the type specimen was taken from Pleasant Bay on Admiralty Island. Many modern treatments, including Wilson and Reeder, refrain from using subspecific taxa as most of the named subspecies are based in relatively minor morphologic differences listing all the taxa as synonyns.

Notes: Evidence of beaver is ubiquitous in the Mendenhall Glacier Recreation Area. Beaver dams, felled trees, lodges and paths are common. The beaver are particularly active in the Steep Creek viewing area where dams are constantly being constructed by the beaver and demolished by the Forest Service or beaver patrol volunteers. In 2009 I walked the dike approach trail to the Trail of Time the first week of April and just nine days later walking the same trail found an eight-inch diameter black cottonwood (*Populus trichocarpa*) felled. There are fences around most of the larger cottonwoods to prevent them being felled by the "eager beavers".

To see a beaver is easy when walking or biking the Dredge Lakes in the late afternoon or evening. One's sheer presence will virtually guarantee the amazingly loud sound that the slap of their tail makes when it hits the water. They occupy all of the lakes here and in the evening it is almost impossible *not* to see at least one. The beaver in the pond on the Moraine Ecology Trail are a bit more cagey and are not easily seen. In 2010 they occupied the lodge with the infrared camera and delighted all those who watched their goings-on from the pavilion. They did not occupy this lodge in 2011. There are many small bank lodges that are a bit harder to find than the big stick lodge. Every once in a great while a beaver can be seen swimming in Mendenhall Lake and once I even saw one sitting on an iceberg! These were all juvenile and must have been just out wandering about seeing what the world was like.

The Forest Service regularly opens parts of the dams of Steep Creek in order to allow the sockeye and coho salmon an unimpeded swim to their spawning grounds. I've seen the two dams at the end of Steep Creek approach three feet in height and am sure this presents a significant obstacle for the salmon. In 2010 the dam on Steep Creek next to Glacier Spur Road was completely demolished and has been kept open since.

Family Erethizontidae Bonaparte, 1845 **porcupine**

New World porcupines are quite distinct from their Old World relatives and share but a very distant common ancestor. Four genera with 17 species are found in South America while North America has only one. Linnæus placed all the world's porcupines in the genus *Hystrix*. Somewhere around 32 million years ago, the common ancestor to all New World caviomorphs arrived in North America. How has not been established. It may have arrived via Beringia from Asia or by rafting across the Atlantic from Europe. Once here, only *Erethizon* colonized North America and those that exploited South America literally exploded with diversity.

Voss, R.S., C. Hubbard & S.A. Jansa. 2013. *Phylogenetic relationships of New World porcupines (Rodentia, Erethizontidae): implications for taxonomy, morphological evolution, and biogeography*. American Museum Novitates, February 15, 2013, Number 3769. ISSN 0003-0082.

Erethizon F. Cuvier 1823

A monotypic genus with seven subspecies is found throughout the wooded areas of North America.

Latin air-IH-thih-zun, American, air-it-THIGH-zun		Latin *erithizo*, to irritate.

Erethizon dorsatum (Linnæus, 1758) subspecies ***nigrescens*** J. A. Allen, 1903, porcupine, xalak'ách'




door-saw-tum		Latin *dorsum*, back, range, ridge; referring to the mantle of quills along the dorsal surface of the animals. The full species name thus describes an "animal with an irritating back".

nigh-greh-sens		Latin *niger*, black + suffix -*scens* to mean blackening.

"Porcupine" comes from late Middle English *porcupyne*, variant of *porcapyne* derived from Middle English *porke despyne*, derived from the old French word *porcespin*, spiny pig, ultimately derived from the Latin *porcus*, pig, hog; tame swine + Latin *spina*, spine; thorn; spine, backbone, back; thorn, spine, prickle. This became "quill pig". Universally pronounced porky-pine, it certainly results in a euphonious name that seems entirely appropriate for this pig-like rodent full of quills.

Taxonomy: The orthographic variant *dorsata* comes from Linnæus' *Hystix dorsata* and is currently used by *Wilson & Reeder's Mammal Species of the World* and ITIS. Virtually all other sources use *dorsatum* based upon the fact that *Erethizon* is a Greek participle, not a Latin noun, making *dorsata* invalid.

Seven subspecies have been named, with two in Alaska. Ours, *E. d. nigrescens* occupies the Cordilleran Pacific coast mountains while *E. d. myops* occupies the interior of Western Canada and Alaska north of Prince William Sound.

Notes: This is one of the most common mammals of Juneau and I see them—or evidence of them—frequently wherever there are trees (that means nearly everywhere!). Since their quills are their most "endearing" quality, I begin my notes with them.

On April 22, 2009 while out on the Rainforest Trail, I was deeply involved examining some plant that now I have no recollection of. While crouched on the trail, leashes around my wrist, my grand dog Sugar begins pulling very hard on my right arm. I look up and there's the largest porcupine I've ever seen right on the trail just a foot in front of Sugar's nose! Since she's had several encounters with this beast resulting in veterinarian visits to remove the quills, I'm *so* happy she's on a leash and that I'm able to hold her back. Since the quills are such an effective defensive weapon, these animals can afford to be slow. As long as they can keep their back end toward the threat, they are pretty sure to survive and encounter with a predator. Humans—those not in vehicles—are not much of a threat as the animals pay very little attention to us, or even Sugar.

Porcupine quills are amazing structures. They are extremely sharp on the distal end but remarkably so as well on the end attached to the skin. Dark on the distal end, white on the proximal end, these specially adapted hairs are designed to be released easily from the follicle. Looking at these photos, the mechanism is pretty obvious: the thick quills rapidly reduce in diameter at the skin to a very thin strand that is easily broken and released. The sharp end easily penetrates just about anything short of metal, and once in is difficult to pull out. The black end of the quills are covered with plates shingled downward, away from the point. While not barbs in any way, they have the same effect of holding the quill in place. Easy in, hard out.

> The pelage of the porcupine is composed of quills, hair, and underfur. The quills may be up to 75 mm long, 2 mm in diameter and exceed 30,000 in· number (Hall, 1946; Spencer, 1950a). There are no quills on the undersurface of the body. Each quill is yellowish white with a tip that varies from brown to black. Po-Chedley and Shadle (1955) described the growth patterns of the quills in considerable detail. The quills grow in groups 2 to 5 mm apart, and occur in transverse rows across the body. The longest quills are on the rump, the shortest on the cheeks. Quills are replaced after being lost or pulled out, with the replacement beginning in 10 to 42 days (Po-Chedley and Shadle, 1955). Initial growth is at the rate of .5 mm per day, and growth may continue for a period of 2 to 8 months (Costello, 1966). Whitney (1931) reported that not all quills are barbed. In winter, underfur may outgrow and conceal the quills. Young animals tend to be darker than adults and their pelage resembles the winter coat of adult animals (Goodwin, 1935). Animals usually molt during summer (Costello, 1966) and the underfur becomes absent or short (Hall, 1946). The color of hair of the eastern subspecies is more variable than that of other races, ranging from coal black to albino (Dodge, 1967). Anderson and Rand (1943) indicated that there is considerable geographic variation in the color of the hair throughout the range of this mammal.

Woods, C.A. 1973. *Erethizon dorsatum*. Mammalian Species No. 29, The American Society of Mammalogists. 1-6, 2 figs.

Nearly every time I encounter a porcupine with a group, at least one person will exclaim "I didn't know they could climb!" We find the at least as often up in the trees as down on the ground and I'm sure if I kept track of my sightings, the majority would be in trees. Along the Steep Creek trail they are nearly always up in the black cottonwood (*Populus trichocarpa*) trees, chomping on what seems to be their favorite food here. In spring, they also devour a large amount of pussy willow buds.

Porcupine have two anatomical features that allow them the freedom of the trees: strongly clawed forelegs and a very stout tail. On the way up, their claws provide their main path to security, but on the way back down it's the tail. As I watch them, I nearly always think of woodpeckers and how they use their tail as the third leg of a tripod. Porcupine do the same thing!

Every time I see porcupine pooh I can't help but sing to myself Neil Diamond's song "Porcupine Pie" substituting "pooh" for "pie"! Porcupine scat is abundant on both the Perseverance and West Glacier trails. Since they eat mostly wood, their poop is mostly wood, and forms in nearly the same cylindrical shape as the commercially prepared wood pellets and could probably be sold as pellets for stoves! It looks and feels much the same. That porcupines have designated bathrooms with many using the same location for defecating is a truth that becomes obvious in porcupine country. This large Sitka spruce (*Picea sitchensis*) is in the Perseverance basin and has obviously been used for decades.

In all my walks near the glacier, I've never found a tree girdled by porcupines. On the Trail of Time and Under Thunder there are several trees about two-thirds girdled. Do the porcupine know if they eat all the way around the tree it will die? That would certainly be evidence of a higher level of thinking than we credit most rodents with. I'm inclined to think it's simply a coincidence. There are so many available trees here, they probably forget which one they're working on and move to another, thus preventing full girdling. It is very easy to find porcupine trees as the marks of the twin incisors are very apparent with every bite they make.

It's a very different scene up in the flats of Sheep Creek's valley. This "forest" of black cottonwood (*Populus trichocarpa*) and Sitka spruce (*Picea sitchensis*) has been recently (these photos are from June 19, 2011) decimated by what appears to be an overabundance of porcupine. While the cottonwood are abundant, many of them have rather thick bark. The Sitka spruce have much thinner bark. It seems to come to a choice: work through the tough bark or quickly chew away the easy bark? It seems they've done both. These trees will not survive the girdling and will die. With three feet of cambium gone, there is no way for the trees to reconnect all the vascular channels to the leaves above. The curious thing to ponder, is once the trees are dead, there is nothing there for the porcupine. While these are young trees, they are probably all many years older than the porcupines. This strikes me as a forest out of equilibrium that will soon result in no food for the porcupine.

This porcupine fell and did not survive. It's demise allows me to examine the body. Quills are all over the place! Many of them punctured its body. While good climbers, some porcupine climb further than their skills and fall, as this one did. Very curiously, their quills have antibiotic properties having a coating of free fatty acids that "strongly inhibited the growth of six grampositive bacterial strains". What this means is that when porcupines fall—a very common experience—they don't suffer from being poked by their own quills:

> It is suggested that porcupines benefit from the quill fatty acids: evidence from healed fractures of major skeletal components (35.1% incidence in 37 skeletons examined) suggests that porcupines fall relatively frequently from trees. Quill antibiotics may limit self-injury suffered in such falls.

Uldis R., D.C. Locke & N. Vatakis. 1990. *Antibiotic properties of porcupine quills*. Journal of Chemical Ecology. V. 16, Issue 3, pp 725-734.

The incisors of the dead porcupine give me some clues as to how they work at eating hard tree bark and wood. Only the outer yellow-orange surface has enamel, the inner surface is simply dentin. Similar to the other wood-eating rodent, the beaver, this structure provides them with a constant sharp edge to cut with. The softer dentin wears away faster then the enamel, so a thin edge of hard material is always in front. As the wood eating wears away at the dentin, the harder enamel breaks, providing a constant supply of sharp edges capable of cutting even the hardest of woods. Neither porcupine nor beaver are interested in the dead bark, they must cut through it to expose the soft and nutritious cambium layer.

Family Cricetidae J. Fischer, 1817 **hamsters, voles, lemmings, New World rats and mice**

Taxonomy: The Cricetidae is often split into smaller families, if so, this vole would be in the Muridae. As this family has been traditionally circumscribed it includes members who make it polyphyletic. Cricetidae is monophyletic and thus the preferred grouping.

Myodes Pallas 1811

my-oh-dees Greek μυοδες *myodes*, name for keyhole mouse.

Myodes rutilus (Pallas, 1779) northern red-backed vole, kag̱áak

ROO-tih-lus Classical Latin *rutilus*, red, golden red, reddish yellow.

Taxonomy: synonym = *Clethrionomys rutilus* (Pallas, 1779). The genus *Myodes* was named by Pallas in 1811 and typified with *Mus rutilus* by Lataste in 1883 since Pallas did not designate a type. *Myodes* is thus the oldest name for this specific vole.

Wilson, D.E. & D.M. Reeder (editors). 2005. Mammal Species of the World. A Taxonomic and Geographic Reference (3rd ed), Johns Hopkins University Press.

Notes: Since I'm at the front of the line of folks on the trails, I get to see things people behind me don't. This little rodent is abundant and I often see it scurrying across the trail in front of me. It is, by all accounts I find, the most common mammal of the rain forest. With the very short views I get of them, they are much chunkier than deer mice or other small mice that I'm used to seeing. Even when running, their backs are far more arched than deer mice and the legs appear much shorter as well. These are probably adaptations to the boreal environment, reducing their surface area for heat loss.

Family Sciuridae Fischer de Waldheim, 1817 **squirrels**

Marmota Blumenbach 1779 marmots and woodchucks

mar-MOW-tuh Etymology uncertain; c.1600, from French *marmotte*, alpine rodent.

Marmots form a monophyletic genus of 14 or 15 large ground squirrels of the Holarctic (temperate and boreal Eurasia and North America) with five or six species. The three or four western species [with the exception of the Alaska or Brooks Range marmot (*M. broweri*)] form a distinct clade and gave been named as subgenus *Petromarmota* Steppan, Akhverdyan, Lyapunova, Fraser, Vorontsov, Hoffmann & Braun 1999. There is some question of whether or not *M. vancouverensis* should be included in our *M. caligata*.

> The cyt b data strongly support the monophyly of *Marmota* and a western montane clade in the Nearctic. Although some other scenarios cannot be rejected, the results are consistent with an initial diversification in North America, followed by an invasion and subsequent rapid diversification in the Palearctic.

Steppan, S.J., M.R. Akhverdyan, E.A. Lyapunova, D.G. Fraser, N.N. Vorontsov, R.S. Hoffmann & M.J. Braun. 1999. *Molecular Phylogeny of the Marmots (Rodentia: Sciuridae): Tests of Evolutionary and Biogeographic Hypotheses*. Systematic Biology 48(4):715–734

Marmota caligata (Eschscholtz, 1829) subsp. *caligata*, hoary marmot


Latin kah-LIH-guh-tuh, American cal-ih-GAY-tuh Latin *caligatus,* common soldier; private; wearing army boots; booted; in reference to their dark feet.

The grayish-white mantle of this marmot gives it the name hoary; *har* coming from an Old English for gray, venerable, or old. It came to be applied to fog that freezes as hoarfrost giving a gray-white look appropriate for this creature.

Taxonomy: Three subspecies have been named with *M. c. caligata* occupying all of our area. *M. c. okanagana* occupies the interior mountains and meets *M. c. caligata* in western British Columbia. *M. c. cascadensis* occpies a much smaller range of the Cascade and Coast mountains from the Columbia River to the Gardner Canal. Curiously, from there to Portland Inlet and east to the Kispoix River there are no marmots. My identification of subspecies is strictly from geography.

<u>Notes</u>: The two places where I've seen marmots the most are very different: the Alpine Loop Trail on Mount Roberts and the north shore roadside on Douglas Island. The only two places I've heard their whistle here is in the Silverbow Basin on the Perseverance Trail and on the Alpine Loop Trail. They are probably the most common animal to be encountered on a drive "out the road" to Echo Cove. I've never seen a marmot on the glacial outwash plain, but as soon as the snow melted the scat from the wolves there is full of hoary marmot hair. The wolves could have captured the marmots elsewhere and simply defecated here leaving the evidence of marmots. On the Douglas Road they are really too tame for their own good and some end up as road kill.

It seems this large rodent can tolerate small amounts of corn lily (*Veratrum viride*) with its highly toxic alkaloids. When the young plants are emerging from the ground, at about 1 dm, many of the top 1 to 2 cm of the shoots are bitten off. I've never seen a marmot do this, but along the Alpine Loop Trail they are the most obvious mammal and I'm concluding they're the ones doing the eating. When the bud elongates to its full height, all of the leaves are cut off almost like a tailor with pinking shears. Had I not seen the nipped buds early in the season, it would take some serious detective work to figure out this. Since all the leaf buds are already formed in the emerging sprout, the bite takes some off every one of them.

Tamiasciurus Trouessart 1880, pine squirrel

tay-me-uh-sigh-ur-us Greek ταμίας *tamias,* cashier + σκίουρος *skiouros*, squirrel hence "hoarder squirrel"

A strictly North American genus with three species. A single fossil identified to this genus was found in southeastern China. The three extant species are believed to have separated some 12 million years ago in the Late Pleistocene or early Holocene. There is a very narrow area of hybridization between *T. douglassii* (Douglas tree squirrel or chickaree) and *T. hudsonicus* where their ranges overlap. There is sharp difference in genetic distance away from the contact zone.

Arbogast, B.S., R.A. Browne & P.D. Weigl. 2001. *Evolutionary Genetics And Pleistocene Biogeography Of North American Tree Squirrels* (Tamiasciurus). Journal of Mammalogy, 82(2):302–319.
Chavez, A.S., C.J. Saltzberg & G.J. Kenagy. 2011. *Genetic and phenotypic variation across a hybrid zone between ecologically divergent tree squirrels* (Tamiasciurus). Molecular Ecology 20, 3350–3366.

Tamiasciurus hudsonicus (Erxleben, 1777) subsp. ***picatus*** Swarth, 1921, red squirrel, American red squirrel, kanals'áak

hud-SAW-nih-cuss; pih-CAY-tus Of or pertaining to Hudson Bay. Latin *picātus*, pitchy; presumably from the pitch from the cones it eats.

Taxonomy: With an almost complete boreal forest range in North America variations in this squirrel have given rise to 25 lower taxa names. Juneau marks the northernmost range of *T.s. picautus*, a cordilleran subspecies. *T.s. petulans* reaches south to the Lynn Canal and Glacier Bay. I use geography as my criteria for identification. Swarth gives these characters is the description of his new subspecies:

> As regards to color, *Sciurus h. picatus* is dark as compared to *petulans* ... The differences are most apparent in winter pelage; in the summer coat the two forms are closely similar in general appearance, differing on in certain minor details. ... In *picatus* the reddish color is generally brighter, there is a fairly well-defined hazel dorsal strip and the center of the tail below is reddish. The black lateral stripe on the body is much more prominent. In all pelages *picatus* has the tip of the tail much less extensively black ...

Swarth, H.S. 1921. *The red squirrel of the Sitkan district, Alaska*. Journal of Mammalogy, 2(2).

His description seems to match my observations pretty well In our area we just may have an overlap of the two.

Notes: "What wildlife are we likely to see?" is a common question as we start our hikes. The answer isn't easy as folks want to see something exotic or unique to Alaska like a bear or mountain goat. About the only mammal I can count on seeing on every hike is the red squirrel. Since they are so common, so active and so vocal, it's easy to find them.

My favorite interpretive moment with them is when I find Sitka spruce (*Picea sitchensis*) cones that have been stripped by the squirrels. I pick one that hasn't been stripped and encourage others to do the same, then to pull off the scales of the cone to expose the small twin seeds under each. It is not easy to do. Yet when we are at a midden (bottom right photo) there are thousands of stripped cones, all done perfectly. I then say if you do most anything a thousand times you become an expert at it and tell them our little red squirrels do this a thousand times a day every day all summer! That's why they're so good at it. Plus its their food source for winter (they don't hibernate but are active in a subnivean world) and the middens make for great insulation that many other animals (notably the red-backed vole) take advantage of as well. Underneath 1 to 2 meters of snow, the large piles of shredded cones probably keep the temperature near the freezing mark, if not slightly above from the heat of the animals, making it a rather comfortable place out of the winds and snow.

These guys probably eat some of the fall mushrooms as many of the abundant Russulas have twin teeth marks that are the size of the squirrel Do they taste peppery to them like humans?

As the bumper crop of Sitka spruce (*Picea sitchensis*) cones ripened in the summer of 2014, the forest floor was littered with the branches stripped of ripe cones. There were so many cones that the squirrels seemed to choose only the ones they very much liked and discarded the rest. Many branches were full of unopened or unripe cones that showed no sign of eating. In 2013, a sparse cone year, finding any nearly ripe spruce cone was a minor miracle as all were devoured. It will be interesting to see if our population increases in the next couple of years from the incredible amount of food available for these hearty eaters this year!

Chart of on-the-water locations

This is a cropping of the National Oceanographic and Atmospheric Administration's Chart 17300, *Stephen's Passage to Cross Sound, Including Lynn Canal*, that covers the northern—and most frequently travelled—bodies of water for my marine wildlife observations.

Gastineau Guiding's water tours leave from Auke Bay and most trips travel through Favorite Channel or Saginaw Channel or both when circumnavigating Shelter Island.

Places to take note of that are repeated in my notes:

Bodies of Water: Amalga Harbor, Auke Bay, Barlow Cove, Favorite Channel, Fritz Cove, Lena Cove, Lynn Canal, Pearl Harbor, Saginaw Channel, Stephen's Passage, Tee Harbor and Young Bay.

Cuts: Indian Island, Barlow Islands, Coghlan, North Pass.

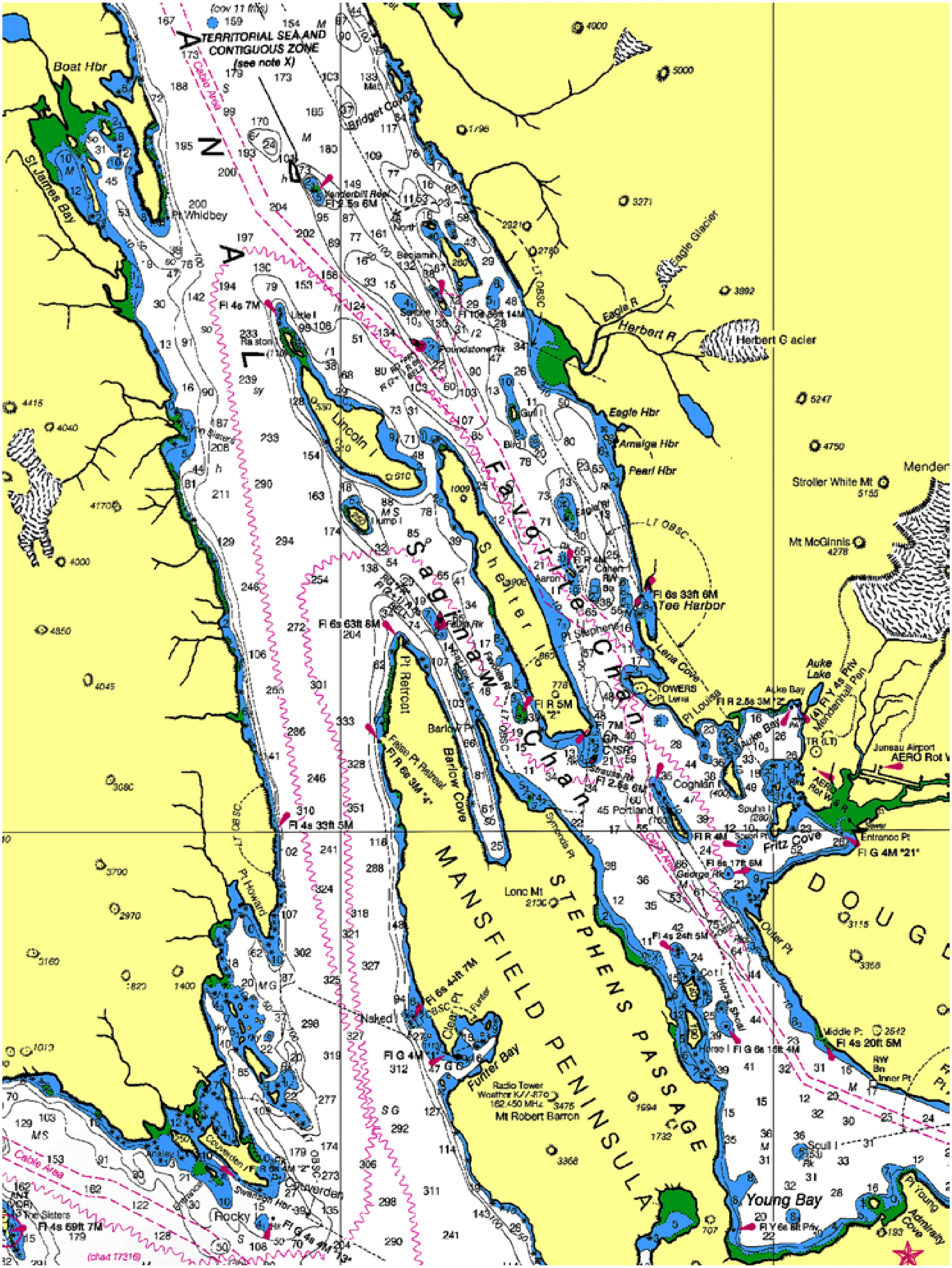
Islands: Aaron, Barlow Islands, Benjamin, Bird, Coghlin, Cohen, Colt, Gull, Horse, Hump, Indian, Lincoln, Little, North, Portland, Ralston, Scull, Sentinel, Shelter and Spuhn.

Reefs & Rocks: Cohen, Eagle, Favorite and Vanderbilt reefs, George & Gibby rocks.

Buoys, & Cans: Coghlin, Strauss Rock and Gibby cans; Faust Rock and Poundstone Rock bell buoys.

Lighthouses: Point Retreat and Sentinel Island

Land Points: Barlow Point, Boy Scout Beach, Eagle Beach, False Outer Point, False Point Retreat, Lena Point, Lynn Sisters, Middle Point, Outer Point, Point Louisa, Point Retreat, Point Young, Sand Spit and Symonds Point.


TERRITORIAL SEA AND CONTIGUOUS ZONE (see note X)
Boat Hbr
St James Bay
Pt Whidbey
Vanderbilt Reef
Bridget Cove
Benjamin I
Sentinel I
Poundstone Rk
Little I
Ralston I
Lincoln I
Gull I
Bird I
Eagle Hbr
Amalga Hbr
Pearl Hbr
Eagle Glacier
Eagle R
Herbert R
Herbert Glacier
Stroller White Mt
Mt McGinnis
Favorite Chan
Saginaw Chan
Shelter I
Hump I
Aaron I
Tee Harbor
Pt Stephens
Lena Cove
Pt Lena
Pt Louisa
Auke Bay
Auke Lake
Mendenhall Pen
Juneau Airport
Pt Retreat
False Pt Retreat
Barlow Pt
Barlow Cove
Symonds Pt
Portland I
Coghlan I
Spuhn I
Fritz Cove
Entrance Pt
George Rk
Pt Howard
MANSFIELD PENINSULA
STEPHENS PASSAGE
DOUG
Long Mt
Naked I
Funter Bay
Mt Robert Barron
Radio Tower
Outer Pt
Horse Shoal
Horse I
Middle Pt
Inner Pt
Scull I
Young Bay
Pt Young
Admiralty Cove
Couverden I
Swanson Hbr
Couverden
Rocky I
The Sisters
Cable Area

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