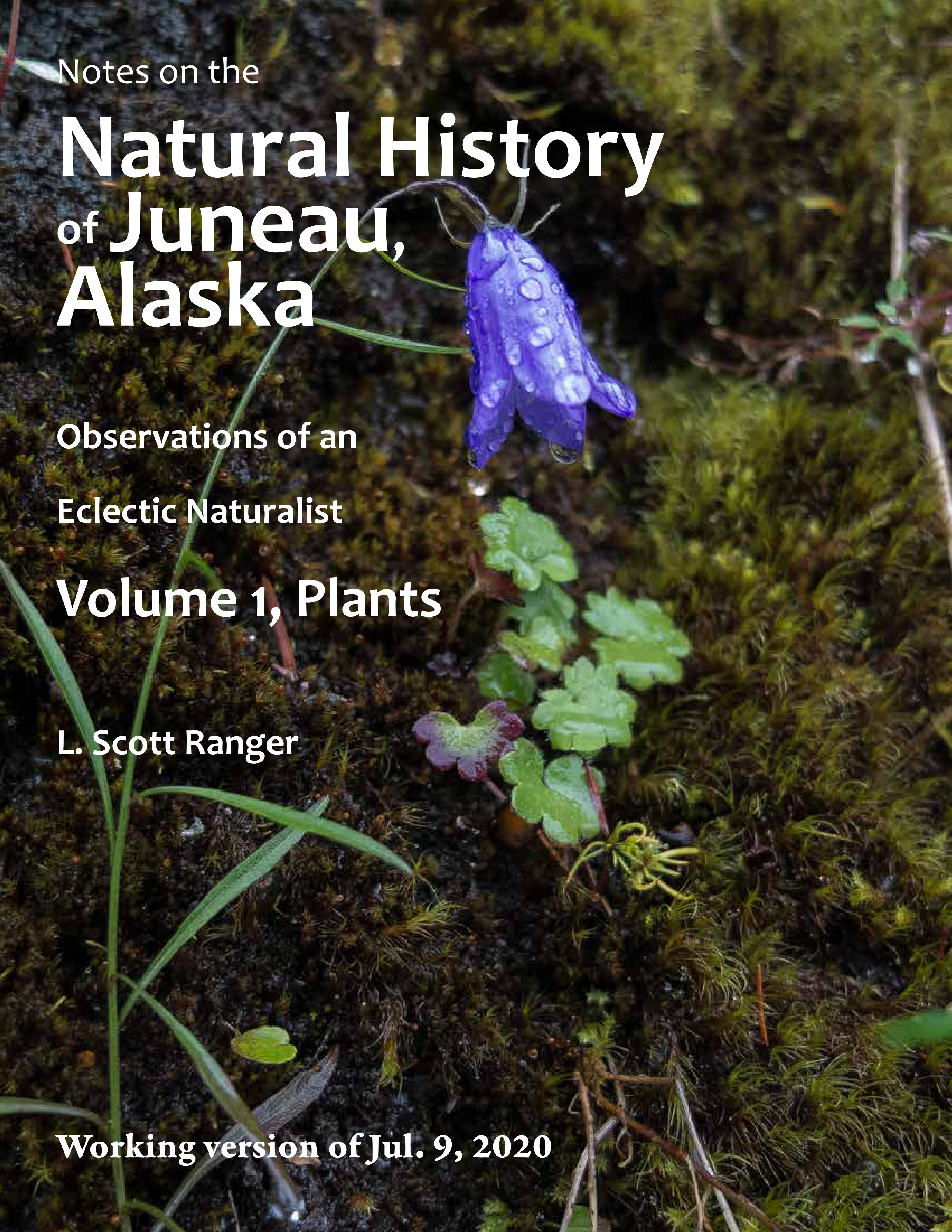


Notes on the

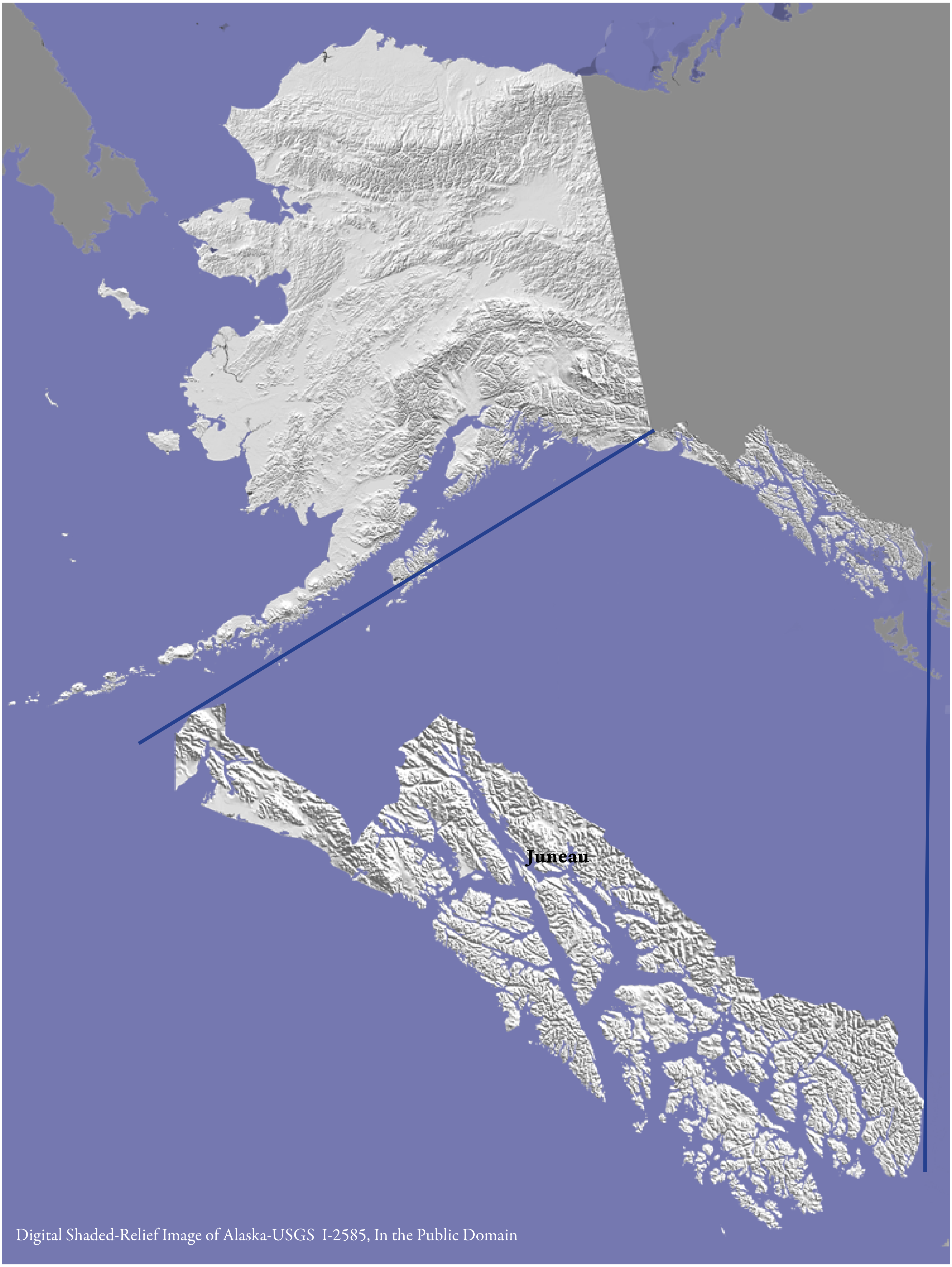
Natural History of Juneau, Alaska

Observations of an Eclectic Naturalist

Volume 1, Plants

L. Scott Ranger

Working version of Jul. 9, 2020


Juneau
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Notes on the

Natural History of Juneau, Alaska

Observations of an Eclectic Naturalist

Volume 1, Plants

L. 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

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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, now more than a decade.

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

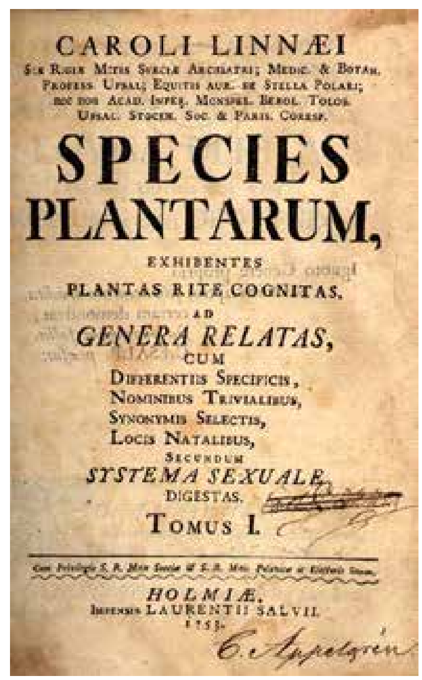
Look! How many times in our lives do we experience when someone observes something and wants to share it with those around and shouts this word out? They usually have their arm up and pointer finger out in the general direction of what they see. Unless the thing is huge, we often have a hard time finding 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.

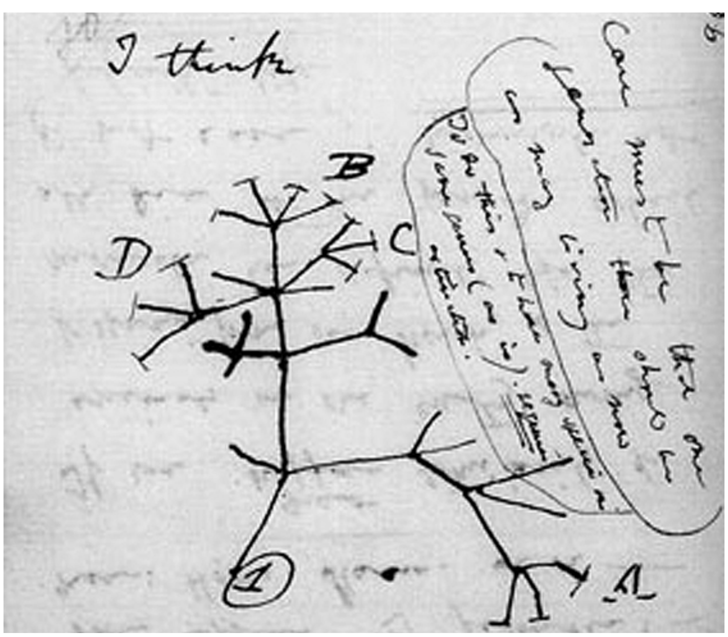
These early classifications are based on phenetics, a classification based on overall similarity of morphology.

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.

Alfred Russel Wallace (1823-1923) noted early in his career that "In all works on Natural History, we constantly find details of the marvellous adaptation of animals to their food, their habits, and the localities in which they are found." His widespread travels led him to be considered the "father of biogeography". With such experience, independently of Darwin, he conceived the idea of evolution through natural selection and published "*On the Tendency of Varieties to Depart Indefinitely From the Original Type*" in 1858 along with some of Darwin's writing. This prompted Darwin to write the *Origin of Species*.



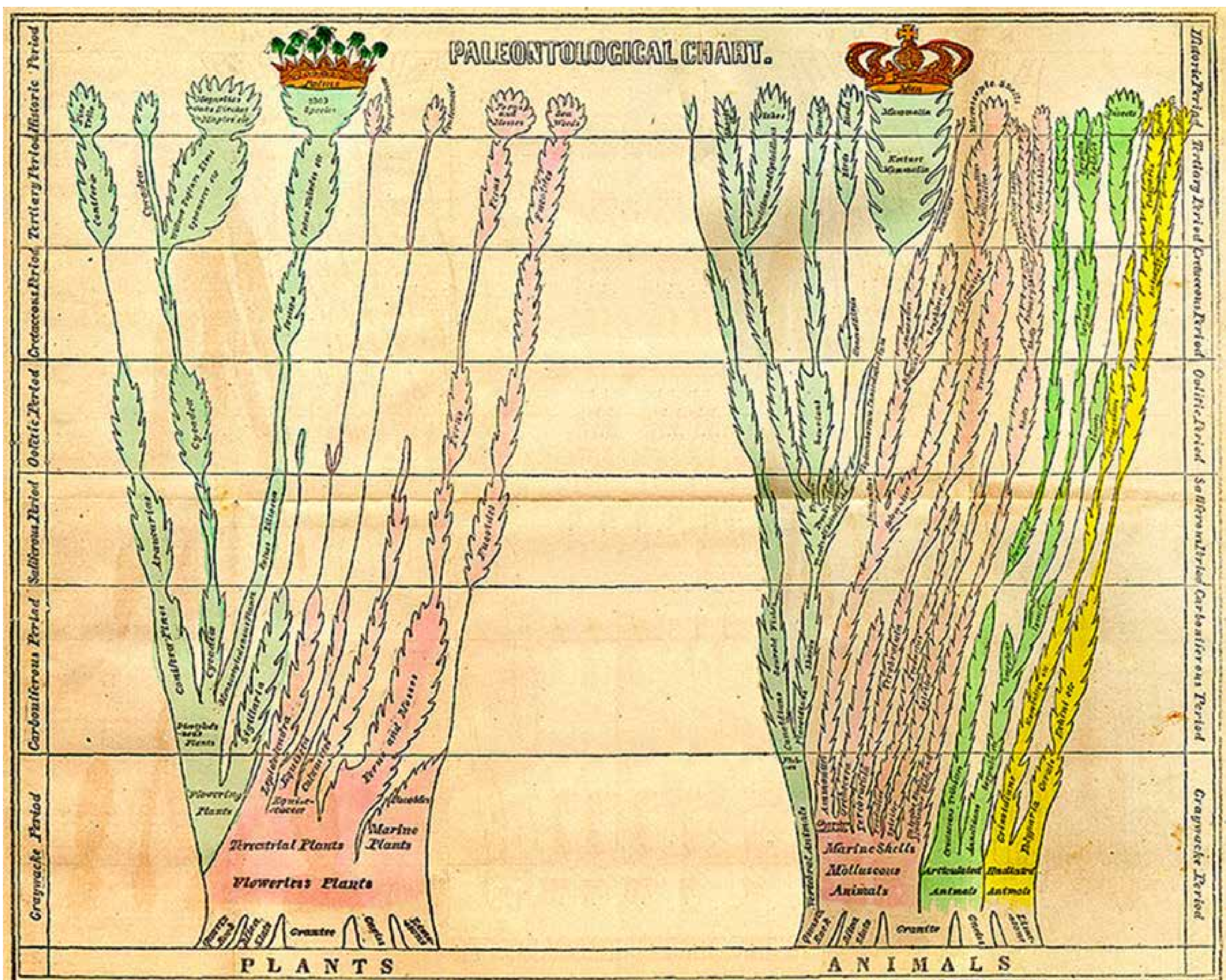
Charles Darwin (1809-1882) jotted down this tree in one of his notebooks around July of 1837 (In the Public Domain). Note the words at the top, "I think..." demonstrating the way the mind of a curious observer of nature works when he places the older organisms at the base and the more modern branching 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.

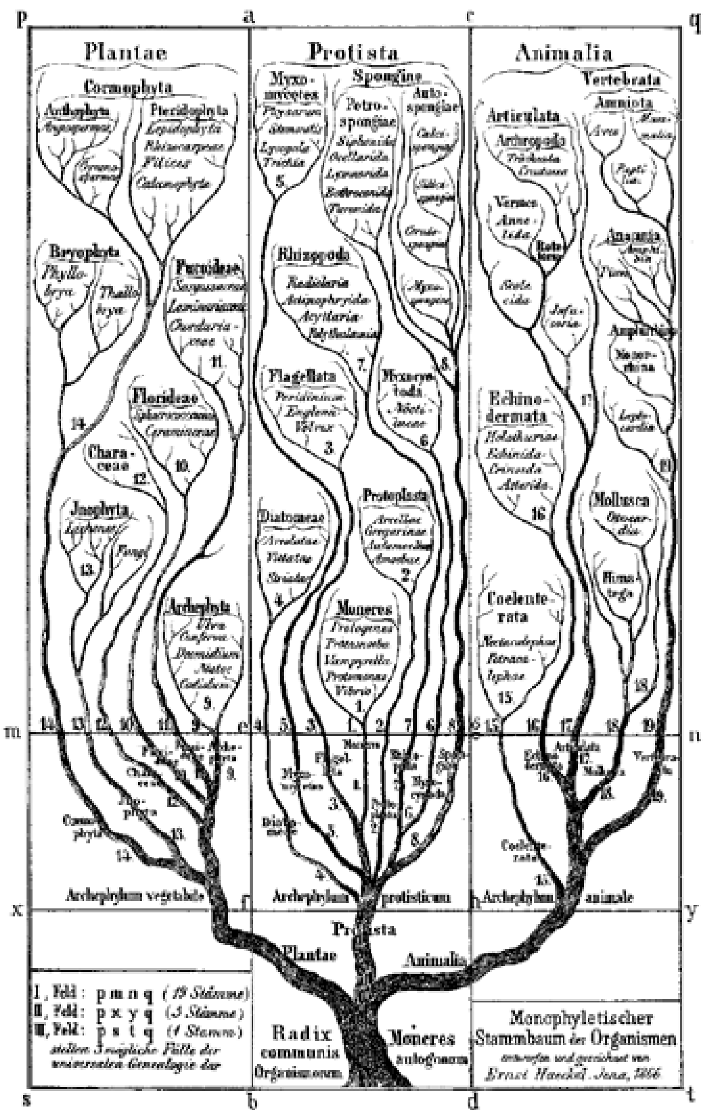
Edward Hitchcock (1793–1864) produced a tree in his 1840 book *Elementary Geology*. As a devoutly religious person (an ordained Congregationalist pastor) and geologist, he was concerned more with the fossil forms he was familiar with and called the tree a "paleontological chart". It is the first tree 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:

> 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*.



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

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.

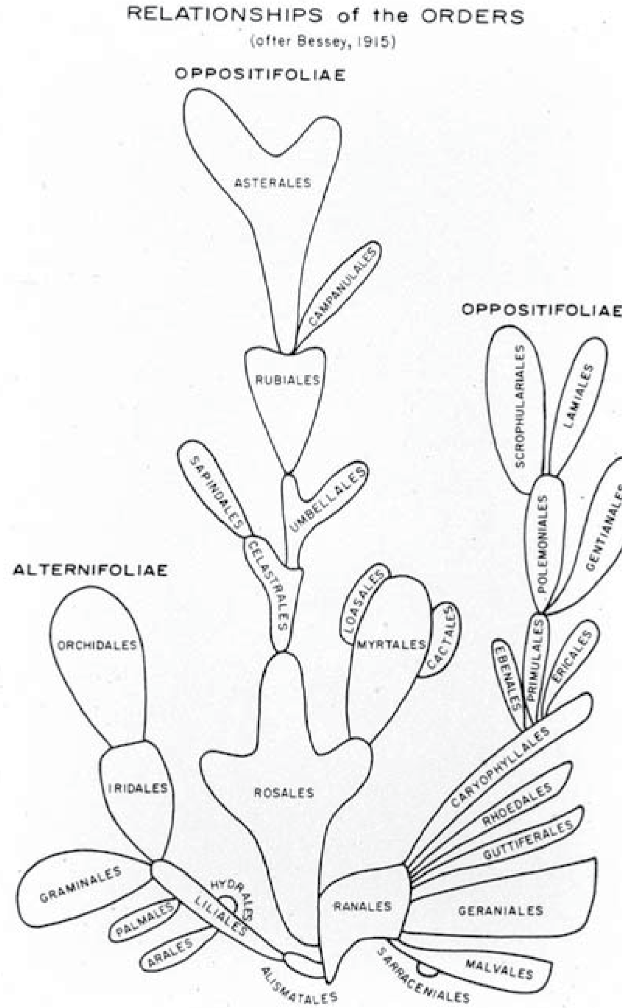


Haeckel's 1866 tree—his second—is far more fully branched and leafed out than Darwin's. His evidence was based primarily on morphology, the structure and form of organisms, and precious little in the use of fossil life forms. His extreme interest, observation and accurate drawings of the embryology of 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". 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 "eyespot" 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 phylogenetic 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).

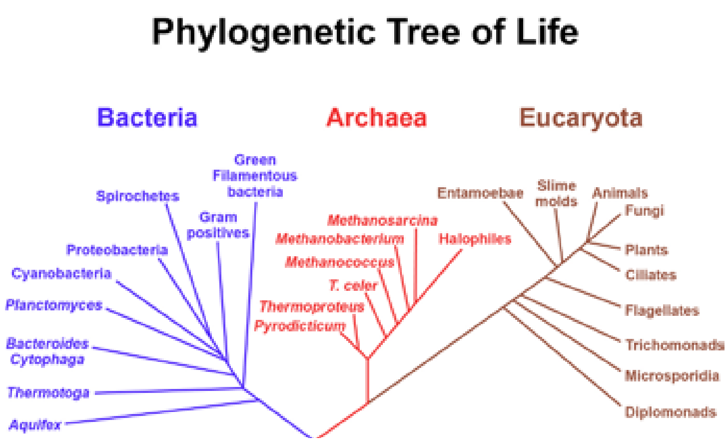
Cronquist, primarily a student of the Asteraceae, began to question the basis and details of the Engler and Prantl system that dominated phylogenetics of his day. He published the *Evolution and Classification of Flowering Plants* (1968; 2nd edition, 1988) and (1981) *An Integrated System of Classification 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.

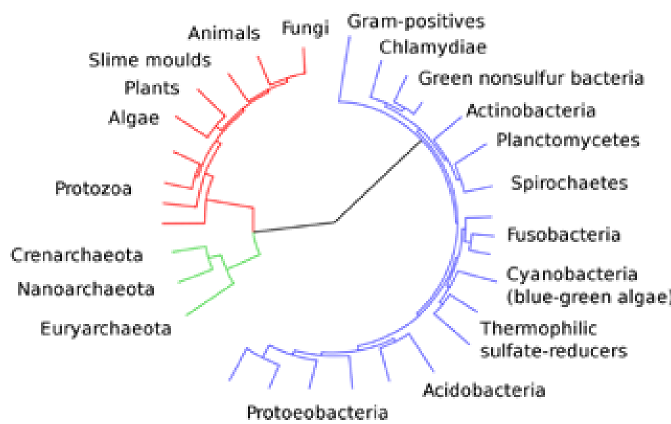
Robert F. Thorne (1920 to present) still works at Rancho Santa Anna Botanical Garden in Claremont, California and created his first system, the "Thorne System" in 1992 with *Classification and geography of flowering plants*. It was greatly expanded and modified with the publication of *A Phylogenetic 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 genetic coding cannot be understated and is rapidly becoming the standard method for measuring phylogenetic distance. Currently most "measurements" are made on the basis of just a few, or even one, gene, and the vast majority of organisms have never been sampled. We are at the very beginning of a long and complex but wonderful exploration of life in a way never even dreamed of by the creators of the early trees of life.

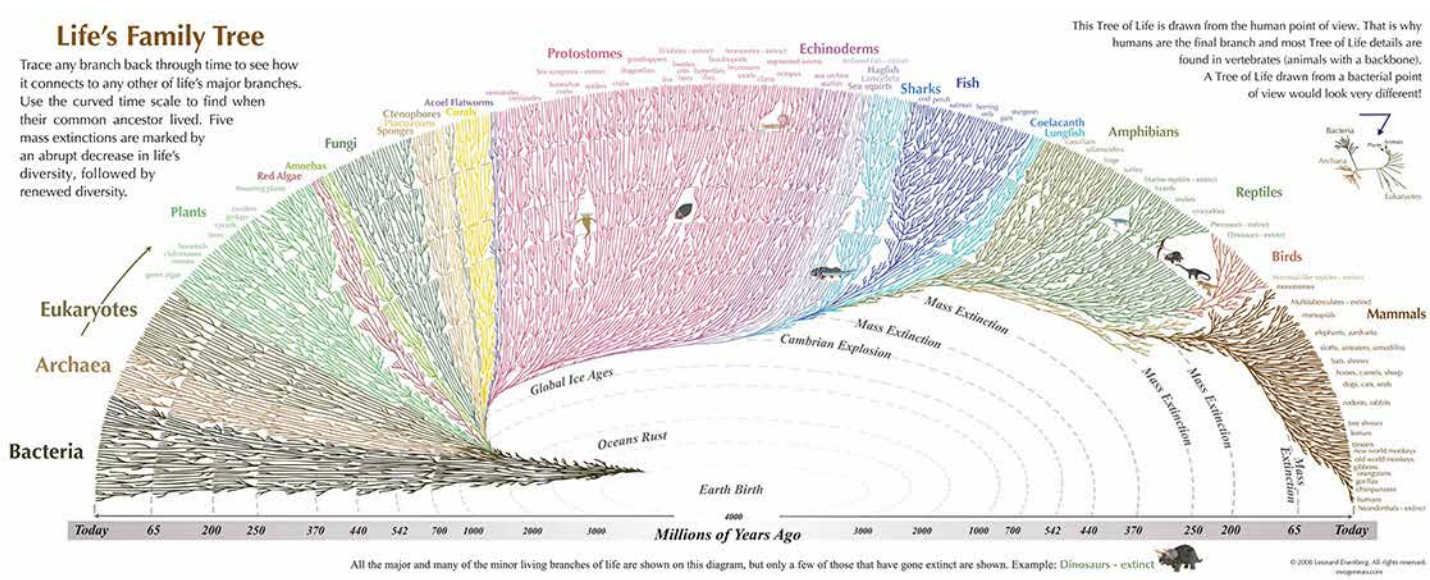
The usefulness of the concept of a "tree of life" remains robust. Current thinking finds that the most primitive organisms (prokaryotes, single-celled without organelles) are so varied and interconnected that it is difficult to consider them "kingdoms" in any traditional sense of the word. The concept 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.) Note that in the two trees below that bacteria take up more branches of the tree than anything else. The tree below is the most amazing and beautiful I've ever seen but note the real estate given to bacteria in comparison to the rest of life. It can be found at http://biologylair.tumblr.com/post/29010573907/brilliant-diagram-depicting-the-phylogenetic-tree



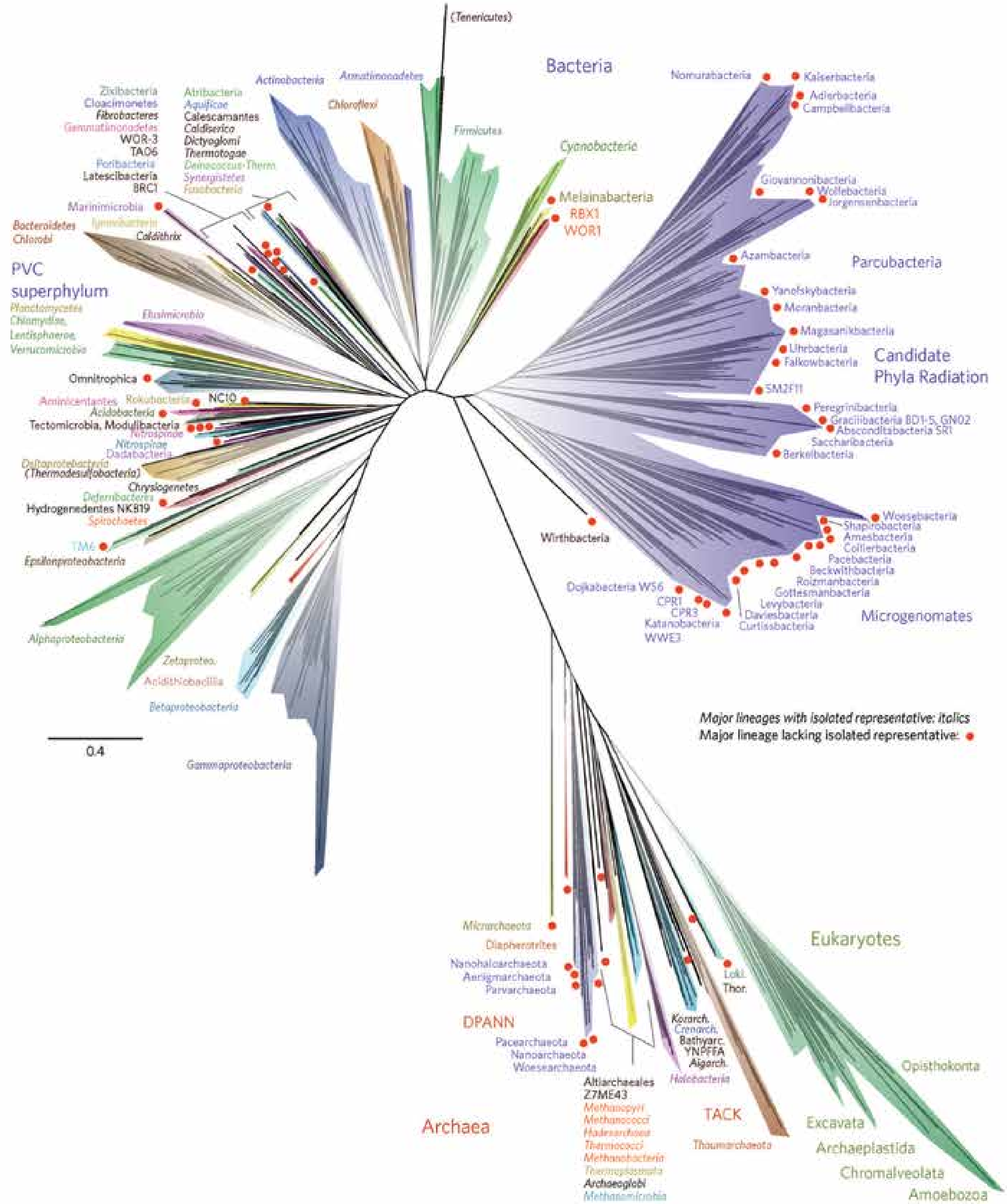


Figure 1 | A current view of the tree of life, encompassing the total diversity represented by sequenced genomes. The tree includes 92 named bacterial phyla, 26 archaeal phyla and all five of the Eukaryotic supergroups. Major lineages are assigned arbitrary colours and named, with well-characterized lineage names, in italics. Lineages lacking an isolated representative are highlighted with non-italicized names and red dots. For details on taxon sampling and tree inference, see Methods. The names Tenericutes and Thermodesulfobacteria are bracketed to indicate that these lineages branch within the Firmicutes and the Deltaproteobacteria, respectively. Eukaryotic supergroups are noted, but not otherwise delineated due to the low resolution of these lineages. The CPR phyla are assigned a single colour as they are composed entirely of organisms without isolated representatives, and are still in the process of definition at lower taxonomic levels. The complete ribosomal protein tree is available in rectangular format with full bootstrap values as Supplementary Fig. 1 and in Newick format in Supplementary Dataset 2.

This incredible tree of life illustrates a view of life that is certainly foreign to me and my way of thinking, and I'm sure to that of most humans. It illustrates immediately that we, higher organisms, take up very small real estate on the tree of life. We are way down on the lower right with the Eukayrotes, and at this resolution, can't even be seen!

> Recent depictions of the tree of life have focused either on the nature of deep evolutionary relationships or on the known, well-classified diversity of life with an emphasis on eukaryotes. These approaches overlook the dramatic change in our understanding of life's diversity resulting from genomic sampling of previously unexamined environments. ... Here, we use new genomic data from over 1,000 uncultivated and little known organisms, together with published sequences, to infer a dramatically expanded version of the tree of life, with Bacteria, Archaea and Eukarya included. ... ***The results reveal the dominance of bacterial diversification***...

The implications of this for future research and understanding are immense and it clearly illustrates the incredible lack of information we have about life, particularly in its simplest form.

Hug, L.A. et al. 2016. *A new view of the tree of life*. Nature Microbiology. Article no 16048. doi:10.1038/nmicrobiol.2016.48. Open Access.

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 a definable "kind". 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.

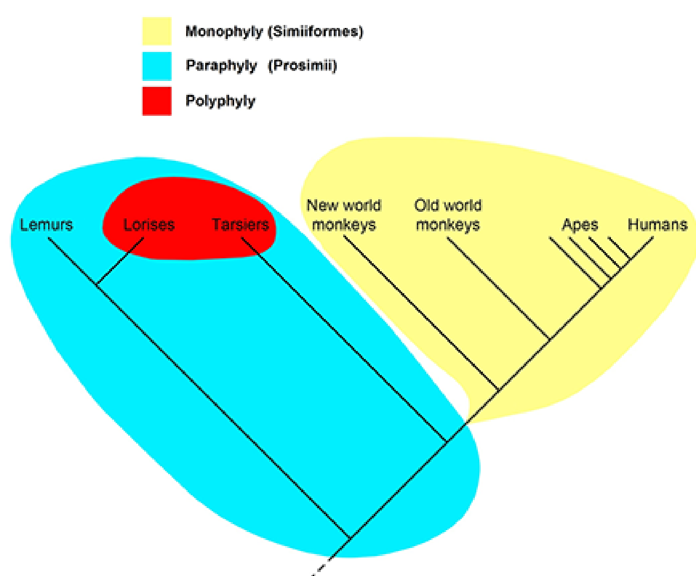
We slowly progress in our understanding of what we all see. Many have noted that local groups have at least some interaction with other local groups, no matter how rare. This came to be known as a "population of populations", now known as a "metapopulation". This word was coined by and based upon the 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.

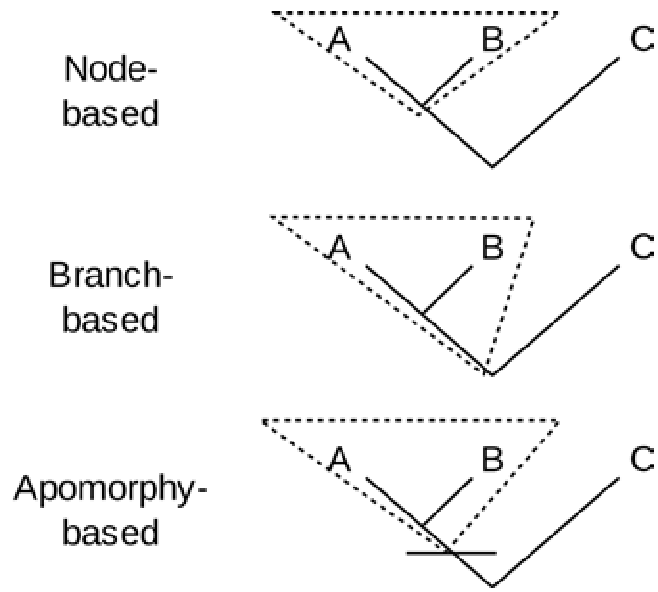
Since one of the most common concepts of the idea of species is based upon a group of organisms that can, and do, reproduce within themselves, species can evolve. Any group higher than a species has no mechanism for evolving and by this definition are not "natural". Just as any real tree one looks at 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.





The diagram on the left illustrates the primary principle of cladistics, monophyly and its two heresy's, paraphyly and polyphyly. A robust argument continues on the usefulness of paraphyly used within the Linnæan naming system that pure cladists find confining while all recognize that polyphyly represents a mistaken view of relationships. In this diagram, lorises and tarsiers are not related in any direct way, yet New World monkeys, Old World monkeys, apes and humans are related directly but that this encompassing does not include all of their direct relatives which includes lemurs, lorises and tarsiers. Once again it boils down to the question of where do you draw the lines?

Original work by Petter Bøckman, revised by Peter Brown - http://commons.wikimedia.org/wiki/File:Monophyly-paraphyly-polyphyly.jpg, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=20149186

In the diagram on the right (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), III (2009) and IV (2016). 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 always 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 always 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 more than 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 photographs 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 (κυανός *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 photograph on the left illustrates. The other "arid" habitat is the high alpine as atop Mount Roberts for the photograph on the right. These photographs 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 photograph 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 photosynthesisto 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

pro-toe-zo-uh Modern Latin *protozoa*, coined in1818 by German zoologist Georg August Goldfuss (1782-1848) from Greek πρῶτος *protos,* first + ζῷα *zoa*, animal

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

uh-mee-bow-so-uh Greek ἀμοιβή, *amoibè*, change + ζῷα *zoa*, animal, referring to their changing shape

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**

mix-oh-gas-tree-uh 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

feye-sair-ih-duh

Family Physaridae Rostafinski, 1873

feye-sair-ih-dee

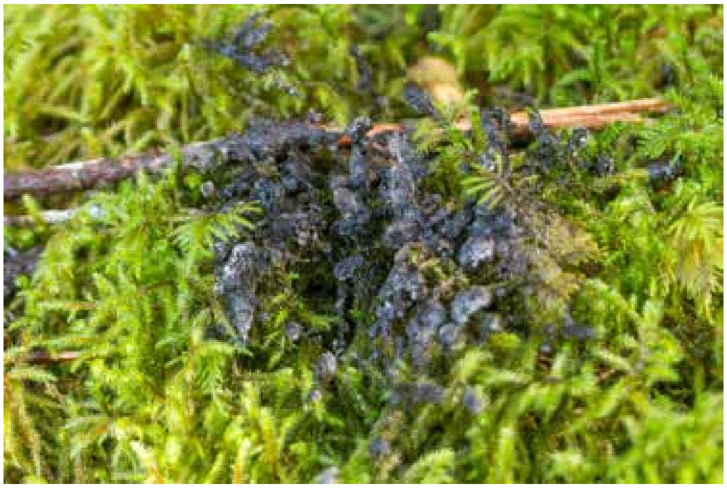
Physarum Persoon 1794

FEYE-sahr 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. Almost every year it always appears as a slime over big red stem moss in this same spot. I didn’t find it there in 2015. 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 photographs 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 photograph 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

trih-key-al-ees From the type genus *Trichia*, Greek *tríchion*, diminutive of θρίξ *thríx*, hair

Taxonomy: Also known as Trichiida T. Macbride 1922

Family Trichiaceae Chevallier 1826

trih-key-a-suh-ee

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 photograph (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 photograph) 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 *Rhytidiadelphus lore*us, lanky moss, catch my eye for the lower left photograph, 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

my-zo-zo-uh   Greek μύζω *myzo*, to suckle + ζῷα *zoa*, animal; meaning unclear

Class Dinophyceae (Bütschli, 1885) Pascher, 1914

dino-fie-suh-ee   Greek δῖνος *dinos*, whirling + Classical Greek φύκος *phykos*, seaweed in an ancient sense used as a standard ending for alga classes

Order Gonyaulacales Taylor, 1980

go-nee-all-uh-cal (as in California)-ees		Greek γόνος *gonos*, seed, procreation

Family Ceratiaceae Kofoid, 1907

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

Latin ker-at-ee-um, American ser-at-ee-um		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.

Algae

From Latin *alga*, seaweed (singular *alga*, plural *algae*); etymology uncertain

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 ýaatl'; ocean algae is káas'

Phylum Bacillariophyta Engler & Gilg, 1924 *diatoms*

ba (as in bat)-sill-air-ee-oh-fie-tuh Classical Latin *bacillum*, stick, walking stick, staff + Ancient Greek φυτόν *phutón*, plant

Diatom comes from Ancient Greek διά diá, through + τέμνειν témnein, to cut, i.e., "cut in half" referring to the bilateral symmetry of many

Class Bacillariophyceae Haeckel, 1878

ba (as in bat)-sill-air-ee-oh-fie-see

Order Bacillariales Hendey, 1937

ba (as in bat)-sill-air-ee-all-ees

Family Bacillariaceae Ehrenberg, 1831

ba (as in bat)-sill-air-ee-a-suh-ee

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

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

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

co-sin-oh-dis-co-fie-suh-ee

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

co-sin-oh-dis-co-all-ees

Family Coscinodiscaceae Kützing, 1844

co-sin-oh-disk-a-suh-ee

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

co-sin-oh-dis-cuss 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

me-dee-oh-fie-see etymology undetermined

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

kee-toe-sair-oh-tal-ees

Family Chaetocerotaceae Ralfs, in Pritchard, 1861

kee-toe-sair-oh-tay-suh-ee

Chaetoceros Ehrenberg, 1844, undetermined species

key-tah-sair-us Greek χαίτη *chaitē*, hair or bristle + κέρας *keras*, horn; referring to the spikes common to the genus

Order Thalassiosirales Glezer & Makarova, 1986

thal-ass-ee-oh-seer-al-ees Greek θᾰ́λᾰσσᾰ *thalassios*, belonging to the sea

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

skell-eh-to-neh-muh-tay-suh-ee

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

skell-eh-toe-NEE-muh 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

oh-crow-fie-tuh Greek ὠχρός *ochros*, pale yellow + Ancient Greek φυτόν *phutón*, plant

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**

fee-oh-fie-suh-ee Latinized form of the Ancient Greek φῦκος *fūkos*, seaweed

Order Fucales Bory de Saint-Vincent, 1827

few-cal (as in California)-ees

Family Fucaceae Adanson, 1763

few-cay-suh-ee

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 photograph 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 ***kelp***

lamb-in-air-ee-all-ees Latin *lamina*, thin sheet or layer hence in botany, blade; referring to the leaf-like wands

Family Laminariaceae Bory, 1827 **kelp**

lamb-in-air-ee-a-suh-ee

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 photograph 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*

rod-doe-fie-tuh Ancient Greek ῥόδον, *rhodon*, rose, hence red + Ancient Greek φυτόν *phutón*, plant

Class Florideophyceae Cronquist, 1960

floor-ih-dee-o-fie-kay-suh-ee presumably from Latin *floridus*, flowery, or, in bloom referring to the large "blooms" of red algae

Order Ceramiales Oltmanns, 1904

Latin Kare-ah-mee-ah-less, American sare-am-ee-al-ees From the type genus, *Ceramium*, see:

> ...the name *Ceramium* Roth, derived from the Greek *ceramion*, meaning pitcher or vessel, but currently applied to a genus of red algae with no vessel-like structures ... the name was most likely derived from an earlier publication, wherein it was coined in reference to the reproductive structures in a red alga currently known as *Gracilaria* and unrelated to present-day *Ceramium*.

Huisman, J.M. 2012. *Illogical etymology and the curious case of* Ceramium. Taxon, Volume 61, Number 2, 13 April 2012, pp. 456-458(3)

Family Rhodomelaceae J.E. Areschoug, 1847

row-doe-mell-a-suh-ee

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, hence red + 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 photograph 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

American, fun-gee, European fun-guy Classical Latin *fungus*, fungus or mushroom; fungi is plural, fungus is singular

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 χἰτον *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".

<u>Taxonomy</u>: 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.

My nomenclature follows Index Fungorum.

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, *Mushrooms 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.
Laursen, G.A. & N. McArthur. 2016. *Alaska's mushrooms, a wide-ranging guide*. Alaska Northwest Books, Portland, OR
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)

die-care-ee-uh 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***

ass-co-my-ko-tuh 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

nee-oh-leck-toe-my-seats From the type genus, *Neolecta* (see *Neoloecta*)

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

nee-oh-leck-tall-ees

Taxonomy: A monotypic order.

Family Neolectaceae Redhead 1977

nee-oh-leck-tay-suh-ee

Taxonomy: A monotypic family.

Neolecta Spegazzini 1881

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

Taxonomy: This 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 photographs 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 *Rhytidiadelphus lore*us, lanky moss under a dense canopy 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

gee-oh-gloss-oh-my-seats see *Geoglossum*

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

gee-oh-gloss-al-ees

Family Geoglossaceae Corda 1838

Geoglossum Persoon 1704, earth tongue

gee-oh-gloss-um 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

lee-oh-tee-oh-my-seats Ancient Greek *leo-tio*, a gathering + Greek μύκης, *mukes*, fungus; apparently for their colonial habit

Order Helotiales Nannfeldt ex Korf & Lizon 2000

hell-oh-tee-all-ees from the type genus, *Helotium*; etymology undetermined

Family Helotiaceae Rehm 1892

hell-oh-tee-a-suh-ee

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 photographs 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

Latin peh-zih-zo-my-seats, American peh-zie-zo-my-seats from the type genus, *Peziza*; Latin *pezica*, a sessile mushroom + Greek μύκης, *mukes*, fungus (see etymology under *Peziza*)

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

peh-zih-zahl-ees

Family Helvellaceae Fries 1822

hell-vell-a-suh-ee

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

ee-las-tih-kuh   Ancient Greek ἐλαστός *elastós*, elastic



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 *Rhytidiadelphus lore*us, lanky 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

whoo-mare-ee-a-suh-ee from the type genus *Humaria*; etymology undetermined

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**

peh-ziz-a-suh-ee

Peziza Dillenius ex Fries 1822

Latin peh-zih-zuh, American 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

pie-row-nem-uh-tay-suh-ee Greek πυρήν *pyren*, the stone of a fruit; because of the usually somewhat tough texture of their tissue

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 photographs 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

soar-dare-ee-oh-my-seats Latin *sordes* dirt, filth + New Latin -*aria*; referring to many that grow in dung

Order Hypocreales Lindau 1897

hih-po-cree-al-ees from the type genus, *Hypocrea*; Greek υπό *hypo*, below + Latin *creare*, to create; referring to the invisible mycelium

Family Hypocreaceae De Notaris 1844

hih-po-cree-a-suh-ee

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

hih-po-my-sees 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" photograph 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

zye-LAIR-ee-all-ees from they type genus, *Xylaria*

Family Xylariaceae Louis Rene Tulasne & Charles Tulasne, 1861

zye-LAIR-ee-a-suh-ee

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 photograph) 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 photographs 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

American lie-ken, European lich-en Ancient Greek λειχήν *leikhḗ*, which may mean "to lick" extended to "what eats around itself". Originally used of liverwort; the modern sense first recorded 1715.

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.sharnoffphotographs.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

are-thawn-ee-oh-my-seats   from the type genus *Arthonia*; etymology undetermined

A monotypic class of mostly tropical and subtropical lichenized fungi.

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

are-thawn-ee-all-ees

Contains four families of mostly lichenized fungi.

Family Chrysothricaceae Zahlbruckner 1905

cry-sow-thrik-a-suh-ee   from the type genus *Chrysothrix*

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 *thríx*, 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

can-dell-are-is   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

leck-ann-or-o-my-seats from the type genus *Lecanora*; Greek *lekanē* basin + *hōra* beauty, grace; from the form and color of the apothecium

Order Agyriales Clements & Shear, 1931

uh-jeer-ee-all-ees from the type genus *Agyrium*; Ancient Greek Ἀγύριον *Agúrion*, an ancient town in Sicily

Family Trapeliaceae M. Choisy ex Hertel 1970

truh-pell-ee-a-suh-ee from the type genus, *Trapelia*; etymololgy undetermined

Placopsis (Nylander) Lindsay 1866

play-cop-siss 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

leck-ann-or-o-all-ees from the type genus *Lecanora*; Greek *lekanē* basin + *hōra* beauty, grace; from the form and color of the apothecium

Family Cladoniaceae Zenker, 1827

kla (as it cat)-DOE-nee-a-suh-ee from the type genus, *Cladonia*

Cladonia P. Browne 1756, cup lichen

kla (as it cat)-DOE-nee-ah Greek 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 photograph 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 photograph 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 photograph), 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

Latin fur-CAH-tuh, American 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 photograph. 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 photograph I find of the Sharnoff's [http://www.sharnoffphotographs.com/lichensB/cladonia_maxima.html] is white to off-white while the photograph and text of "Lichens around Mendenhall Glacier" (Derr & Armstrong 2010) match this photograph 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 photograph 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

ick-mah-DAW-fill-a-suh-ee   for the type genus, *Icmadophila*

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 photohsynthesizing 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

ver-mih-cue-lare-is 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 photograph 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

par-mel-ee-a-suh-ee   from the type genus, *Parmelia*; etymology undetermined

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-tare-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 photograph. 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 photographs. 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 photograph. 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

Latin ra-muh-lin-a-suh-ee, American ram-ah-line-a-suh-ee from the type genus *Ramalina*

Ramalina Acharius 1809

Latin ra-muh-lin-uh, American ram-ah-line-uh   Classical Latin *ramale*, brushwood, twigs, sticks.

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

fair-in-A-see-uh   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*. CalPhoto 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

sphere-AWE-for-a-suh-ee from the type genus *Sphaerophorus*

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

stair-ee-oh-call-a-suh-ee for they type genus *Stereocaulon*

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 photograph 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

sub-al-bih-cans   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

oss-trow-pal-ees etymology undetermined

Family Graphidaceae Dumortier 1822

graph-id-a-suh-ee from the type genus *Graphis*

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

Latin thel-AWE-treh-mah-tay-suh-ee, American thell-oh-TREE-mah-tay-suh-ee from the type genus *Thelotrema*

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

pell-tih-ger-al-ees   from the type genus *Peltigera*

Family Collemataceae Zenker 1827

call-eh-mah-tay-suh-ee   from the type genus *Collema*; Greek κόλλημα *kollema*, glue, or to stick

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

low-bear-ee-a-suh-ee   from the type genus ***Lobaria***

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 photograph on the left shows, but some have almost frilly edges (but they are very stiff) like the photograph on the right. These can be mistaken for desiccated *Lobaria oregona*.

Lobaria linita (Acharius) Rabenhorst 1845, cabbage lungwort

Latin LINN-ih-tah, American lin-eye-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**

pell-TIH-jer-a-suh-ee   from the type genus *Peltigera*

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 photograph of a chimeroid form where the cyanobacteria is the dominant partner and is dark gray, the same color as the cephalodia in the upper photograph. [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

uh-nahm-uh-luh 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

neh-froe-mah-tay-suh-ee from the type genus *Nephroma*

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

pur-tuss-air-ee-al-ees — from the type genus *Pertusaria*; etymology undetermined

Family Pertusariaceae Körber ex Körber 1855

pur-tuss-air-ee-a-suh-ee

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

ver-oo-care-ee-all-ees from the type genus *Varrucaria*; Latin *verrūca*, wart + -āria

Family Verrucariaceae Zenker 1827

ver-oo-care-ee-a-suh-ee

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 photograph), 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 photograph 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"***

buh-sid-ee-o-my-co-tuh from the presence of basidia, spore-producing structures + Ancient Greek μύκης *múkēs*, mushroom, fungus

Subphylum Agaricomycotina Doweld (2001)

uh-gare-ih-co-my-co-tigh-nuh from the genus *Agaricus* + Ancient Greek μύκης *múkēs*, mushroom, fungus with a Latinized ending

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

treh-mell-o-my-seats from the type genus *Tremella* + + Ancient Greek μύκης *múkēs*, mushroom, fungus

Incertae sedis

Order Tremellales Fries 1821

treh-mell-all-ees

Family Tremellaceae Fries 1821

treh-mell-a-suh-ee

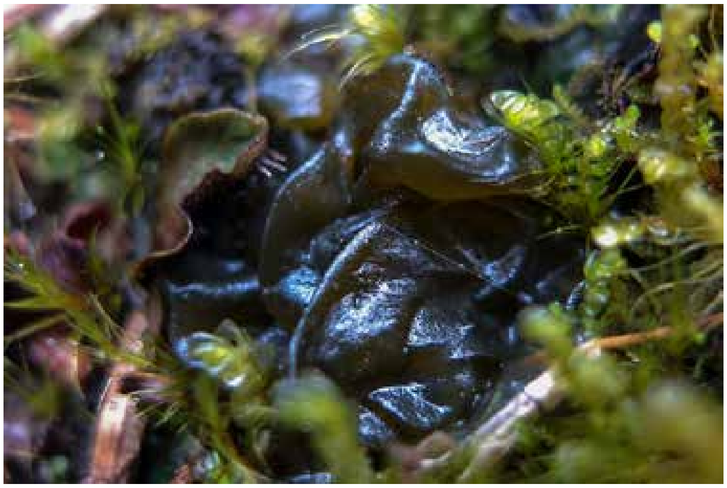
Tremella Persoon 1794

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

da-krih-my-see-tal-ees from the type genus *Dacrymyces*

A monotypic order containing only the single family.

Family Dacrymycetaceae J. Schröter 1888

da-krih-my-see-tay-suh-ee from the type genus *Dacrymyces*

Dacrymyces Nees 1816

da-krih-my-sees Greek δάχτυλ *dactyl*, a finger + Greek μύκητας *mykitas*, fungus

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

Latin pall-MAH-tus, Ameriacan pall-MAY-tus 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 photograph 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

uh-gar-ih-co-my-seats from the type genus *Agaricus* + Ancient Greek μύκης *múkēs*, mushroom, fungus

Order Agaricales Underwood, 1899*, gilled mushrooms*

uh-gar-ih-call-ees from the type genus *Agaricus*

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

strow-fare-ee-a-suh-ee from the type genus *Stropharia;* Greek 'στροφος *strophos*', belt; from the ring on the stipe

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)

core-tih-NAIR-ee-a-suh-ee from the type genus *Cortinarius*

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 (?)

al-bow-vie-oh-LAY-see-us Latin *alba*, white + Latin *violāceus*, from the flower, viola

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 *Rhytidiadelphus lore*us, lanky 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



Taxonomy: 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.

Notes: 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)

sa-thi-rell-a-suh-ee from the type genus *Psathyrella;* Greek ψαθυρός *psathuros*, meaning straw-like, fragile or friable; referring to the texture of the cap

Taxonomy: 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

hid-nan-gee-a-suh-ee   from the type genus *Hydnangium*; etymology undetermined

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 (?)

luh-cah-tuh   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

uh-gare-ih-cus — Latin name for larch or tinder fungus; from the Ancient Greek ἀγαρικόν *agarikón*, fungus

Coprinus Persoon 1797

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

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

Latin CAH-mah-tuss, American CO-mah-tus — 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 *Kaxdigoowu Héen 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 photographs 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 photograph nicely matches mine [http://healing-mushrooms.net/archives/phaeolepiota-aurea.html]

Family Mycenaceae Overeem (1926)

my-see-NAY-suh-ee from the type genus *Mycena*

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.

Atheniella Redhead, Moncalvo, Vilgalys, Desjardin & B.A. Perry 2012

ah-THEEN-ee-ell-ah "Purposely spelled to achieve phonetic harmony and uniqueness with an allegorical allusion to mythical Athena (beauty, spear shield) and her ancient Mycenaean origins" Index Fungorum no. 14.

Atheniella aurantiidisca (Murrill) Redhead, Moncalvo, Vilgalys, Desjardin & B.A. Perry 2012, orange bonnet, coral spring Mycena, candy corn mushroom

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




Synonyms: *Prunulus aurantiidiscus* Murrill 1916; *Mycena aurantiidisca* (Murrill) Murrill 1916

This is the only *Mycena* I can confidently name to species when I see it, but it got moved into a new genus in 2012! 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 photograph 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.

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.

Family Marasmiaceae Roze ex Kühner 1980

muh-raz-me-a-suh-ee from the type genus *Marasmius*; Greek μαρασμός *marasmos*, wilting

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 photograph 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)

fie-sah-lack-ree-a-suh-ee from the type genus *Physalacria*; etymology undetermined

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 photographs 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

am-uh-nee-tay-suh-ee   for the type genus *Amanita*

Amanita R. Heim ex Pouzar 1983

am-an-eye-tah, sometimes am-uh-nee-tuh   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 photograph 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 photograph) 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 photograph), 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 photograph 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

lie-ko-per-day-suh-ee for the type genus *Lycoperdon*

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***

bow-lee-tall-ees for the type genus *Boletus*

As genetic and micromorphologic work progresses with fungi, many old ideas have been challenged, modified and thrown out. The name "pore fungi" for the Boletales is one of the things that needs changing as there are gilled fungi mixed in amongst the pore fungi! No longer can we cavalierly use the broadly used term "bolete" to encompass the variety of fungi that it now contains. Fortunately for us, there are few in southeast Alaska. I've got to be on the lookout for members of the Gomphidiaceae such as *Chroogomphus tomentosus* in as it is highly specific to *Tsuga heterophylla* in the Pacific Northwest as well as several others commonly found on western conifers further south.

Binder, M. & D.S. Hibbett. 2006. *Molecular systematics and biological diversification of Boletales*. Mycologia 98 (6): 971–81. doi:10.3852/mycologia.98.6.971. PMID 17486973.

Family Boletaceae Chevall, 1826

bow-lee-tay-suh-ee for the type genus *Boletus*

Boletus Linnæus 1753

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

Boletus edulis Bulliard 1782, king bolete, the king

Latin ED-you-liss, Ameridan EE-dyew-lus   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*

russ-you-al-ees from the type genus *Russula*

This "order" can, and probably 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

russ-you-la-suh-ee from the type genus *Russula*

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

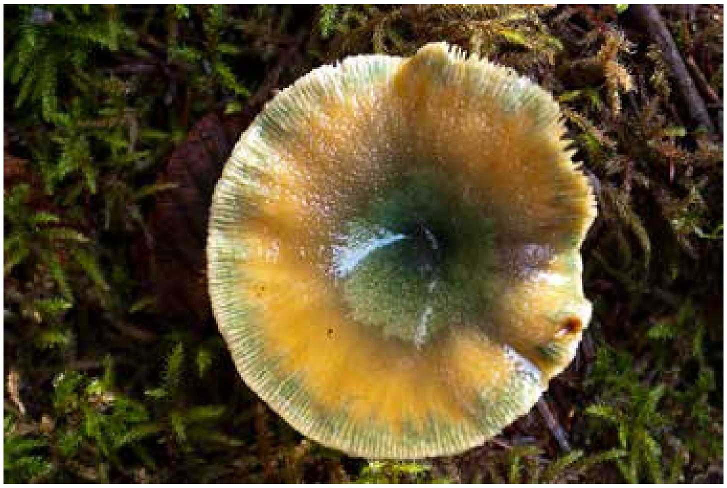
I have been attempting to put names on all the milk mushrooms in the area and it has proven very difficult for me. Some of the characters used in my many references don't seem to be consistent with what I'm seeing here. There seem to be five consistently recognizable forms in the area that can be recognized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

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 photograph 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

in-teh-gruh Medieval Latin *integralis,* forming a whole

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

<u>Notes</u>: 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 photograph 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***, polypores, or non-gilled mushrooms***

pah-lih-pore-al-ees a simple word meaning many pores

This "order" can, and 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

clah-vare-ee-a-suh-ee for the type genus *Clavaria*; Latin *clava*, a club

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

gan-oh-der-mah-tay-suh-ee   from the type genus *Ganoderma*

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".

Taxonomy: 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 occur

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

pah-lih-pore-a-suh-ee   a simple word meaning many pores

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

gom-fal-ees from the type genus *Gomphus*; Greek γομφος *gomphos*, plug or large wedge-shaped nail

Taxonomy: This order is often included in a wide circumscription of Phallales, or distinct from it (as here), or even as a straight synonym.

Family Gomphaceae Donk 1961

gom-fay-suh-ee

Taxonomy: Now includes the former family Ramariaceae.

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

Taxonomy: 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

thel-awe-for-al-ees from the type genus *Thelephora*; Greek θηλή *thele*, nipple + *phorus*, bearing

Family Bankeraceae Donk 1961

bank-er-a-suh-ee from the type genus *Bankera*; etymology undetermined

Hydnellum

Latin HID-nell-um, American hid-NELL-um Greek ύδνον *(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 photograph) 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 photographs 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 photograph) a single mass just barely smaller than 2009 appears on the same spruce roots. Here a bright red fingertip give scale to the photograph.

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 photograph 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

high-men-o-key-tall-ees

The name probably means long-haired membrane from Ancient Greek ὑμήν *humḗn,* skin or membrane + χιτε *chaite,* long hair

Family Repetobasidiaceae Jülich 1982

reh-peh-toe-ba-sih-day-suh-ee from the type genus *Repetobasidium*; Latin *repetō*, resume + basidium, a new form of basidiomycete

Alloclavaria Dentinger & D.J. McLaughlin 2007

al-oh-clah-VARE-ee-ah Latin *allo*, the other + Latin *clava*, a club; hence, another clavaria

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 photograph 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 **gall and smut fungi**

exo-bah-sih-dee-o-my-seats from the type genus *Exobasidium*

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

exo-bah-sih-dee-all-ees from the type genus *Exobasidium*

Family Exobasidiaceae J. Schröter, 1888

exo-bah-sih-dee-a-suh-ee from the type genus *Exobasidium*

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

This family of fungi grow almost exclusively on members of the plant family Ericaceae.

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 rust fungi

poo-chee-nee-o-my-seats from the type genus *Puccinia*

Synonym: Urediniomycetes

The name "rust" comes from the powdery spores that form on the leaves, here on the under side. Some 7,000 species world-wide cause large economic losses in many agricultural plants.

Rust fungi are *obligate parasites*, having specific living hosts for each alternation of generations where other species cannot be infected. They may have up to five alternate generations, but may only have two. Host death is not normal, but greatly stunted growth is common.

The most common alternation of generations are *uredinia* that create *urediniospores* that spread the fungus asexually. This is often called the repeating stage as these spores can re-infect the host plant without continuing to the alternate generation. *Telia* develop on the summer on the alternate host and produce *teliospores.* They overwinter on the fallen dead leaves and young twigs. The germinate and produce *basidia* that create *basidiospores* that are wind born and spread the fungus.

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.
Pei, M.H. and McCracken, A.R. 2005. *Rust Diseases of Willow and Poplar*. CABI publishing.

Order Pucciniales Clements & Shear 1931

poo-chee-nee-all-ees   from the type genus *Puccina*; New Latin honorific for Italian anatomist Tommaso Puccini died 1735

Family Coleosporiaceae Dietel (1900)

co-lee-oss-pore-ee-ay-suh-ee   from the type genus *Coleosporium*; Greek κολεός *koleos*, a sheath

Chrysomyxa Unger (1840)

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

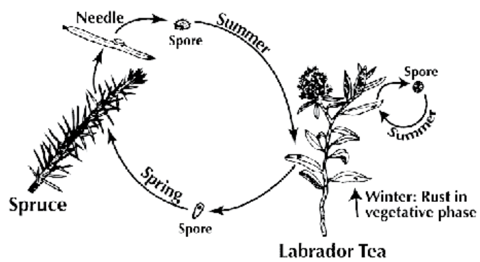
Chrysomyxa ledicola Lagerheim 1893, spruce needle rust, large-spored spruce-Labrador tea rust

leh-DIH-co-lah   referring to the leaves of *Ledum*

While camping at the Mendenhall Campground August 11, 2019 I noticed many of the Sitka spruce trees had dead leaves of this year's growth. I assumed, while looking at them at a distance, that it was from drought stress as the area is more than 5 inches below normal rainfall. While taking a walk and looking much more closely, I discovered it is not at all from drought but from a fungal rust! Sitka spruce needles are four-angled but slightly flattened with two white stomatal bands on the upper (adaxial)side. Odd pinkish-cream structures are growing out these bands! *Insects and Diseases of Alaskan Forests* has the answer. From a distance the spruce needles have an odd orangish cast. Only about half of the needles on each of this years sprouts show the pustules of the rust growing out of them. The pustules appear as a row of tightly-packed cylinders with smooth columns with a cut, almost lacy, top. The columns seem very thin and a covering for a mass of orange spores that are contained within.

This is a heterocyclic rust that requires two hosts for the entire life cycle. One stage grows inside the current years needles of spruce trees and erupts as aecia (they cylinders) that open to release orange asexual aeciospores which find their way to the leaves of Labrador tea, *Ledum groenlandicum* (*Rhododendron groenlandicum*) where it grows in the leaves (last photo above) to form uredinia on the surface that release asexual urediniospores which have the ability to re-infect the same plant as well as the alternate host. Rusts are obligate parasites that have specific host species and don't infect other species around them.

With the requirement of two hosts, this rust occurs only where the two hosts are nearby. In our case, Labrador tea is the limiting factor as this plant is found in close proximity to bogs, muskegs, streams and lake shores in the Juneau area. Since Mendenhall Campground is surrounded by Mendenhall Lake with lots of Labrador tea and with Sitka spruce being the dominant conifer in recently deglaciated areas, this is prime habitat for the rust, yet it's taken me eleven years to spot it!



from: Forest Service Leaflet R10-TP-99 August 2001

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. These are the *uredia* that produce *urediniospores*.

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 **pine rust**

crow-nar-tee-a-suh-ee from the type genus *Cronartium*; etymology undetermined

A family of three genera (*Cronartium*, *Endocronartium* and *Peridermium*) using *Pinus* species as one of the hosts and a flowering species as the other. Most cause significant mortality of the pine host.

Endocronartium Y. Hirats 1969

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

A genus with three species, all using *Pinus* as one of the hosts: our *E. harknessii* and *E. pini* and *E. sahoanum* both of Japan.

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

mel-am-sore-a-suh-ee from the type genus *Melampsora*

The family is monotypic, containing only one genus

Melampsora Castagne 1843, rust fungi

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

This genus of fungus with about 90 species are obligate parasites that specialize on two specific living hosts in an alternation of generations.

Melampsora epitea Thümen 1879, willow rust

This rust on *Salix scouleriana* is probably *Melampsora epitea* f.sp. *tsugae* Ziller 1959 where hemlock (*Tsuga*) is the alternate host as the rainforest is abundant with two species (*T. heterophylla* and *T. mertensiana*); but it could also be *Melampsora epitea* f.sp. *ribis-purpureae* Bagyan 2005 with gooseberries and currants (*Ribes*) as the alternate host.

[f.sp. is the abbreviation for *forma specialis*, special form, an informal name allowed by the International Code of Nomenclature for algae, fungi, and plants that is most commonly used for fungi with an alternation of generations with specific hosts]

These are the *uredia* that produce *urediniospores*.

Melampsora medusae Thümen, 1878, poplar rust

meh-dew-see (or say) 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. 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 yet seem to grow into it, unlike the other rusts I've encountered. These are the *uredia* that produce *urediniospores*.

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 photograph 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 photographs 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**

plan-tay Latin *planta,* sprout, shoot or cutting. The broader sense of "any vegetable life, vegetation generally" is first recorded in the 1550s.

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. Plantae sensu Copeland, 1956 includes the algae.

The classification scheme that I use 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).

Hitchcock, C.L. and A. Cronquist. 2018. Flora of the Pacific Northwest: An Illustrated Manual, 2nd Edition. Edited by D.E. Giblin, B.S. Legler, P.F. Zika, and R.G. Olmstead. University of Washington Press, Seattle, WA. [abbreviated Flora PNW (2018) in notes]

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. 2015. *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

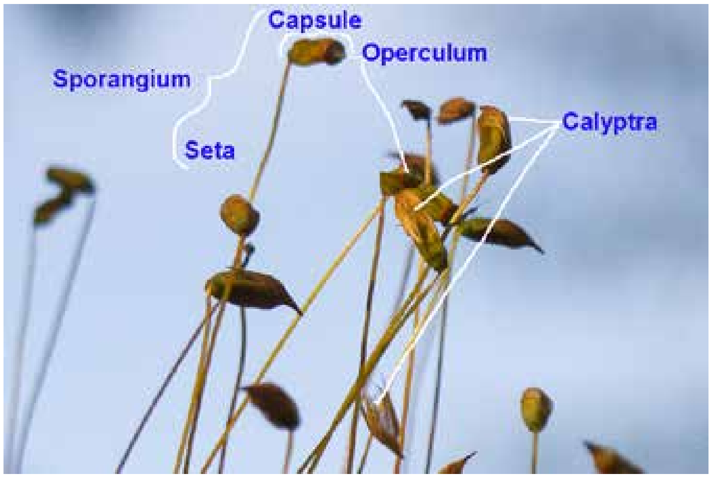
Subkingdom unnamed–non-vascular plants

This group is traditionally called the bryophytes and has been given the formal name as Bryophyta A. Braun (1864). 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, 1*n* 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*

heh-pa-tih-co-fie-tuh	Latin *hepaticus,* pertaining to the liver, hence Hepaticae, a former name for liverworts + Ancient Greek φυτόν *phutón*, plant

Taxonomy: synonym Marchantiophyta Stotler & Crandall-Stotler 2000 (this name represents an attempt to base names on type specimens)

mar-can-tee-o-fie-tuh	from the type genus *Marchantia*; New Latin, 1753, honorific for botanist Nicholas Marchant

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

heh-pa-tih-cop-sih-duh

Taxonomy: synonym Marchantiopsida Stotler & Crandall-Stotler 2000

Order Marchantiales Limpricht 1876

mar-can-tee-all-ees	from the type genus *Marchantia*; New Latin, 1753, honorific for botanist Nicholas Marchant

Family Conocephalaceae K. Müller ex Grolle 1972

co-no-seff-all-a-suh-ee	from the type genus *Conocephalum*

Conocephalum F.H. Wiggers 1780

Latin kawn-awe-SEFF-ah-lum, American co-no-seff-all-um		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.




Taxonomy: 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. There are some who consider the Western North America material to be *C. conicum*, but I've not found literature to support it.

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 photograph on the right from August 9, 2012 shows it with sporangia. I must admit to being a bit confused by what I'm seeing. The female archegonia I'm used to seeing 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]

Since 2012, I've gotten good at spotting sporophytes and the flattened top maroon are indeed male, with the conical form female. When young they are green and mature into a tawny tan color. I now see them early spring, every year. They were out the earliest I've ever seen on April 12, 2016 at the normal weeping wall on the East Glacier trail. They disappear in short order and after two weeks there is no sign they ever existed.

Family Marchantiaceae Lindley, 1836

mar-can-tee-a-suh-ee New Latin, 1753, honorific for botanist Nicholas Marchant

As currently circumscribed, the family contain four genera: *Bucegia*, *Marchantia*, *Neohodgsonia* and *Preissia*. It formerly included *Asterella*, now in family Aytoniaceae; *Conocephalum*, now in the Conocephalaceae; Dumortiera, now in the Wiesnerellaceae; *Lunularia*, now in the Lunulariaceae; and *Reboulia*, now in the Aytoniaceae. *Marchantia* is almost certainly in our area, but I've never encountered it.

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 Chalaud, 1930

mets-jer-ee-all-ees from the type genus *Metzgeria*; honorific for German copper engraver and art restorer Johann Metzger (1771–1844)

Family Pelliaceae Grolle, 1972

pell-ee-uh from the type genus *Pellia*

Pellia Raddi 1818

PELL-ee-ah Honorific for L. Pelli-Fabbroni, a Florentine friend of moss botanist Karl Gustav Limpricht (1834–1902)

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 Schimpler sensu stricto *mosses*

bry-o-fie-tuh from the type genus *Bryum* + Ancient Greek φυτόν *phutón*, plant

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

bry-op-sih-duh

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

bry-all-ees

Family Bryaceae Schwägrichen 1830

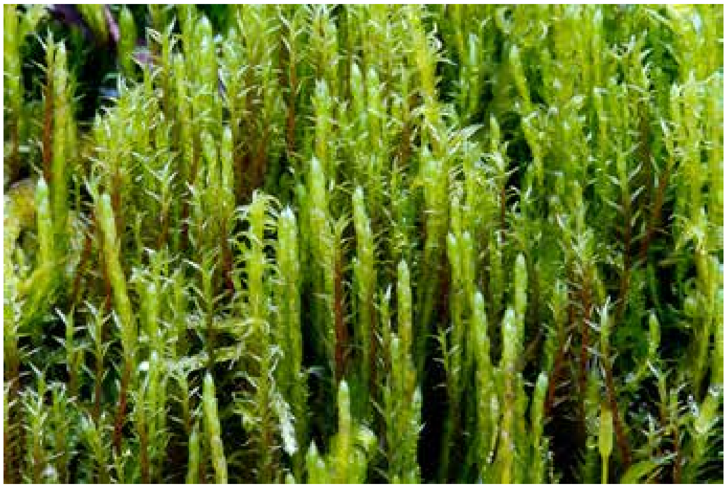
bry-a-suh-ee

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

nie-a-suh-ee from the type genus *Mnium;* Greek μνιον *mnion,* moss

Leucolepis Lindberg 1868

Latin lew-CAW-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

or-thow-trih-kay-suh-ee   from the type genus *Orthotrichum*; Ancient Greek ὀρθός orthós, straight, right, proper + Late Greek θρίξ *thríx*, hair

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 photograph and description for this identification. I love the pinwheel growth pattern of the whorls of leaves.

Order Hypnales W.R. Buck & Vitt 1986 ***feather mosses***

hip-nal-ees　　from the type genus *Hypnum*; Late Greek *hypnon*, a moss

Family Brachytheciaceae Schimper1876

bra (as in bracket)-key-thee-a-suh-ee　　from the type genus *Brachythecium*; Ancient Greek βραχύς *brakhús*, not far off + Latin -*thecium*, case, capsule, sheath, container, receptacle

Isothecium

ice-oh-THEE-see-um　　Greek ἔσος *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

hi-low-co-me-a-suh-ee from the type genus *Hylocomium*

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".

Rhytidiadelphus (Limpricht) Warnstorf 1901

rye-tih-dee-ah-DELL-fus Literally "the brother of *Rhytidium*" from the genus *Rhytidium* and Greek αδελφός *adelphos*, brother; alluding to relationship

Rhytidiadelphus loreus (Hedwig) Warnstorf 1906, lanky moss, little shaggy moss (England)

lore-ee-us   Greek λουρί, *lourí,* strap to Latin *loreus*, made of leather strap or thong; probably referring to the greatly narrowed leaf apices.



This is, for me at least, one of the easier mosses to spot, even if one has no name for it. While placed with the feather moss, it doesn't look anyting like a feather and cursory glaces at guides will lead one astray based upon that character.

A major forest groundcover, 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. I almost always find this moss in the more recently deglaciated forest areas which leads me to think this is something of a pioneer species. I rarely find it at all along the Rainforest Trail or Herbert Glacier Trail in the old growth forest.

The fruiting bodies are hard to find for such a common moss, but at the right time, once one is spotted, others will usually be found. The egg-shaped 1.3–2.5 mm capsules are deep red drooping atop red to deep brown wiry stalks. The mature in late winter and are found not long after the snow cover melts.

Family Hypnaceae Schimper 1856

hip-naye-suh-ee   from the type genus *Hypnum*; Late Greek *hypnon*, a moss

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

pla-gee-oh-NIGH-um Greek πλάγιος *plagios*, oblique thus sideways, slanting, sloping + μνιον *mnion*, Classical Greek for moss; regarding the arching stem

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

paw-lih-trih-cal (as in cat)-ees Greek πολύς *polus,* many + Late Greek θρίξ *thríx*, hair

Family Polytrichaceae Schwägrichen 1830

paw-lih-trih-cay-suh-ee

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

Synonym: *Polytrichum urnigerum* Hedwig 1801

Class Sphagnopsida Schimper 1968

s'fag-nop-sih-duh from the type genus *Sphagnum*

Order Sphagnales M. Fleischer 1904

s'fag-nal-ees

Family Sphagnaceae Dumortier 1829

s'fag-nay-suh-ee

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).

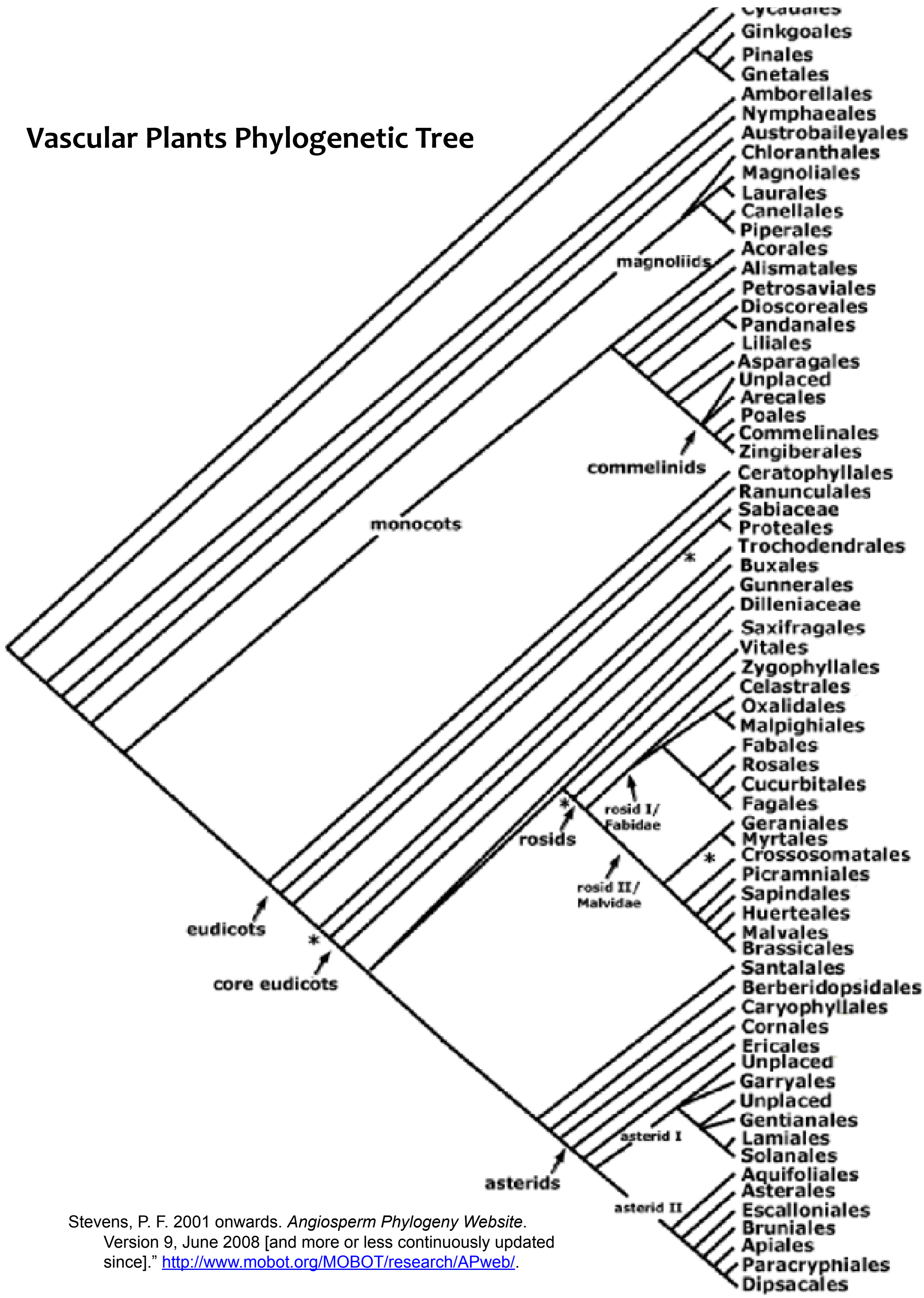
There are four species of Sphagnum in the National Forests of Alaska that helps me narrow the 90 species treated in FNA! Only two are green and shaggy sphagnum has leaves that bend off the stem at right angles for a very different look. For serious taxonomic work, a microscope is necessary to examine 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.

Subkingdom Tracheophyta Sinnott, 1935 ex Cavalier-Smith 1998***, Vascular plants***

tray-key-o-fie-tuh Ancient Greek τραχεῖα *trakheîa*, windpipe, for the vascular structures of plants + Ancient Greek φυτόν *phutón*, plant

The lines on this phylogeny indicate common ancestors and relationships to all vascular plants. The listing of orders on the right is a linear representation of this phylogeny and I use it for the ordering of vascular plants that follows. Note that this phylogeny is inclusive of all plants, and many of these orders do not occur in Alaska.



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*

lie-co-poe-dee-o-fie-tuh from the type genus *Lycopodium* + Ancient Greek φυτόν *phutón*, plant

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.

Lycopodiophyta now circumscribes the clade with club mosses, spike mosses, and quillworts. This clade is basal and equal to what has been called Euphyllophytina, an unranked clade that includes the ferns and seed plants. This places them far distant from the ferns, with whom they have been placed for a very long time. Even the loose term "fern ally" belies their distant relationship with ferns. They are better placed here, at the beginning of the vascular plants than with the ferns.

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 clubmosses

lie-co-poe-dee-op-sih-duh from the type genus *Lycopodium*

clubmosses derive their name from the club-like form of the strobili (spore bearing structure) and superficial resemblance to mosses.

Order Lycopodiales De Candolle ex Berchtold & J. Presl 1820

lie-co-poe-dee-al-ees from the type genus *Lycopodium*

This order contains on the extant Lycopodiaceae and extinct Drepanophycaceae (Late Silurian to Late Devonian age, 427 to 359 million years ago).

Family Lycopodiaceae Palisot de Beauvois ex Mirbel 1802 Lycopodium

lie-co-poe-dee-a-suh-ee from the type genus *Lycopodium*

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 remarkably little interspecific hybridization. I'm using it in the narrow sense here. Synonmyns as *Lycopodium* are included for each species in its "new" genus.

It takes a very practiced eye to separate our clubmosses. The first thing to look for are strobili, the spore-bearing structures, 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 photographs. 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 photograph 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 photographs 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

Taxonomy: *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

Synonym: *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 branchless erect stem arising from a running stolon.

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 ***ferns, s'aach, and horsetails***

tear-ih-do-fie-tuh from the type genus *Pteris* (Ancient Greek πτέρις *ptéris*, fern) + Ancient Greek φυτόν *phutón*, plant

Taxonomy: synonym Monilophyta P.D. Cantino & M.J. Donoghue, 2007. This forms the clade that includes the eusporangiate (sporangia arise from several epidermal cells, the whisk ferns, grape ferns and horsetails) and leptosporangiate (sporangia arise from a single cells, all others) ferns, excluding lycophytes and seed plants, the very traditional understanding of "fern".

Class Equisetopsida C. Agardh 1825

eh-kwiss-eet-op-sih-duh from the type genus *Equisetum*

Order Equisetales de Candolle ex von Berchtold & J. Presl 1829

eh-kwiss-eet-al-ees from the type genus *Equisetum*

Family Equisetaceae L.C. Richard ex de Candolle 1805 **horsetails**

eh-kwiss-eet-a-suh-ee from the type genus *Equisetum*

Equisetum Linnæus 1753, horsetails, scouring rush

eh-kwiss-ee-tum Latin *equis*, horse, and *seta*, bristle

When I spot a horestail there are two characters I look for immediately to help identify which species it is. First, and easiest, are the stems branched or unbranched? Second, is are the stems annual or are they persistent over the winter?

Equisetum arvense Linnæus 1753, common horsetail, field horsetail

are-VEN-sis Latin *arvensis*, from the field



This horsetail tests my first test! Almost as soon as the snow melts away from the ground, but with many feet of it still nearby not yet melted, the unbranced fertile stems of this horsetail appear in early spring where afternoon sun shines. I've encountered this plant many times in many places in North America, except in Georgia. It has a wide range in the temperate and boreal belt around the entire Northern Hemisphere but almost entirely lacking in the Southeastern United States and Texas. Until my Alasaka experience, I'd never seen the early-erupting fertile stems that are not branched and completely lack chlorphyll. 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 two photos of fertile stalks on the right show the sheaths that bear the "leaves" which are reduced to a whorl of deep chestnut teeth.The sporophylls atop the fertile stem almost look like a morel mushroom or a Turkish head wrap or even a brown Russian Easter egg!

About a month after the fertile shoots erupts, the sterile shoots come out. They are ~5 mm diameter, hollow and bright green. A dozen or more tiny, ~1 mm, solid branches come out in a tight whorl at each node, ~2.5 cm.

The plant is abundant and a problem weed in the Juneau area as it grows in lawns, plantings and just about anywhere one looks for it. It is difficult to control as the stolons grow aggressivley. 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 a perennial, erect shoot arising directly from the ground. The stems are thick yet hollow with strong ridges that can be seen as well as felt when the stem is rolled between fingers. The fertile and sterile stems are alike as some stems have strobili and some do not. The "cones"(sporophylls) develop in midsummer at the tip of the stem.

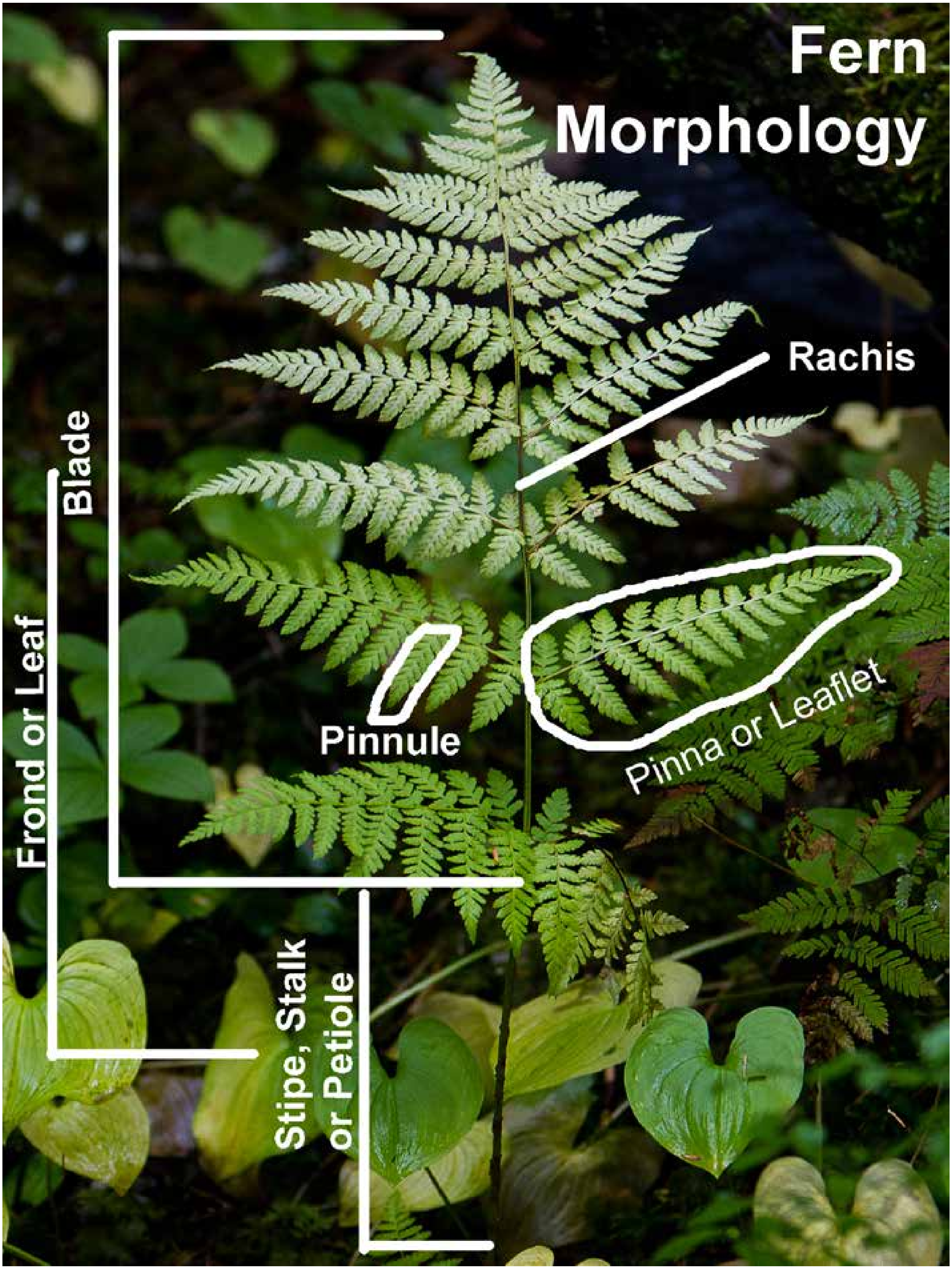
Almost exclusively an aquatic plant, it is abundant in the shallow waters of nearly all the ponds in the Dredge Lakes and Mendenhall campground area. Here the stems are deep green, producing more chlorophyll than the Dredge Lake plants as this environment is far darker.

Equisetum variegatum Schleicher ex F. Weber & D. Mohr subsp. ***alaskanum*** (A. A. Eaton) Hultén 1941, northern scouting rush

vare-ih-gay-tum   Late Latin *variegatus* made of various sorts or colors   ah-lass-cah-num of Alaska

This species has unbranched stems that are persistent. The stems are usually very dark green, stiff and break with a snap. Strobili are born on some of the branches and mature in the summer.

This patch is at the base of a weepy wall on the East Glacier Trail.


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

pol-ee-poe-dee-al-ees   from the type genus Polypodium

Family Dennstaedtiaceae Lotsy 1909 **bracken fern**

den-stayed-tee-a-suh-ee   from the type genus *Dennstaedtia*; honorific for German botanist August Wilhelm Dennstedt (1776 - 1826)

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 photograph 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**

tare-ih-day-suh-ee from the type genus *Pteris*; Greek πτέρις *pteris*, fern

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 photograph). 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**

sis-TOP-ter-ih-day-suh-ee — from the type genus *Cystopteris*

Cystopteris Bernhardi 1805

Latin kiss-TAWH-tear-is, American sis-TOP-ter-is — Greek, κιστις *kystis*, a bag + Greek πτέρις *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 photograph shows.

Family Aspleniaceae Newman 1840 **spleenworts**

a-spleh-nee-a-suh-ee from the type genus Asplenium

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

<u>Taxonomy</u>: 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.

<u>Notes</u>: This photograph 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**

thel-ip-tear-ih-day-suh-ee from the type genus *Thelypteris*; Ancient Greek θῆλυς *thēlys*, female, feminine + Greek *πτέρις* pter*is, f*ern

Phegopteris (C. Presl) Fée 1852

feh-gawp-ter-is Greek φεγος *phegos*, beech + Greek *πτέρις* pter*is, f*ern

Phegopteris connectilis (Michaux) Watt, 1866, northern beech fern, narrow beech fern

Latin con-NECK-tih-lis, American con-neck-TIH-lis 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**

woods-ee-a-suh-ee from the type genus *Woodsia*

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

ill-ven-sis *Ilvensis* is the Latinization of Elba, the island off Tuscany and 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**

BLEK-nay-suh-ee from the type genus *Blechnum*

Struthiopteris Scopoli 1770

strew-thee-op-ter-is Latin *struthio* ostrich +↱-*ous* relating to + Greek φτέρη *ftéri*, fern, derived from πτερών *pteron*, wing or feather, for the closely spaced pinnae, which give the leaves a likeness to feathers; from the fern's resemblance on an ostrich feather

The Pteridophyte Phylogeny Group classification of 2016 (PPG I) moved five species, including ours, into *Struthiopteris* based upon

de Gasper, L.A., V.Antonio de Oliveira Dittrich & A. Salino. 2016. *A classification for Blechnaceae (Polypodiales: Polypodiopsida): New genera, resurrected names, and combinations*. Phytotaxa 275 (3).

Struthiopteris spicant (Linnæus) F.W. Weiss 1770, deer fern, hard fern, redwood fern

spih-CANT Latin *spica*, spike

Taxonomy: Formerly placed in the Polypodiaceae.

Synonyms: *Osmunda spicant* Linnæus 1753
Acrostichum spicant (Linnæus) Willdenow 1787
Lomaria spicant (Linnæus) Desvaux 1811
Blechnum spicant (Linnæus) Smith 1873, this is the most commonly used name for this fern
Lonchitis-aspera spicant (L.) Farwell 1931

Notes: As a deep green evergreen fern, it survives the snowy winter blanket and exposes its fronds allowing photosynthesis as soon as it escapes from the snow cover. Fronds from the previous season lay prostrate on the ground while the new growth rise quickly from the rootstock in late May until early June. Sterile fronds are pinnatifid (divided, but not all the way to the stem) and tapered at both ends.

It has dimorphic fronds where the fertile have a different form than the sterile. 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. It is almost a constant companion in the forested parts of the Bessie Creek Trail.

Family Athyriaceae Alston 1956 **lady ferns**

ah-THEER-ee-a-suh-ee from the type genus *Athyrium*

Athyrium Roth 1800

ah-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. 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*)

Synonyms: This species is one confused mess, and this is an edited list of synonyms. Note all the names given the same year by Franz Josef (Ivanovich) Ruprecht. I'm following Hultén and most western botanists with the subspecies taxa.

Athyrium alpestre (Hoppe) Clairville 1811 var. *cyclosorum* Moore (unreferenced in TROPICOS!) for a boreal form
Athyrium cyclosorum Ruprecht 1845
Athyrium filix-femina var. *sitchense* Ruprecht 1845
Athyrium filix-femina var. *cyclosorum* Ruprecht 1845
Athyrium angustum (Willdenow) C. Presl var. *boreale* Jennings 1918

Notes: If you look carefully at the large ferns (waist high or more), 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 more commonly, taller than a man's waist (1.5 m). I've seen it 2 m tall, with the tip well over my head.

If the twice divided (2-pinnate to 2-pinnate-pinnatifid) fern is tapered at both ends, it is lady fern. It can be broadest near the middle, elliptic, of broadest near the tip, oblanceolate. 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 trail side 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. Some people are sensitive

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Family Dryopteridaceae Herter 1949 **wood ferns**

dry-op-tare-ih-day-suh-ee   from the type genus *Dryopteris*

Dryopteris Adanson 1763, wood fern

dry-op-tur-is   Greek δρυς *drys*, tree + Greek *πτέρις* pter*is, f*ern

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-eye Honorific for Alaskan botanist Jacob Peter Anderson (1874-1953)

Taxonomy: Formerly placed in the Polypodiaceae and Aspidaceae. While originally described in 1913 as a distinct species, this fern was interpreted as a variety of Braun's holly fern in the lumping days of the 1960's and now reconsidered as a full species.

Synonyms:
P. jenningsii Hopkins 1917
Polystichum braunii (Spenner) Fée subsp. *andersonii* (M. Hopkins) Calder & Roy L. Taylor 1965
Polystichum braunii var. *andersonii* (M. Hopkins) Hultén 1968

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 photograph 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 (photograph 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 photographs when preparing this account that were wrong! This fern is smaller, narrower, darker and less cut than the lady fern.

Polystichum lonchitis (Linnæus) Roth 1799, holly fern, northern holly fern

lawn-chi-tis		Greek λόγχ, *logché*, lance or spear

Being extremely familiar with the Christmas fern (*Polystichum acrostichoides*) of the Eastern deciduous forest, this fern at least resembles what I've seen as opposed to Anderson's holly fern. Like Christmas fern, this is once-pinnate (a single division of the frond into leaflets) and the base of each pinnae has an auricle ("ear") on the distal (toward the tip) side, visible in the bottom right photo above. This fern is much more coriaceous (leather-like) and stiff.

If one carefullyt observes the cliffs of East Glacier Trail, this fern is fairly obvious at the base of the several cliffs and in some of the rock crevices.

A hybrid between *P. a.* and *P.l.*, *P .* × *hagenahii* Cody is "known only from its type locality in Ontario, where it grows with both parents" (FNA).

Family Polypodiaceae Berchtold & J.C. Presl 1820 **polypodys**

polih-poe-dee-a-suh-ee		from the type genus *Polypodium*

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 photograph), but note their absence from the base of the leftmost pinnae but an unopposed sori at the base of the third pinnae (second photograph) as well as several single sori at the distal ends. In the first photograph 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 photograph.

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 P.D. Cantino & M.J. Donoghue, 2007*, Extant Gymnosperms*

a (as in cat)-row-jim-no-sperm-aye Ancient Greek ἄκρος *ákros*, highest, at the extremity + Ancient Greek γυμνός *gumnós*, naked + σπέρμα *spérma*, seed

<u>Taxonomy</u>: 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, Alaska, 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 in a 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 but still have four sides.

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!

Sitka spruce flowers every year, but periodically it flowers with great abandon in impressive showings that only become obvious when the staminate flowers are ripe and the pollen is released to the winds. The left photograph is of the flanks of Thunder Mountain on May 24, 2010 and the right is the northwest corner of Douglas Island near Outer Point on May 12, 2014. Spring of 2019 produced another tremendous pollen year and copious crop of cones. I have now experienced an every four year pattern of extreme spruce pollen. The photos show winds carrying massive amounts of spruce pollen upslope. There are so many staminate strobili that they color the tree from its normal blue-green to brown-green when viewed from a distance. The following years (2011 and 2015) produced a copious crop of cones. With abundant food from the seeds of all these cones, the Pine Siskin remained in Juneau until August instead of their normal May departure for the interior. Red squirrel harvested so many cones that the forest floor in many places was littered with branches, many with untouched cones due to the obvious bounty.

In August of 2019 I found spruce needle rust on many trees in Mendenhall Campground. See *Chrysomyxa ledicola* for a description.

Pinus Linnæus 1753, pines

PIE-nus Latin *pinus*, pine that may derive from the Indo-European base _*pīt-_ ‘resin for the tree’s abundant sa.

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 photographs) 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 photograph 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. There are several plants in the kettle pond above A.J. Falls on the East Glacier Trail of all places! 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. It is in many of the deeper ponds of the larger "meadows" on the Bessie Creek Trail. 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

<u>Taxonomy</u>: 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, <u>x</u>'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 Photograph 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 glutinosa (Michaux) Baker 1879, , 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.

Once removed from *Tofieldia* and placed in *Triantha*, the relationship of the four named species was found by Azuma & Tobe to be so close as to be unresolvable. They remain in the literature as *T. glutinosa*, *T. japonica*, *T. occidentalis* and *T. racemosa*. FNA notes "In the absence of any clear understanding of evolutionary relationships within *Triantha*, the species are here listed alphabetically." *T. glutinosa* and *T. occidentalis* share nearly the same distribution. FNA makes the bold statement about *T. glutinosa* "inflorescence never forming globose head". Many of our plants have the raceme so tightly bunched it resembles a "globose head" confusing matters as my photos illustrate. The key to *Triantha* in Flora of PNW (2018) is helpful:

1a Seed coat tightly and smoothly fitted except at the ends, the seed thus brown; both ends of the seeds tailed;... *T. glutinosa*
1b Seed coat loosely fitted to inflated, often spongy or irreg shaped, the seed thus whitish; ... *T. occidentalis*

Using this and iNaturalist (2020) when I look at the seeds (as in the photo above) these clearly are *T. glutinosa*.

Azuma, H. & H. Tobe. 2011. *Molecular phylogenetic analyses of Tofieldiaceae (Alismatales): family circumscription and intergeneric relationships*. Journal of Plant Research 124(3):349-357. doi:10.1007/s10265-010-0387-5.

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. As my explorations widen and eyes become more accurate in Juneau, this is a common plant of the eastern shore of Mendenhall Lake in the area where the fine clay settles on the sands making a soil that drains when the rain stops. It's flowering period is brief, just a week or two in mid-June. It is often tucked just under or beside larger plants such as the ubiquitous willows. Perhaps the slight elevation here provides additional drainage. The plant is "hydric" but not "aquatic". 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 color is actually amazingly variable as they can be pure "chocolate" to nearly pure deep green suffused with brown to mottled with both colors. The most common is mostly "chocolate" with some streaky patches of greenish-brown.

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. They are beyond abundant on the Kaxdigoowu Héen Dei in the meadow the 2020 trail goes through. They are common on the drier edges of most muskegs including Spaulding Meadows. They also come up in my yard every year, much to my pleasure!

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, tleik̲w kahínti

am-plex-ih-foal-ee-us. Latin *amplexi-*, embrace, clasp, clasping + Greek φύλλο *fyllo*, leaf; for the clasping leaves






Taxonomy: 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.

Notes: 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 *tleiḵw 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. It is abundant along the Auke Village Recreation Area trails, especially on the way to Point Louisa. 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**

Ancient Greek ὄρχις *órkhis*, usually written as *orchis*, testicle. First used by Theophrastus in his *De Historia Plantarum*, On the Natural History of Plants apparently due to a resemblance of the tubers of some species to testicles.

Taxonomy: see notes under Liliaceae.

Bowles, M. & B. Armstrong. 2019. *Native orchids in Southeast Alaska with an emphasis on Juneau*. Available from www.naturebob.com.

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 *ll* 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.*! Their key to separating the two

Tip with rounded lateral lobes; mentum obscure, adnate to edge of ovary; dorsal sepal 4.7–15 mm; column 3.3–7.8 mm.
6 *Corallorhiza maculata*
Tip with acute lateral teeth; mentum prominent, protruding backward along but free from ovary; dorsal sepal 6–12 mm; column 5–8.2 mm.
7 *Corallorhiza mertensiana*

If you look carefully, the "acute lateral teeth" can be seen in the middle two photos on the bottom row.

Notes: Wife Annette first found and photographed this plant in 2007 (top left photo) along the Auke Village Recreation Area trail and we've found it there each season since, and as this photograph 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. It is common in the nearly old growth spruce woods on the trail out to Point Louisa where I photographed the top right two phots on June 22, 2012 and the bottom four on June 28, 2020. I've found spent inflorescences on the Rainforest Trail.

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 (photograph 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 another "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).

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 photographs 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?

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. Spring of 2020 has them coming up over a wide area, but in small numbers of stems, often only one. I've heard it said many times that orchids don't usually come up in exactly the same place every years. Our experience with this little orchid shows it to be true.

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 and Outer Point 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 bud out in early June but remain that way until the end of July! The flowers only last about a week before withering and the capsule began swelling with flowering. On East Glacier, many rosettes do 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.

Neottia Guettard 1754, twayblades

nee-awe-tee-uh Ancient Greek νεοτια *neottia*, nest, in reference to the tangled mass of roots

Taxonomy: The twayblades were originally included in this genus whether or not they had chlorophyll. The genus *Listera* Robert Brown 1813, was created to account for those that had chlorophyll, leaving those without in *Neottia*. They are now reunited as modern phylogenetic studies show that those lacking chlorophyll were derived from those that had it making two general polyphyletic. *Neottia*, being the older name has priority.

Neottia banksiana (Lindley) Reichenbach filius 1863, northwestern twayblade

bank-see-an-uh Honorific for English naturalist, botanist and patron of the natural sciences Sir Joseph Banks, 1st Baronet, GCB, PRS (1743-1820) who led Kew Gardens to pre-eminence.

Taxonomy: Synonyms *Listera banksiana* Lindley 1840; *Listera caurina* Piper 1898; *Ophrys caurina* (Piper) Rydberg 1905, *Neottia caurina* (Piper) Szlachetko 1995. When moved into *Listera*, the epithet with priority is *banksiana* so this is the proper name.

Notes: Both species of *Neottia* occur in the deep shade of mature spruce and hemlock forests where the middle story of shrubs is nearly absent and the forest floor is a thick carpet of moss. They often form colonies into the hundreds of individuals of mixed ages, some, presumably younger, only have leaves.

I nearly always find both species of twayblade together as the left photograph from the Tolch Rock Trail illustrates where *N. cordata* is on the left and *N. banksiana* 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. *N. caurina* has egg-shaped leaves that are twice as long as broad with 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 with the outline of a bell. The outer edge may be slightly 3-lobed or just wavy. 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 *N. cordata*.

There are hundreds of both species in the mossy flat forest on the West Glacier Trail and scattered about on the Rainforest Trail. Many small colonies are along the Nugget Creek Trail in the deep, mossy shade.

Neottia cordata (Linnæus) Richard 1817, heart-leaved twayblade

kor-dah-tah. Latin *cordi-* from *cor,* heart

Taxonomy: Synonyms *Ophrys cordata* Linnæus 1753; *Listera cordata* (Linnæus) Robert Brown 1813; *Distomaea cordata* (Linnæus) Spenner 1825; *Pollinirhiza cordata* (Linnæus) Dulac 1867; *Serapias cordata* (Linnæus) Steudel 1821.

Two varieties have been named under the genus *Listera* that lack a published name as *Neottia*. FNA key attempts to separate them:

Leaf blades 0.7–2 cm wide; lip 3–4 mm; flowers yellow-green, green, or reddish purple.	var. *cordata*
Leaf blades 1.8–3.8 cm wide; lip 5–6 mm; flowers green to yellow-green.	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: Both species of *Neottia* occur in the deep shade of mature spruce and hemlock forests where the middle story of shrubs is nearly absent and the forest floor is a thick carpet of moss. They often form colonies into the hundreds of individuals of mixed ages, some, presumably younger, only have leaves.

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 *Neottia banksiana*. 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 *N. banksiana*.

Platanthera Richard, 1817 rein-orchids, bog orchids

Latin plah-TAN-thur-ahm, American 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, white bog-orchid, bog candles

dill-ah-tay-tah. Latin *dilatatus*, dilated; widened out, referring to the lip of the flower.

Taxonomy: The three varieties in the North American flora are separated by variations in the spur length: short, intermediate and long. The short-spurred variety, *albiflora*, is apparently absent from Southeast Alaska. FNA includes this idea explaining the differences:

> These infraspecific taxa seem to reflect differing pollination pressures. The moderate spur length and diurnal fragrance of var. *dilatata* suggests

adaptation to diurnal Lepidoptera; the long spurs and primarily nocturnal fragrance of var. *leucostachys* indicates specialization for moth pollination, and the short spurs and often broader viscidia of var. *albiflora* suggest a broader range of pollinators or, in extreme cases, specialization for bee or fly pollination.

Bowles & Armstrong (2019) have observed long-tounged hawk-moths and owlet moths visiting var. *leucostachys* and speculate "moths of bees with tongues as long as nectar spurs may be able to access nectar and be effective pollinators" for var. *dilatata*.

The FNA key our varieties:

Spur about equal to lip (mostly within 2 mm).	*Platanthera dilatata* var. *dilatata*
Spur markedly exceeding lip (commonly 11/2 or more times length of lip).	*Platanthera dilatata* var. *leucostachys*

Notes: White bog orchids are the most common of orchids in the Juneau area. 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!

Platanthera dilatata (Pursh) Lindley 1833 ex L.C. Beck var. ***dilatata***, small bog candles

Notes: This, the short-spurred (~ 8 mm), variety seems to prefer a bit higher elevation and the muskegs in the Juneau area. They are abundant in nearly all the muskegs on the east side of Douglas Island, especially so in Gastineau Meadows. The plants usually have a thin or narrow appearance with the inflorescence stalk about that of a standard wood pencil, ~ 6 mm. The height of the inflorescence varies greatly and I find no correlation of it to help distinguish the varieties unlike the "thinness" or "stoutness". With a very close look, one might discern that the lip has just a bit broader or widened-out (dilated) on this variety (see the lower right photograph) and the spur might have a bit of a club or bulb at the base (clavate). I find these characters to be very subtle and have made no effort to measure or correlate them with the varieties so it is a general sensing or *gestalt* of the variety.

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 in July of 2018. It is subtle, but spicy and very pleasant.

Platanthera dilatata (Pursh) Lindley 1833 ex L.C. Beck var. ***leucostachys*** (Lindley) Luer 1975, large bog candles

Greek λευκός *leucos*, white + σταχυς, *stachys*, an ear of grain, for the spike of white flowers

Notes: The plants usually have a stout appearance with the inflorescence stalk about that of a finger or even thumb. The leaves seem to me to be a bit wider than the short-spurred form, and a bit more closely spaces on the inflorescence stalk below the flowers. The height of the inflorescence varies greatly and I find no correlation of it to help distinguish the varieties. With a very close look, one might discern that the lip is just a bit narrower on this variety (see the right two photographs) and the spur is more uniformly cylindrical I find these characters to be very subtle and have made no effort to measure or correlate them with the varieties so it is a general sensing or *gestalt* of the variety. The spur is obviously far longer than the lip and easy to see 10 feet away from the plant.

This, the long-spurred (~ 14 mm), variety seems to prefer a bit lower elevation in the meadows of the Juneau area. It is abundant along the east road bank ditch of Glacier Highway from the Fred Meyer store south. There is a small clump (left photo above) below the Steep Creek Trail boardwalk above the kettle pond. Many plants are scattered in the somewhat open mossy areas of the Moraine Ecology Trail by lakes on the west side. It is reported from the south shore of Mendenhall Lake but I've not encountered it there yet. A few show up every summer along the more open sections of the flat portion of the West Glacier Trail.

Platanthera stricta Lindley 1835 slender bog-orchid, green bog orchid

strik-tah. Latin *strictus*, tight, close, strait

Taxonomy: Synonyms *Habenaria borealis* var. *viridiflora* Chammisso 1828; *Habenaria saccata* Greene 1895; *Limnorchis stricta* Rydberg 1900; *Platanthera gracilis* Lindley 1835 (*sensu latu*); *Platanthera saccata* (Greene) Hultén 1968; *Platanthera hyperborea* var. *viridiflora* Luer1975. FNA makes this note that helps sort out all of the synonyms and the differing ideas of the authors:

> *Platanthera stricta* have in common more or less saccate spurs, orbiculate viscidia, and leaves that abruptly diverge from the stem, often at angles approaching 90º (this feature is sometimes obscured in sheltered, deeply shaded habitats). The plants described as P. gracilis Lindley are florally typical of the slender-spurred extreme of *P. stricta*; they differ only in peculiarly reduced, slenderly oblong but nonetheless abruptly wide-spreading leaves. The plants figured by C. A. Luer (1975) as *P. hyperborea* var. *gracilis* (Lindley) Luer are not referable to *P. stricta* but rather are apparently hybrids of *P. stricta* and *P. dilatata*. Critical study of the description of *Habenaria borealis* var. *viridiflora* Chamisso and an evident isotype show this plant to be referable to *P. stricta*, although the name has been applied to *P. huronensis* in the Northwest and to *P. convallariifolia* in Japan.

Notes: This is the common green bog orchid, with the flowers arranged in a tight and narrow spike, giving it the common name. It is far less common than white bog orchid, but still found in nearly every muskeg I explore. It is nearly absent from the roadside slopes along Glacier Highway. The lip is very prominent and on cursory views almost obscures the nectar spur. When examined closely, the spur is inflated or saccate (or as FNA says, scrotiform!).

So what to do with these plants found in the Sheep Creek valley. Note how the inflorescence stalk is greatly inflated and gives the plant a dramatic look when compared to the "normal" slender bog orchid. Bowles & Armstrong include the comment that "larger plants may be so robust as to appear to be different species from smaller plants". Is this the case with this population? It resembles both *P. aquilonis* and *P. huronensis* in general aspect but the lip and spur don't fit either. I think these are probably hybrids between *P. stricta* and *P. dilatata*. My confusion matches that of all the synonyms. I'm not sure what I'm seeing other than it is a "green bog orchid" and certainly a *Platanthera*.

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, and in fact may be my favorite iris ever. The flowers are large, with petals ~2 cm long, rich purple-blue (as my photos show it can be either blue or purple) 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 beaéch 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 Recreation Area picnic area road. It is abundant in the meadow at Brotherhood Bridge along the 2020 section of the Kaxdigoowu Héen Dei. Look for it in the slightly higher ground areas of all of our muskegs.

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 photograph 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 έριο *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 photograph 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 photograph 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.

<u>Toxicity:</u> 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 photograph 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 photograph 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.

Arcteranthis Greene 1897

arc-ter-ann-this Latin *arcticus*, arctic, northern; from the Greek ἄρκτος *arktos*, a bear; from the northern constellation The Bear (the Big Dipper) + *Eranthis*, another genus in the Ranunculaceae; due to its early flowering in arctic areas.

Taxonomy: Segregated out of *Rannunculus*

Arcteranthis cooleyae Greene 1897, Cooley's buttercup

KOO-lee-aye. Honorific for American botanist George R. Cooley (1896-1986)

Synonyms: *Ranunculus cooleyae* Vasey & Rose 1893
Kumlienia cooleyae (Vasey & Rose) Greene 1894

Taxonomy: Since my first sighting in 2009, this plant has been "officially" in three different genera! Until sorted out, *Ranunculus cooleyae* might be the most conservative and consistent name that still is in common use. In 1894 Greene moved *R. cooleyae* into *Kumlienia* joining *K. hystriculus* as the only two members of the genus. Thee years later he created a new, monotypic, genus for this plant, *Arcteranthis*. His comments in *Pittonia* 3: 190. 1897 are pithy to the point of being comical, but he offers many characters that prevented him from placing this into the available genera.

Notes: 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.

An alpine plant, the first place I find it is on the Mount Roberts Trail (top left photo). 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 Moraine Ecology beach there are three plants that reliably flower each year in a place that is decidedly not alpine (top right photo). But the environment mimics that of the alpine, being exposed and buffeted by cool to cold air all summer long. It, along with several other alpine plants, can be found at low elevation.

Coptis Salisbury 1807

COP-tiss. Greek κόπτω koptein, cutting, as in a slaughter; referring to the dissected leaves

<u>Taxonomy</u>: 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.

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








Notes: 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. I have yet to find a strictly pistillate flower. Mary Willson has conducted an experiment in her garden with this curious mixing of sexual flower parts.

Willson, M.F. & E.M. Anderson. 2007. *Natural History of Fern-leaf Goldthread* (Coptis aspleniifolia) *in Juneau, Alaska*. Northwest Science, Vol. 81, No. 2.

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 photograph 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 as well as the deep forest sections of Kaxdigoowu Héen Dei. The "mother lode" is along the Nugget Creek Trail where they form a nearly continuous ground cover is places.

Coptis trifolia (Linnaeus) Salisbury 1807, three-leaved goldthread, goldenroot, yellow snakeroot, savoyana

try-foe-lee-us for the three-parted leaves


Synonyms: *Helleborus trifolius* Linnæus 1753; *Anemone groenlandica* Oeder 1771, *Coptis groenlandica* (Oeder) Fernald 1929; *C. trifolia* subsp. *groenlandica* (Oeder) Hultén 1937

Notes: This plant will confuse you I'm nearly certain! It sure confused me. I've known about this plant for years but didn't encounter it until hiking up Bessie Creek, June 9, 2020, and found it growing in abundance in all of the "meadows" (really muskegs). Hundreds of flowers that looked like I should know what they are and they really look—at least from eye level—five-leaved bramble (*Rubus pedatus*). I know this plant well from the mossy forests and know it also occurs in muskegs (but I've never seen one in a muskeg), but this plant just didn't look right. The first clue that it is something else is from what I thought were staminodes (a strange sterile form of a stamen) with white stalks and a yellow-oraange clavate tip. No *Rubus* I've ever seen has staminodes. The leaves, although in early development, are also wrong for the little bramble as they are trifoliate not pedate and the margins are dentate and not serrate. My confusion stimulates me to dig futher.

The white "petals" in these photos are not petals but sepals! The "staminodes" are actually the petals! They have become so specialized that they are now home to the nectary which is the yellow-orange structure at their tips. It takes a very close look to determine this and a hand lens is mighty useful. Looking at the flower reveals the lowest whorl is in deed the "petals" that are actually sepals as they occupy the lowest position. Immediately above them are the highly modified petals, and above them the 30-60 stamens. In the midst of all of them are 4-7 pistils.

Unlike *C. aspleniifolia*, *C. trifolia* flowers are all perfect or bisexual as they have male and female parts.

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 ἀκίς *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 photograph 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: The flowers have five or six petals and are up to some three inches across. They can be born singly or it groups in a cyme (where the top flower opens first). The petals are generally egg-shaped and very shiny, and if one looks closely, nectaries can be seen near the base. The leaves vary a great deal but are almost always reniform (kidney-shaped) but the lobes may almost overlap and look circular. The can be deeply divided or not, basal into five segments while the stem are usually have three. All leaves have long petioles. They are a very deep blue-green.

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, 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 as along the new section of Kaxdigoowu Héen Dei. It is serious weed in most Juneau yards and can take over an even vigorous lawn.

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. In 2020 I can't find a single plant!

Ranunculus uncinatus D. Don, 1831, woodland buttercup, little buttercup.

un-sin-AYE-tus   Latin *uncīnātus,* bearing hooks, barbed


While looking weedy, this is a widespread native to Western North America. There is a consistent patch of them on the section of the Trail of Time that goes from the middle parking lot to Dipper Bridge above the pond and against the greenstone cliff where plants get the benefit of afternoon sun and a decidedly warmer experience than in the nearby woods.

The stem leaves are much smaller than the basal leaves but all divided into three toothed lobes. The all have long petioles. Bracts at the base of the inflorescence are almost linear and undivided. The upper stems can reach a meter in length, but are often lax, almost laying on other plants or itself while some are stiff and held up. The flowers have four or five petals that are far smaller than any of the other buttercups here and one almost has to look to find them as the barely smaller green sepals below almost hide them.

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 and Nugget Falls 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

Taxonomy: *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. FNA separates *Micranthes* from *Saxifraga* has having "leaves usually basal; flowering stems usually leafless, rarely leaves crowded proximally at base of flowering stems; seeds ribbed."

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

Taxonomy: As a saxifrage it's name is *Saxifraga nivalis* Linnæus.

Notes: 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

Taxonomy: *Micranthes* was removed from *Saxifraga* in 1812 and again in 2001, this time on molecular phylogenetic evidence. FNA separates *Saxifraga* from *Micranthes* has having "leaves basal and cauline; flowering stems usually with reduced cauline leaves; seeds smooth, tuberculate, or papillate."

Saxifraga bronchialis Linnæus 1753

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]

Our two subspecies are easily separated using this key from FNA:

1. Petals yellow-spotted, distinctly clawed....................subspecies *funstonii*

1. Petals yellow-spotted proximally, purple or red-spotted distally, not clawed............subspecies *austromontana*

Saxifraga bronchialis Linnæus subsp. ***austromontana*** (Wiegand) Pipe 1906, matted saxifrage.

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

fun-stone-ee-eye — Honorific for Frederick N. Funston (1865–1917) who led a botanical survey to Alaska from 1892-1893

Taxonomy: syn. = *Saxifraga funstonii* Small; *S. funstonii* (Small) Fedde

Notes: 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

Taxonomy: 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..."

Notes: 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, purple mountain saxifrage

uh-paws-ih-tih-foal-ee-uh. Latin *oppositus*, opposing; intervention; opposite; against + Latin *folia*, leaf; for the opposite leaves

<u>Taxonomy</u>: Two subspecies are currently recognized based upon the nature of the hairs on the calyx: if bristly it is ssp. *oppositifolia*; if glandular it is ssp. *smalliana* (Engler & Irmscher) Hultén 1968. Examining our flowering material I find both bristly and glandular hairs on the calyx! On April 12, 2016 with very fresh material (flowers only a day or so old) the lower half of the sepals have glandular bristles and the upper are sharp-pointed. This strikes me as a trivial trait to base a subspecies on, by John Kunkel Small named this a full species, *Saxifraga pulvinata* in 1901 (Britton & Rydberg) from material he collected on the higher summits near Lake Bennett along the British Columbia-Yukon border where he notes "sepals softly glandular-pubescent when young" and that it differs from *S. opppositifolia* by "the smaller size, the markedly naked upper part of the flowering stems, the smaller turbinate hypanthium and the slender tips of the follicles". Many of Small's keen-eyed observations have be resurrected and now are full species, but this one really seems a stretch.

Britton, N.L. & P.A. Rydberg. 1901. *An Enumeration of the Flowering Plants collected by R. S. Williams and by J. B. Tarleton*. Bulletin of the New York Botanical Garden 2(6): 172.

<u>Notes</u>: Of all our saxifrages, this is my favorite, probably because it is one of our earliest wildflowers. Some years it can be found in flower in late March if the siting gives it afternoon sun. Several patches adorn the black greenstone along the stairway to the Mendenhall Glacier Visitor Center that when in flower most people simply walk by. They are in very early flower, even for an early flowering plant, on April 11, 2016. 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 the genus 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 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.

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; abundant near the Ebner adit at the beginning of the Perseverance Trail, and along much of the Sheep Creek Trail one in the valley. If one looks closely there are some plants along the Trail of Time, East Glacier Trail and West Glacier Trail where they are a bit more open. They are common, but easily hidden by lush grown along the Treadwell Mine Trail.

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.

<u>Taxonomy</u>: 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.

<u>Notes</u>: 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 or dense woods, they don't have the opportunity to grow in as large a mass and aren't as showy. They are a constant companion in the forest of the Bessie Creek Trail.

Family Crassulaceae J. Saint-Hilaire 1805 **stonecrops**

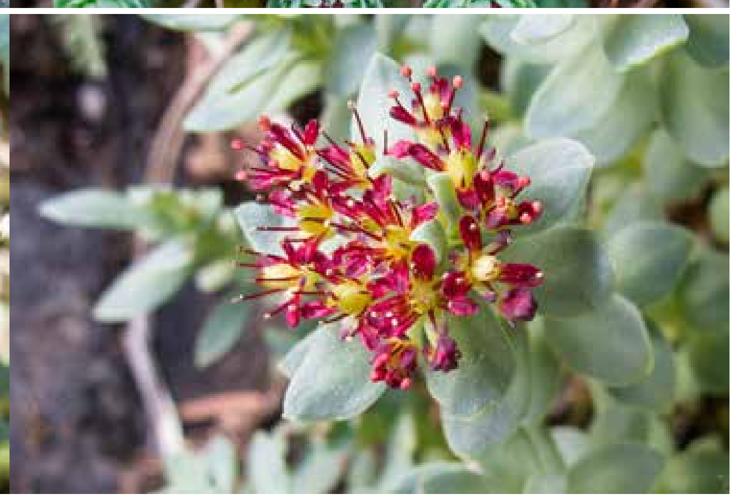
Rhodiola Linnæus 1753

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: The plants are *dioecious* (having the male and female reproductive organs in separate individuals) or *polygamodioecious* (having bisexual and male flowers on some plants, and bisexual and female flowers on others). Most plants are dioecious with a single sex flower. Male flowers are showier as the stamens are much longer than the spreading and hooded deep red-purple petals. Flowers are 4-5-merous (but with stamens twice the number of sepals). Female flower petals are erect and not hooded.

A common plant of rocky places, be it weepy slopes, alpine or beach heads, one can find this anywhere there are exposed rock faces such as those all around the Mendenhall Glacier Visitor Center. The slope below the Trail of Time glacier overlook has many dozens of tufts. 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 some times. I found it in abundance on the rocks of Bishop Point on May 7, 2010, then kept finding it on the East Glacier Trail in many spots showing some color in the opening buds as in this photograph 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? The mystery is solved, but for two reasons. First, because I was seeing mostly the females without the fairly showy stamens. Second, it turns out that some of the "heads" remain closed each year, and while flower buds form, they never open as flowers. It is likely that I found some polygamodioecious plants on the EGT that self-pollinated while never opening and produced fruits (this is called *cleistogamy*).Here is yet another reason to always take a second (or third or seventieth) closer look and try not to assume just because you've seen it once, all others will look the same.

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, beach pea

jah-PON-ih-cuss. Of or pertaining to Japan; hence found in Japan. muh-RIH-thi-muss

Taxonomy: Recent treatments (iNaturalist; Flora of PNW (2018), E-Flora BC 2020) choose to consider this a Pacific coast plant of both Asia and North America with the name *Lathyrus japonicus* covering all forms. The many subspecific taxa seem to be now fairly abandoned with the exception of *Lathyrus japonicus* var. *maritimus* (Linnæus) Kartesz & Gandhi 1991, the name would apply to our plants. The differences between them are based upon pubescence that doesn't seem to fit any pattern, geographic or otherwise.

Synonyms: *Pisum maritimum* Linnæus 1753
Lathyrus maritimus Bigelow 1824
Lathyrus maritimus Linnæus is an invalid name used by Hultén that should be *L.m.* (L.) Fries 1835 which is also invalid
Lathyrus aleuticus (Greene ex T.G. White) Pobedimova 1959

Notes: *Flowers* With its very showy flowers, it's always a treat to the eye. The color varies remarkably from pink to blue to purple. The wings are usually a deep color of blue or purple but can fade in the sun to very pale. The banner on pink-winged flowers is usually a deeper pink to magenta while on deep blue is usually a rich magenta-purple. The color variations can be seen in the photographs. Many of the inflorescences rise above the mass of vegetation.

Stems The 10-150 cm long stems are lax and angled or flanged but not winged. In the same area, stems can be glabrous or variously hairy. The stems and leaves weave in and out of the other growth making it hide among the other plants.

Leaves The tendril-tipped alternate leaves have more than 6 opposite leaflets and all are rather gray-green and egg-shaped. Paired stipules at the leaf base are arrowhead-shaped and larger than most of the leaflets.

Fruit The 3-7 cm pods are often two-toned as the photos shows, usually hairy, 1 cm wide, and contain 5 to 16 seeds.

Ubiquitous along open shorelines above the tides where salt water submersion is rare.

Ethnobotany: 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)

Taxonomy: 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)

Notes: 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


Taxonomy: 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 photograph 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 photograph 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 photograph 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 photograph, 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]

I can't write notes on this lovely plant without a comment and photograph of "lupine diamonds". The hairs are hydrophobic, they repel water. When young, the leaves are very hairy as in the photo on the right. With palmately compound leaves (all the leaflets arise from the same point on the petiole or leaf stalk), rain water often runs down the keel-shaped leaflets and settles in the low spot at the base of the leaflets. This globe of water can grow to significant size (I've seen one a centimeter in diameter!) based solely on the strength of the leaf. Once it exceeds the strength of the leaf, it rolls off, just as the lower right diamond is about to. What purpose might hydrophobic hairs serve? In our abundant rain, additional water is certainly not needed for the plant and this probably serves to get rid of it. I'm always enchanted by these ephemeral "diamonds" and nearly always stop to admire at least a couple whenever I'm wandering through lupines. They don't last long, usually less than 12 hours after rain stops they have evaporated away.

[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 and I consider it to be alien. I found four plants in August of 2014 in a most obvious place along Glacier Spur Road. The same month I found two plants on the Nugget Falls Trail (top three photos). 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. With the rebuilding of Brotherhood Bridge, completed fall of 2015, this lupine was planted along the berm of the new road and has established a thriving population of very large plants (lower two photos).

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

au-mer-ih-cus 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 photograph 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, as the oblanceolate petals are 15–25 mm long and twisted.

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. The roadsides in Mendenhall Campground are loaded with plants. 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 nutkanus Mociño ex Seringe 1825, thimbleberry, ch'eex'

noot-CAN-us 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

Taxonomy: Nearly every reference will use the name *Rubus parviflorus* Nuttall 1818, however it turns out this is a *nomen illegitimum*, an illegitimate name, according to Abraham Van De Beek. The epithet *parviflorus* (Latin *parvus*, small, little, insignificant + *florus*, bloom or flower; hence small-flowered) is an unfortunate name as this is one of the largest flowers in the genus. However that's not the reason for rejection as Nuttall named it for a small-flowered specimen. It seems Nuttall took the name *parviflorus* from *Rubus parviflorus* Weston 1770 (a *nomen regectum*, rejected name) and places an asterisk in front of it, but without explanation. It turns out that Weston's plant is actually *Rubus creticus*. Thus *Rubus nutkanus* has priority and must be used. Flora of PNW (2018) is the first to use this name in a flora.

Van De Beek, A. 2016. Validations of the Rubus *taxa in Tournefort's* Institutiones *and their* Corollarium *in later literature*. Adansonia, 38(1):35-53. https://doi.org/10.5252/a2016n1a4

As must be expected when a plant has such a widespread range, many varieties have been applied to it. PLANTS only recognizes two varieties and Tropicos lists 21. Hultén uses *Rubus parviflorus* var. *grandiflorus* Farwell, which TROPICOS considers invalid. Until someone takes on this as a serious monograph, the broad sense seems most parsimonious.

Notes: 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. 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, Sheep Creek's valley as well as the more open areas near the beach at Auke Village Recreation Area.

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 photograph shows, this dwarf bramble (a word that originally referred to thorny plants but now by use seems reserved for the genus *Rubus*), is a diminutive plant that can be a ground cover in deep woods or forest edges as it spreads by thin runners, giving it the name trailing bramble. At each node on the rootstock, a single leaf or leaf and flower stalk arise.

Flower The flower is immediately recognizable as a blackberry with its five white petals. They are short-flowered, perhaps a week or two, and the petals fall off but the sepals are long persistent. The filiform filaments are nearly as long as the petals and rise well above the flower. A pair of cream colored anthers form a club at the very tip. The pistils are wider near the top and flattened as the close up photo illustrates.

Fruit References say 3-6 pistils, but when the drupelets develop, the most I've ever seen on one flower stalk is seven (only once at the high point of East Glacier Trail) with one to three the most common. As they ripen they rapidly enlarge to their mature size of 3 to 5 mm long. The sepals are persistent and tightly wrap the fruit. 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. The are like a diminutive jelly bean.

Hultén (p. 601) makes two 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 photograph showing its ground cover habit. On such large ground cover of trailing bramble is in what I call the "fern garden" of the Trail of Time between the "water from a rock" sign and the upper bridge over Steep Creek. Here I've never seen a single flower and I've walked it uncountable times.

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. nukanus*) 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
pear-in-SIGH-sum Latin *per-* very, utterly + *incīsus*, cut up, having been cut up, incised






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 photographs. The puberulence (covered in soft, downy hairs) on the pedicel is just barely visible in the left photograph 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

<u>Taxonomy</u>: FNA 2014 recognizes three varieties, PLANTS recognizes four, Tropicos lists eight, but they seem ill-defined and even Hultén uses only the full species.

<u>Notes</u>: 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 photographs. 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 photograph of my friend Mark Carls stopping to smell the roses!

****Rosa rugosa** Thunberg 1794, Japanese rose*

rue-go-sah Latin *rūgōsus*, wrinkled


Don't just assume that all pink "wild" roses here are native! This one is a naturalized alien (there is some question about that on the plants way out on the Aleutian archipelago) that strongly resembles our native Nootka rose. It is considered a noxious invasive in much of New England.

The differences to look for: The veins on the leaflets are deeply incised into the leaflet; the new stem growth is puberulent (very hairy); the prickles are much more roselike and stiff instead of thin and needle-like; and the stems are woodier and darker in color. They occupy the same habitat but are not usually found together. Note in the right photo that the calyx is persistent, even into fruiting.

It is scattered about here and not as common as our native. This shrub is at the outermost part of Point Louisa.

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, runners and pinnately compound leaves. It has been elevated to generic status numerous times where Weakley (2015), iNaturalist (based upon Kew's Plants of the World) and PLANTS place it now. The generic assignment of *P. anserina* is problematic... (FNA 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)

See notes under *Potentilla*.

Soják, J. 2010. Argentina Hill, *a genus distinct from* Potentilla (*Rosaceae*). Thaiszia. 20: 91–97.
Dobeš, C. & J. Paule. 2010. *A comprehensive chloroplast DNA-based phylogeny of the genus* Potentilla *(Rosaceae): Implications for its geographic origin, phylogeography and generic circumscription.* Molecular Phylogenet. Evol. 56: 156–175.

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 1993 and 2012 Jepson manual, FNA 2014 and Flora of PNW (2018) take a narrower sense of the genus, they all return *Anserina* into *Potentilla* where I choose to keep it.

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

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 photograph 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 photograph 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 photograph 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, a “blood stauncher”.

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 “Plants from northwest North America and northeast Asia are not taxonomically distinguishable...” FNA. Flora of PNW (2018) notes that *S. canadensis* is “misapplied” to our plants.

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 photograph 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





Cluster of male plants in full flower

Showy male inflorescence

Female inflorescence

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*). The male flowers are the showiest and whitest with all the fuzzy stamens. Female flowers are a bit more creamy white and smaller giving the inflorescence a more stark, less filled-in appearance. The separate sexes are especially obvious when 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 From Proto-Indo-European **sor-* / **ser-* "red, reddish-brown" to Latin *sorbus*, sorb, service tree

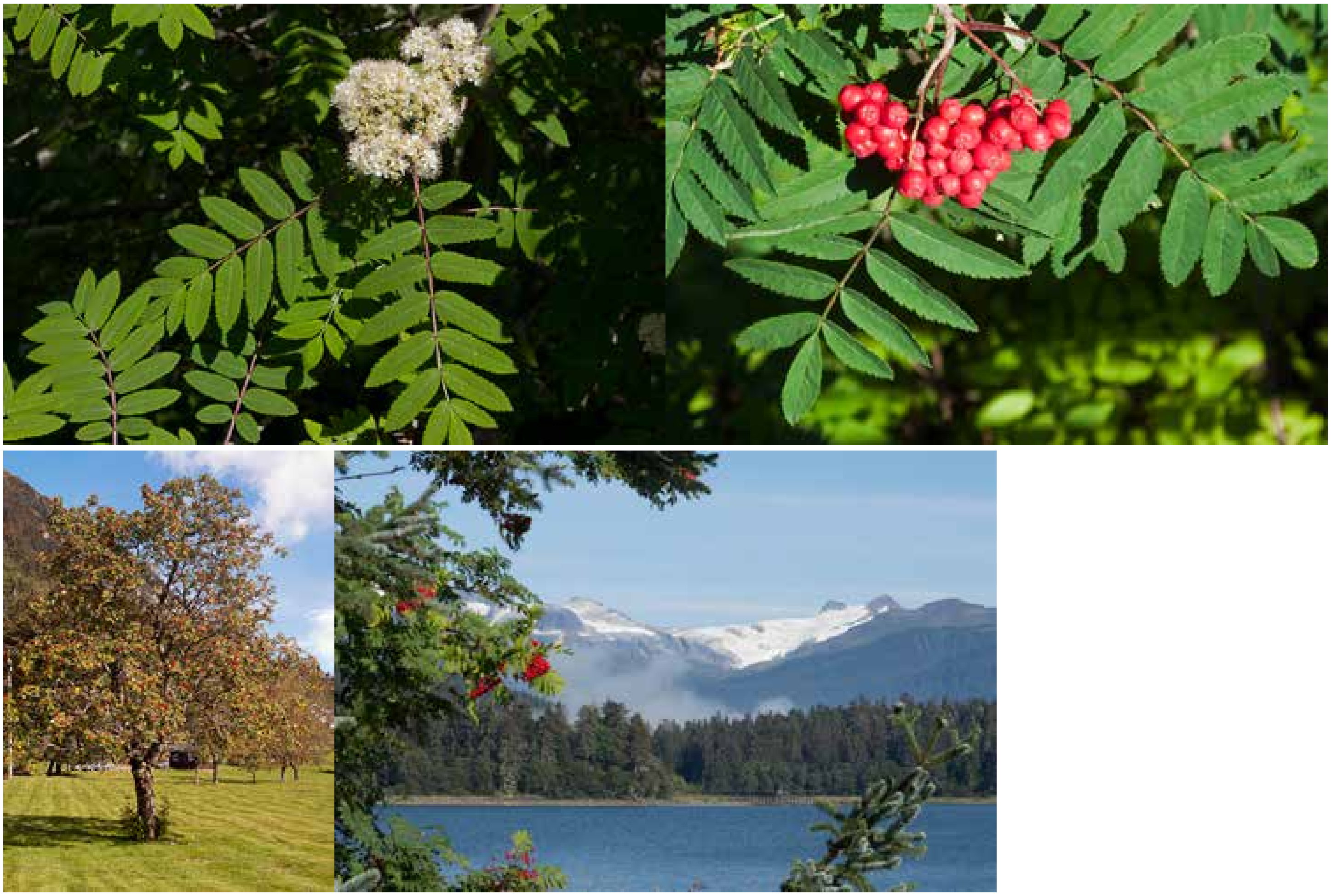
Sorbus sitchensis M. Roemer 1847 var. ***sitchensis*** 1847, Sitka mountain-ash, kalchanéit

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 has been applied to trees at higher elevation that may be dwarfed by exposure and have fewer teeth on the leaf margins hence making the varietal status questionable.

Notes: On our native shrub to small tree the leaves are pinnately compound with fewer than 13 leaflets that are at least a little shiny green on the top surface and toothed all the way around with the leaflet tip blunt. With a hand lens the underside of the leaves are glabrous. The hypanthium and caylx of the flower are glabrous and the flower has four or five styles. Fresh fruits are generally bright red without any orange. It grows natively on Mount Roberts and a specimen was collected at 1,000 foot elevation there on May 13, 1961 by famed forest botanist Elbert L. Little, Jr. with the note "rare on slide with *Alnus sitchensis*". The name "mountain-ash" likely derives from the pinnately compound leaves that somewhat resemble the leaves of the completely unrelated ash tree (Fraxinus in the Oleaceae, olive family), distinguished from it by growing higher in "the mountains".

Sorbus aucuparia Linnæus 1753, European mountain-ash, rowan



aw-koo-PARE-ee-ua From the Laitn *avis*, bird, + *capere*, catching, for the practice of using the fruits in fowling to catch birds

Notes: As one wanders about the city of Juneau, small mountain-ash trees are in yards, roadsides, and ruderal areas. Evergreen Cemetery has dozens of large specimens. It is easy to just glance at them and assume they are our native mountain-ash, but most are not.

On this planted and often naturalized tree the leaves are pinnately compound with more than 13 leaflets that bluish or dull green leaflets and toothed all the way around the leaf with the leaflet tip acuminate, tapered to a point. With a hand lens the underside of the leaves are covered with white-gray long hairs. The hypanthium and caylx of the flower is densly villous when viewed with a hand lens. The mostly orange 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. The European name "rowan" come from the...

> ...rowan-tree, rountree (1540s), northern English and Scottish, from a Scandinavian source (compare Old Norse *reynir*, Swedish *Ronn* "the rowan"), ultimately from PIE [Proto-Indo-European] root **reudh-* "red, ruddy," in reference to the berries.
> [Online Etymology Dictionary https://www.etymonline.com/word/rowan]

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 photographs 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 alnobetula (Ehrhart) K. Koch 1873 ssp. ***sinuata*** (Regel) Raous 2011, Sitka alder, mountain alder, slide alder, green alder, keishísh










all-no-BEH-to-lah Latin *alno* from *Alnus,* alder + *Betula,* the genus for birch.
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]

What name one puts on this is a confusing mess with these synonyms:

Alnus viridis var. *sinuata* Regel 1865
Alnus sinuata (Regel) Rydberg 1897
Alnus sitchensis (Regel) Sargent 1902
Alnus crispa var. *sinuata* (Regel) Breitung 1957

Alnus viridis ssp. *sinuata* (Regel) A. Löve & D. Löve 1965

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* is European; *Alnus crispa* is Northeastern North America; and *Alnus fruticosa* and *Alnus sinuata* ring the north Pacific Ocean.

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.

More recent work corroborates that and a move to place all of the regional forms as subspecies of a single species. What name to put on it?

The confusion lies in the appropriate basionym of this taxon. The name *Betula viridis* Chaix dates from 1785 .... No type specimen was designated. Two years earlier, *Betula alnobetula* Ehrh. was published by Ehrhart (in Gartenkalender 1783) describing a shrub in which "the homeland is unknown to me" (translated from German). In Ehrhart (1788), he republished his work where the name *Betula alnobetula* Ehrh. reappeared.

As *Betula* species were transferred to *Alnus*, authors were evidently unaware of the original 1783 publication of the name *B. alnobetula* Ehrh., so *B. viridis* Chaix was thought to be the older name and was taken to be the basionym for green alders. *Alnus alnobetula* Ehrh. has consistently been associated with the 1788 reproduced work and thus listed as a later synonym of *A. viridis* (Chaix) DC.

Cherry, J. 2015. New nomenclatural combinations in the green alder species complex (Betulaceae). PhytoKeys 56: 1-6.

As the name *alnobetula* illustrates the character that so confused me, I find it easy to accept as having priority. With that acceptance, there was no valid name available until 2011 when *A. alnobetula* ssp. *sinuata* was published as a *combinatio nova*, a new combination by T. Raus. Cherry (above) added two additional subspecies.

Raus. T. 2011. *Betulaceae* in Euro+Med Notulae, 5. Wildenowia 41:129.

There remains the question of "at what level"? Being a circumboreal complex, it seems conservative to consider them all members of the same species at the subspecies level but Weakley (2105) notes "with no great confidence that this is the best treatment".

Notes: Green alder is hard to miss. If one wanders any of the disturbed (by any means) areas of Juneau, the tree will be found. It often forms amazing thickets and is one of the reasons the trail to the Mendenhall Glacier off West Glacier Trail was so difficult to find and follow. Don't get caught in one of these! In yards it is a common weed, one that requires regular pulling to kill off the rootstock.

It is a large shrub and rarely (here) a tree with many stems arching away from the rootstock. Vigorous water sprouts often form, especially after some recent disturbance. The deep green, very shiny leaves are all the more visible by the obvious doubly-serrate margins with prominent veins in a strict chevron arrangement.

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 photograph 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.

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!

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 Photograph 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

<u>Taxonomy</u>: 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 םָשׂ 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 photograph 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.

Taxonomy: 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!

Notes: Say just the word “willow” and most people conjure up a fairly accurate image of these plants. They are shrubs to small trees, often with many stems, and when branches are broken they often release a large amount of watery sap. This sap contains salicin, whose very name comes from the old Latin word for willow, salix that gives it the genus name. When twigs are chewed and salicin is metabolized it changes to salicylic acid, the active ingredient of aspirin. There is a long and widespread enthobotany of the use of willows by indigenous peoples throughout its range. The leaves of willows are usually far longer than wide, often 10 to 20×, and they are often falcate, curved like a sickle. The buds are always lateral as no terminal buds ever form and the leaves are stipulate, with a small leafy bract at the point of attachment. These are sometimes lost with aging. Willows are dioecious with male and female plants. The flowers lack a calyx and a corolla being composed only of the sexual parts along with a nectar gland and long, dense hairs that form catkins (also called aments) as a cluster of flowers. Usually catkins are found in wind-pollinated (anemophilous) plants that produce copious quantities of pollen. Willows, with their nectar gland, have a second strategy to insure pollination by attracting insects (entomophilous) where dry years favor wind and wet years favor insects. The roots of willow are vigorous in growth and extremely tough in texture, characters that are important for pioneer species in areas with few nutrients, such as glacial outwash plains.

Tamura, S & G. Kudo. 2000. *Wind pollination and insect pollination of two temperate willow species*, Salix miyabeana *and* Salix sachalinensis. Plant Ecology, Volume 147, Issue 2, pp 185-192.

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. Often our earliest flowering plant, this abundant willow is a large shrub or small tree that flowers long before the leaves (the pussy willow photograph 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. It is host to a number of insect galls.

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 strobiloides* (Osten Sacken, 1862) [*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 photograph 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 photograph 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 photograph 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: It resembles the *Bistorta bistortoides*,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. It superficially resembles *Triantha glutinosa* so look carefully at spikes of creamy white flowers.

I found them first on a Town, Tram & Trek (T^3) on the Alpine Loop Trail as a rather showy little smartweed. I've found it in scattered locations among the rocks at the high water mark of Mendenhall Lake's muddy shorelines such as the Moraine Ecology beach, Nugget Falls Trail (the old route along the lake shore) and the shores near Skater's Cabin.

In 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.

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

<u>Taxonomy</u>: 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.

<u>Notes</u>: 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

<u>Taxonomy</u>: 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.

<u>Synonyms</u>:
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**

The pink or carnation family is generally easy to recognize. Flowers are usually 5-merous but a large number double the number of stamens to ten. Hypanthia (a cup or tube-like expansion of the receptacle) are common. Often the nodes are swollen. FNA notes that "of the 37 genera in the flora area, 15 are entirely non-native" and more than half its members can be considered weeds in North America. Research demonstrates that the group is monophyletic, but that the various circumscriptions of subgroups may not be monophyletic. It has traditionally been divided into three subfamilies, but FNA chooses to recognize four. A 2010 molecular study completely revises this by arranging the family into tribes that do not correspond well with the traditional delineation. With changing circumscriptions, here the genera are arranged alphabetically.

While the vast majority of flowers in the family are white, it is known as the "pink" family. Since carnations are often pink, a member most are familiar with, many assume the name comes from the color. It does not! Many members have petals whose tips are serrate, much like they were "pinked" with "pinking" shears. Very curiously, it appears that the shears derive their name from the carnation, already called a "pink". This comes from the verb "to pink" dating to 1200 that means "to pierce, stab, make holes in" that gave name to the flower.

Harbaugh,D.T., M. Nepokroeff, R.K. Rabeler, J. McNeill, E.A. Zimmer & W.L. Wagner. *A New Lineage-Based Tribal Classification Of The Family Caryophyllaceae*. International Journal of Plant Sciences 171(2):185–198.

Cerastium Linnæus 1753 mouse-ear chickweed

Greek, κέρας *keras*, horn, alluding to shape of capsule

Cerastium arvense Linnæus 1753 subspecies ***strictum*** Gaudin 1828, mouse-ear chickweed, field chickweed, mouse-ear


are-VENCE Latin *arvensis*, from the field
STRICK-tum Latin *strictus*, tight, close, strait

Taxonomy: This worldwide plant has suffered the indignities of coping with 68 different scientific names indicating a total confusion of species concepts. The FNA treatment chooses to recognize only two subspecies, one of probable European origin that is now a cosmopolitan weed, and a North American native. The easiest character to separate the two is our native subspecies has glandular hairs throughout, visible in these photographs.

Notes: It takes me nearly a decade to find this plant here! On a brisk October 1, 2015 while walking to the parking lot from the Mendenhall Glacier Visitor Center I spot an obvious chickweed flowering in the greenstone cliff where I always look for Sitka mistmaiden. Note the five petals that are strongly cleft in the middle to about ¼ the petal length. This common character in the Caryophyllaceae leades novice flower lovers to count ten petals. Five faint lines of lavender adorn the petals and lead the eye to their green base. When wet, the petals close somewhat and give the impression of a tube, but the petals are all separate to their base. The opposite leaves are narrowly lanceolate and tapered at both ends.

Hairs are ubiquitous on this plant and all of them are glandular. This native form has a greener cast than the yard weed.

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 stem.

<u>Taxonomy</u>: 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.

<u>Notes</u>: 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.

Sabulina Reichenbach 1832, sandwort, stitchwort

saa-bew-LIE-nah Latin *sabul*, sand + Latin *inus*, growing on; hence "growing on sand"

Taxonomy: A wide circumscription of *Arenaria* included *Minuartia* and *Sabulina*. Recent work has shown *Minuartia* to be a mess:

> *Minuartia* has been defined with a plesiomorphic character and is highly polyphyletic. All four subgenera fall into different lineages containing other genera of the family, and *M* . subg. *Minuartia* , as by far the largest subgenus, falls into seven clades, which together do not form a monophylum. These clades are closely related to several other genera, e.g., *Sagina*, *Colobanthus* and *Scleranthus* . In several cases taxonomic groups below subgeneric rank are monophyletic. The type of *Minuartia*, *M. dichotoma*, is part of a clade containing *M*. sect. *Plurinerviae* and sect. *Minuartia*. We propose to retain this clade as *Minuartia s.str*. and to transfer the other species of *Minuartia* to the genera *Cherleria*, *Eremogone*, *Facchinia*, *Mcneillia, Minuartiella, Mononeuria, Pseudocherleria, Rhodalsine, Sabulina* and *Triplateia*.

Dillenberger, M. & J.W. Kadereit. 2014. Maximum polyphyly: Multiple origins and delimitation with plesiomorphic characters require a new circumscription of *Minuartia* (Caryophyllaceae). Taxon Volume 63, Issue 1, Pages 64-88.

Sabulina rubella (Wahlenberg) Dillenberger & Kadereit 2014, boreal sandwort

rue-bell-uh Latin *rubellus*, reddish

Synonyms: *Alsine rubella* Wahlenberg 1812
Arenaria rubella (Wahlenberg) Smith 1828
Minuartia rubella (Wahlenberg) Hiern 1899

Until May 21, 2016, 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. On a sunny May day out on greenstone just past the elevator entrance to the Mendenhall Glacier Visitor Center, I spot a tufted plant that looks like a saxifrage. Only closer look, it is clearly a pink, and requires keying in Hultén. It remains in flower in various places on the greenstone as well as the biological crust atop the sands near Mendenhall Lake.

The flower is solitary on a 3-5 dm stipitate-glandular stalk that is reddish above a pair of opposite bracts. The five sepals are narrowly lanceolate and form a cone when the flowers are in bud. The adaxial side has stipitate glands on the broad face and is glabrous above. The five petals are narrowly ovate, tapering to a rounded tip and clavate at the base. Petals are pure white and exceed the sepals. Most flowers have ten stamens, but some have fewer, leading to the question, were they lost somehow or never formed? The filaments are light green at the base turning to white at the anther and appear to become pure white when fully mature. The 2-lobed globular anther is pure white. The broadly ellipsoid ovary is topped with three or four styles that diverge at about 30° from the plane of the flower. The leaves are thick and overlapping, mostly straight but a few have curved tips. The whole plant arises from a dense tuft.

Here is another example of an alpine plant growing near sea level in a habitat that mimics the alpine.

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

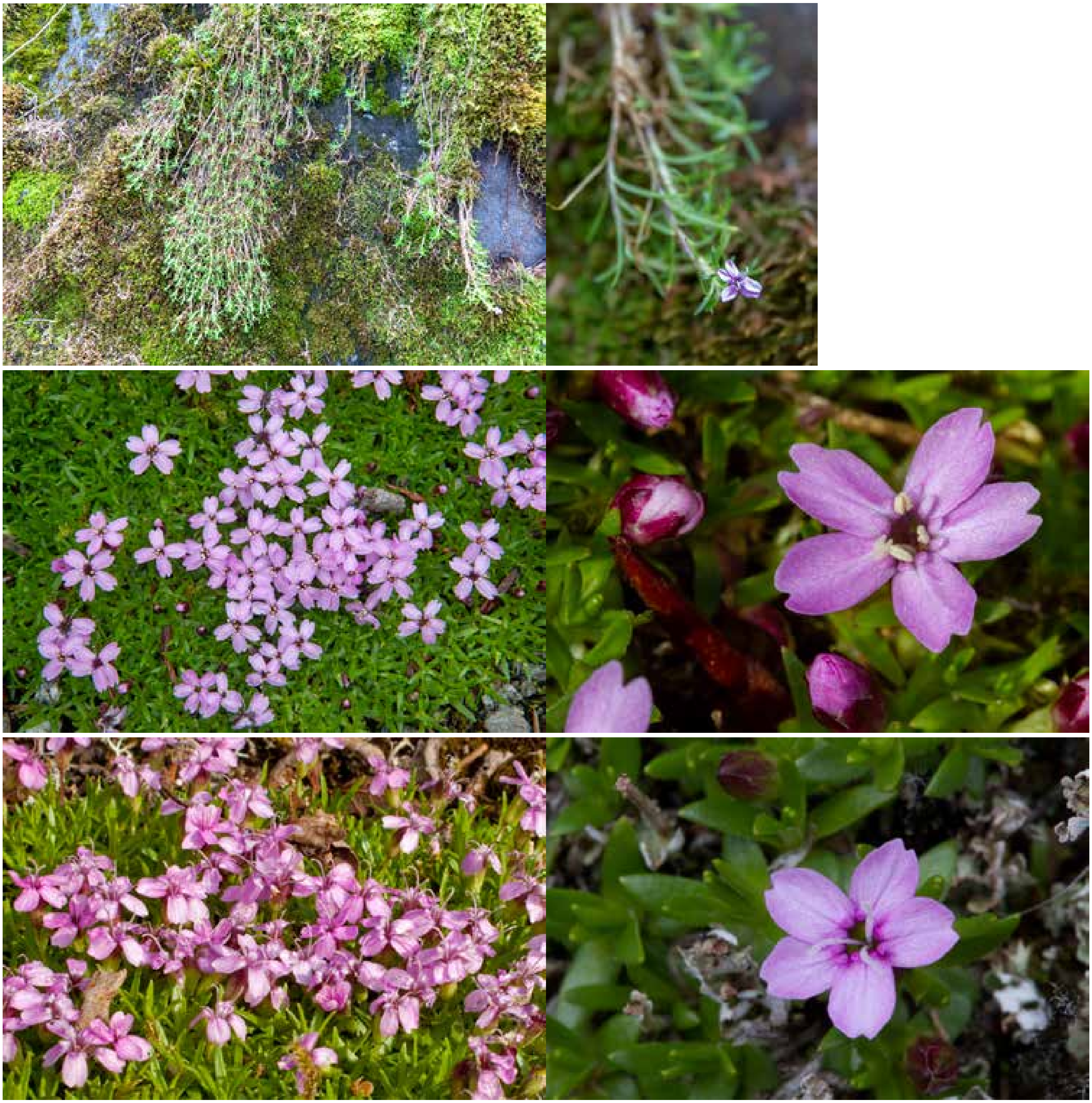
sa (as in cat) -gin-oy-dees *Sagina* + Greek όιδες -*oides*, resembles, looks like; hence "looks like *Sagina*" since has been included in *Spergula* where it would be a *Spergula* that looks like a *Sagina*. Now it literally means a "*Sagina* that looks like a *Sagina*"

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 primary 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.

It took years of hiking the East Glacier Trail until I finally noticed a draping of this plant on August 31, 2019. It is on the rocks just before the A.J. Falls viewpoint. How could I have missed it?

A close look will show that the flowers on the same plant can be male, female or both! The last four photos illustrate this with the first two being male and the lower two female. I have to admit to have only seen this while processing the photos and not while on the ground!

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.

Stellaria ruscifolia Willdenow ex D.F.K. Schlechtendal 1816 subspecies ***aleutica*** Hultén 1943, circumpolar starwort, prickly-leaved starwort


Latin ruh-kih-foe-lee-uh, American rus-sih-foe-lee-uh leaves resembling the Ruscus lily

Just past the swimming pond of Mendenhall Lake in an area where an organic and silt crust lies atop the sands of the lakeshore on May 21, 2016 I spot a flower I've never seen before. The deeply cleft petals immediately identify it as a *Silene*, but the species is unknown to me and require keying in Hultén. The five petals are cleft nearly to the base with oppositely asymmetrical oblanceolate segments. Veins are visible to the naked eye. The five sepals are somewhat sulcate (canoe-shaped) and sharp-tipped with a white hyaline margin, and are cleft about half way from their united base. The ten stamens appear to rise from two whorls or series. The ovary is broadly ellipsoid, yellow-green with a wash of maroon where it narrows, separated by five pale green lines. Does this delineate five carpels? Styles can be three or four as the right photo illustrates, spreading widely in uniform angles and are about half as long as the petals. A single flower crowns each pedicel or stalk which is gray-green with a hint of a maroon wash near the flower. The leaves are very *Sedum*-like, succulent and overlapping, opposite, broad-based with a sharp tip. A keel is visible on the adaxial (lower) side with just a hint of a line on the abaxial (upper) side. The leaves are bluish-green with a wash of maroon. The plant is growing in a tuft of dead leaves from previous years

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).

Taxonomy: 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

<u>Taxonomy</u>: 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.

<u>Synonyms</u>:
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

<u>Notes</u>: 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-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

Synonym: *Chamaepericlymenum suecicum* (Linnæus) Ascherson & Graebner 1898

Notes: 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 photograph 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 (2015) notes:

> Attempts to link the name ***C. sericea*** Linnæus to the red-osier dogwood have focused on the Linnaean description of "*foliis 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 (2015) 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 photograph) and a few still with fresh flowers (left photograph). It is obvious from both photographs 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 photograph, 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

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. I'm keeping this reference here for tradition's sake.

Dodecatheon pulchellum (Rafinesque) Merrill 1948 var. ***macrocarpum*** (A. Gray) Reveal 2006, pretty shootingstar

see ***Primula pauciflora*** (Greene) Mast & Reveal var. ***macrocarpa*** (A. Gray) Mast & Reveal 2007

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

Taxonomy: See notes on the merging of *Dodecatheon* into *Primula* under *Dodecatheon*. *Primula sensu latu* contains some 450 species in a wide range of morphologies that have given rise to an elaborate hierarchy of names. I am finding these useful as some of the "sections" are easily and instantly recognizable such as the shooting stars and garden primula and it makes it easier for me to "give in" on my long-loved name *Dodecatheon*.

Primula subgenus ***Auriculastrum*** Schott 1851

Primula section ***Cuneifolia*** Balfour *filius* (Isaac Bayley Balfour) 1913

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 sect. ***Dodecatheon*** (L.) A.R. Mast & Reveal 2007

Primula pauciflora (Greene) Mast & Reveal var. ***macrocarpa*** (A. Gray) Mast & Reveal 2007

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: The name *pauciflorum* was the first used for this as a species and thus has priority in the transfer.

Synonyms:
D. meadia var. *macrocarpum* A. Gray 1876
D. macrocarpum var. *alaskanum* Hultén 1948
D. pauciflorum var. *alaskanum* (Hultén) C.L. Hitchcock 1959
D. pulchellum subsp. *alaskanum* (Hultén) Hultén 1967
D. pulchellum subsp. *superbum* (Pennell & Stair) Hultén 1968
D. pulchellum var. *alaskanum* (Hultén) B. Boivin 1968
D. pulchellum subsp. *macrocarpum* (A. Gray) Roy L. Taylor & MacBryde 1978
Primula pauciflora var. *macrocarpa* (A. Gray) A.R. Mast & Reveal 2007

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 and this represents a major habitat, the area of full sun just above the highest tide line in the marsh grasses.

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 photograph 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

<u>Taxonomy</u>: 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].

<u>Notes</u>: 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)

<u>Toxicity</u>: 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.

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 groenlandicum (Oeder) K.A. Kron & W.S. Judd 1990, Labrador tea, s'ikshaldéen

green-land-ih-cum Of or pertaining to Greenland

Taxonomy: Molecular and morphologic evidence shows *Ledum* well included in *Rhododendron* as subsection *Ledum*. 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

Synonyms: *Ledum groenlandicum* Oeder 1771
L. pacificum Small 1914
Ledum palustre Linnæus ssp. *groenlandicum* (Oeder) Hultén 1948

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.

Labrador tea serves as one of the hosts of spruce needle rust along with Sitka spruce (*Picea sitchensis*). See *Chrysomyxa ledicola* for a description.

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: In 2011 the genera *Diplarche* and *Menziesia* were found to be deeply nested into *Rhododendron* based upon DNA data and transferred there with a required name change since *Rhododendron ferruginea* was previously taken.

Craven, L.A. 2011. Diplarche *and* Menziesia *transferred to* Rhododendron *(Ericaceae).* Blumea 56: 33–35.

Synonyms: *Menziesia ferruginea* J.E. Smith 1791 var. *ferruginea* will be the name most commonly encountered.

Notes: This plant has many common names that I don't like. It really doesn't look that much like an azalea, especially the flowers, so calling it a “false” or “mock” azalea just confuses things. Being generous, the leaves show some similarity to azaleas except for the obvious mucro. 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, as the photographs illustrate. These forms 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.

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.

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 *εἰλεῖν 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-kun-duh Latin *secundus*, the botanical term for one-sided

Taxonomy: Two forms have been given names, var. *secunda* (10-flowered and greenish white with egg-shaped leaves) and var. *obtusata* (4- to 10-flowered and creamy white with circular dull leaves). "E. Haber (1972) concluded that these characters vary too freely among populations to warrant distinction." FNA

Synonym: *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's egg-shaped leaves are thick, waxy and deep green make it obvious against the more yellow-green mosses. They become more crowded near the base and appear opposite but are actually alternate. It spreads by rhizomes and often is found in small colonies of genetically identical plants.

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.

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 photograph). 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, an orthographic variant, is common in the popular press, but is invalid as Howell named it specifically "Alaskaensis" in *A Flora of Northwest America* 4:412, 1901. Most current treatments (FNA, Germplasm Resources Information Network (GRIN), Olympia Forestry Sciences Laboratory of the U.S. Forest Service) include this within a broadly circumscribed *Vaccinium ovalifolium*. 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*), which I consider highly unlikely as *V. parviflorum* is dramatically different. The two species are rather easily separated in the Juneau area and I include both as full species.

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 (very globose) that have a wash of pink at the base; *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

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 photograph 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.

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

Taxonomy: See notes under *V. alaskaense.*

Notes: The characters I use to identify this blueberry in the field are: *flowers* that open before the leaves develop [hysteranthous]—or at least before they are half expanded; that are longer than wide (very urceolate) and usually more creamy white than pink and the pink is usually near the opening of the flower, not the base; *fruits* that are mostly glaucous (covered with a gray powder) blue-purple (bottom right photo) with the pedicel curved and not enlarged just below the berry; *twigs* are strongly angled and grooved and young are bright red in color (top two photos); *leaves* smaller than Alaska blueberry and the underside is glaucous. The berries are generally sweeter than Alaska blueberry.

This shrub is widespread and abundant in edges where there is some extended periods of light. In 2016 the flowers were in full fruit on April 1 and the Rufous Hummingbird were already here feeding on their nectar. It is more common here than *V. alaskaense*.

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.

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 photograph. 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 photograph was taken. It is a common weed of dry sandy places in yards, parking lots and other similar disturbed sites. The whole plant photograph 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)

Taxonomy: 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 photograph), 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"

This lovely plant has a most curious flowering habit. It comes out early in April, fruits, then sits quietly as photosynthesizing leaves, then does this again each month through September! There is always a break between flowering of a couple of weeks. This character should make it a compelling rock garden plant!

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
jun-cuss   Genus *Juncus* + Greek οιδες *-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 from the common weedy species. It has narrow V-shaped leaves that are very succulent and apparently do look like a goose's tongue (I've not seen one to confirm this). The leave may flare out a bit as the right photos shows. The plants arise from the crown of a thick rootstock. The inflorescence is almost showy. When the stamens are developing (first two photos) they give it an almost bright yellow color.

Common along the rocky beaches such as at Point Louisa and the cliffs of Lena Point, it is abundant at the high tide mark in the Mendenhall Wetlands in a wet, sandy clay soil.

Suktéil' 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 my Tlingít do eat it occasionally.

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**

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 Scrophulariacae 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 ornithorhynchos Bentham 1838, bird's beak lousewort, ducksbill lousewort

Latin Ancient Greek ὄρνις *ornis*, bird + ρυνχός *rynchos*, nose or snout; for the shape of the upper petal





Taxonomy: What appears to be an orthographic variant appears in many places: *Pedicularis ornithorhyncha*. E-Flora BC, Anderson and Hultén use this form. Flora of PNW (2018) show it as a synonym. iNaturalist has it crossed out. Tropicos doesn't show it at all and *Flora Boreali-Americana* (Hooker) 2(9): 108, clearly uses *ornithorhynchos* in the original publication.

Notes: 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 photograph 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 1905, 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

Taxonomy: The native species to North America has two subspecies, *minor*, which is usually found in ruderal areas, and *groenlandicus*, which is found in less manipulated habitats. They synonymy is complicated as FNA notes "The name *Rhinanthus crista-galli* [Linnæus 1753] has been misapplied to *R. minor* by numerous European and American authors. All reports of *R. crista-galli* from eastern North America appear to be based on subsp. *minor*." Our variety has these synonyms: *Rhinanthus groenlandicus* Chabert, 1899; *R. borealis* (Sterneck) Chabert, 1899; *Alectorolophus groenlandicus* (Chabert) Ostenfeld, 1901; *R. arcticus* (Sterneck) Pennell, 1947; *R. minor* Linnæus subsp. *borealis* (Sterneck) Á. Löve. 1950

Tucker, G.C. & B.M. Daugherty. 2012. Orobanchaceae. Flora of North America, Provisional Publication. Flora of North America Association. March 20, 2012. http://floranorthamerica.org/files/Rhinanthus03g%20SI.CH%20for%20Prov%20Pub.pdf. Accessed 16 April 2016.

Notes: 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 late Jne 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. It is abundant on the tombolo out to Point Louisa.

Look carefully at the upper hood-like lip and you may find a pair of short, broad, often purplish teeth near the tip. They show up in the bottom flower of the second photo of the top row. 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. The only study I find on its parasitism is from the United Kingdom where plants utilized "at least 50 species from 18 families with 22% in the Leguminosae and 30% in the Gramineae." Since its most common associates—be it disturbed or natural—are grasses, I'm presuming they are the host.

Gibson, C. C., & A.R. Watkinson. 1989. *The Host Range and Selectivity of a Parasitic Plant:* Rhinanthus minor L.. Oecologia, 78(3), 401–406. http://www.jstor.org/stable/4218881 Accessed 16 April 2016.

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.

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. The flowers do bear a resemblance to deer cabbage (*Nephrophyllidium crista-galli*) but the petals have stipitate glands on the upper surface that make it look frilly where deer cabbage has lacerate (irregularly toothed) petals giving it a "pinked" look. It grows in ponds while deer cabbage grows at the edges and wet margins of ponds or other wet areas.

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: 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. *japonica* (Franch.) Gillett and perhaps represents a relict population from a former circumboreal distribution.

Synonyms: *Menyanthes crista-galli* Menzies ex Hooker 1830
Villarsia c-g .(Menzies ex Hooker) Grisebach 1838
Fauria c-g.(Menzies ex Hooker) Makino 1904

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. It is abundant in many of the pond edges of the muskegs of Spaulding Meadows, Bessie Creek meadows and Gastineau Meadows. On the Mount Roberts Trail it is omnipresent in the weepy bowls and slopes above them wherever moisture is always present.

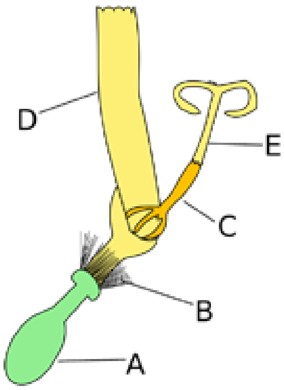
The reniform leaves are all basal, arising from a reddish rhizome that is covered with old leaf bases. The flowers are held above the base in a loose cyme, the uppermost flower opening first. Showy and white, the petals are rotate with a short tube with the lobes undulate (wavy). It is abundant in every muskeg in the area.

The often large patches of deer cabbage in the weepy slopes of the mountains become very obvious 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, kag̲akl'eedí

mih-leh-foe-lee-um Latin *mille*, a thousand + Latin *folia*, leaf; alluding to the many finely divided leaves

<u>Taxonomy</u>: 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.

Anaphalis Augustin Pyramus de Candolle 1838, pearly everlasting

ah-NA-fall-is An ancient name or, perhaps, derived from generic name *Gnaphalium*; Ancient Greek γναφάλλιον *gnaphalion*, a downy plant, the name anciently applied to these or similar plants

Anaphalis margaritacea (Linnæus) Bentham & Hooker f. 1873, pearly everlasting

mar-gar-ee-TAY-see-uh derived from the Latin *margarita*, a pearl, from the pearl-like flowers

I've only encountered this plant twice in Juneau, both times a surprise. The green plants are from June 12, 2016 in Gastineau Meadows and the gray plant is from the Nugget Falls Trail on August 24, 2019. The reason for the surprise is my experience with this plant is in rather dry and sunny places, both rare in Juneau. FNA notes "dry woods, often with aspen or mixed conifer-hardwood, borders and trails, dunes, fields, roadsides, other open, often disturbed sites" which matches my experience. The Flora of British Columbia notes "Moist to dry meadows, open forests, logging units, fields and roadsides in the lowland, montane and subalpine zones" which describes both these locations.

I'm curious more about the green plants than the gray ones as my experience has them mostly gray. I'm assuming the wet conditions in Gastineau Meadows means the plant doesn't need water conserving structures—hairs—and so appears bright green.

The phyllaries or involucral bracts on pearly everlasting give the plant its name. These reduced leaf-like structures cover most of the flower in a nearly complete sphere and being almost shiny white give it a "pearly" look. The flowers are quite persistent long after fruiting hence "everlasting". The disc flowers are bright yellow but often are mostly covered by the phyllaries.

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 photograph) 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

less-in-gee-eye 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 photographs. 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 photographs 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 photograph 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 photograph 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

dip-sack-al-ees   Greek *dipsakos*, δίψακος, ancient name for the plant

Taxonomy: The order presents some challenges for systematists in the manner of circumscribing groups. Currently only two families are recognized, the Adoxaceae and the Caprifoliaceae. All could easily be included in a very broad Caprifoliaceae, but the Adoxaceae appear to be more basal and genetically unique form the rest. The remaining Caprifoliaceae includes the former Dipsacaceae and Valerianaceae. *Sambucus* resided in one of the narrower circumscriptions of the Caprifoliacae until modern genetics found it to be only distantly related and part of the Adoxaceae.

Notes: There are only a handful of plants with opposite budding in North America and a simple mnemonic helps remember the bulk of them: MADwoods, for maples, ashes and dogwoods. Here we lack the ashes but have both maples, *Acer*, and dogwoods, *Cornus*. We add to them the Dipsacales: elderberry, *Sambucus* and *Viburnum*. Curiously, opposite (decussate) budding is often considered a basal character, yet here it helps define a highly evolved crown group with mostly highly derived characters. Opposite budding is nearly always visually obvious, often from a distance.

Family Viburnaceae Rafinesque 1820 *nomen conservandum*, **viburnum**

vih-bur-nay-suh-ee   From the genus of the wayfaring tree, Latin, Viburnum.

Taxonomy: Traditionally part of the Caprifoliaceae in a very broad sense, it is basal to all other members making Caprifoliaceae polyphyletic. It was moved into the Adoxaceae but the ICBN voted in 2017 to resurrect the Viburnaceae as a *nomen conservandum*, a conserved name even though its use violates rules of priority.

Sambucus Linnæus 1753, elder, elderberry

Latin SAM-buh-cuss, American sam-BOO-cuss, sam-BEW-cuss Latin *sambucus*, sambuca-player (a sambuca is an ancient Greek flute reputedly made from this wood)

Elderberry derives from the c. 1400 Old English *ellæn*, *ellærn,* origin unknown and apparently unrelated to "elder" referring to "old"

The Tlingít name yéil', 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.

<u>Taxonomy</u>: Formerly placed in the Caprifoliaceae or honeysuckle family. The genus was often divided into groups based upon fruit color with the black-fruits being *Sambucus nigra* with flat-topped panicles and the red-fruits *Sambucus racemosa* with conical panicles. The numerous intermediate forms confound this simple dichotomy and there are 170 taxa named within the genus, although most modern treatments include only a dozen or fewer species.

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, yet every reference I've found separates out our North American material as var. *pubens*.

Notes: Abundant and encountered in virtually every environment other than shoreline, open rocks or deep closed-canopy forest, one cannot escape this somewhat weedy and large shrub. It usually has many basal wands (also called basal shoots, root sprouts, adventitious shoots, water sprouts or suckers) with wood that is very fiber-like. A single year's growth may be many feet long, and if so, the wood is very fibrous. The root crown is capable of producing prodigious numbers of buds and sprouts readily when the top is removed. Apparently, this is the primary means of reproduction throughout much of the range of the red elder where the plant is established. Seed germination is more common when spreading into new areas. If a main (or several main) stems develop, they are usually in the center of the mass of wands and can form dense wood. In our area, red elderberry is most commonly found in areas with a nutrient rich substrate where the canopy is at least partially open. It is far less common in outwash plains, there usually found only at the forest edge.

Early in the summer I 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 usually start ripening the second week of August, and while bright red and pulpy with an initial sweetness on the tip of the tongue with a slight oddness to it. If the pulp is popped into the mouth leaving the skin on ones fingers, the flavor is decidedly better as the skin is very skunky. The Virginia Tech website calls it "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 page [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. If one presses the pulp through a sieve with cheesecloth to separate the skin and seeds, the juice is rather tasty.

Viburnum Linnæus 1753, viburnum

vih-burr-num Classical Latin *viburnum*, guelder rose; wayfaring-tree

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, it is in first flower on the trail around Floyd Dryden Middle School and place like it in the Mendenhall Valley. The white flowers appear almost wax-like and perfectly pure in color. A floral tube with a distinct sphincter at its summit gives rise to an unfurling of five petals. The tube and the petals are about the same length. Five stamens are inserted on the tube (epipetalous) at each of the cuts between the petals. The filaments are white—like the tube—broad at the base, and narrow abruptly at the anther. The barrel-shaped ovary matches the color and texture of the corolla but has a tan stigmatic crown.

The fruits first appear the last week of July, but are nowhere near ripe, and mostly orange in color. 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. 2009 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 at this stage.

Great fall leaf color is rare in the rainforest, but there is a special subtleness to the pale red tone of many highbush cranberry plants most years. Some turn a vibrant color, but most are subdued as most things are in the rainforest. It is a color that beckons the walker onward to enjoy even more the pleasure of simple things. Very shortly they'll be gone and only the naked buds remain until spring.

Valeriana Linnæus 1753, valerian

vah-lair-ee-aye-nah Medieval Latin word for the plant

Taxonomy: Formerly placed in the Valerianaceae or valerian family.

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.

Order Apiales Takenoshin Nakai 1930

A-pee-al-ees From the Latin *apis*, bee, because of bees' perceived inclination towards the celery plant, Apium

Taxonomy: Apomorphic characters include small flowers, the fruit a drupe, and the endosperm nuclear. Currently considered the crown group of eudicots, the order includes the Apiaceae, Araliaceae, Griseliniaceae, Myodocarpaceae, Pennantiaceae, Pittosporaceae, Torricelliaceae. Only the first two are represented in our flora. A useful character for recognizing the order is the umbelliform inflorescences, usually flat or rounded, but also in spikes of umbels in the Araliaceae.

Family Araliaceae A.L. de Jussieu 1789**, ginseng**

ah-rail-ee-a-suh-ee Modern Latin, etymology unknown

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'

hoar-ih-duss Latin *horridus*, wild, frightful, rough


Synonyms: *Panax horridum* J.E. Smith 1813 corrected to *horridus* to match the gender of the genus
Oplopanax horridus (Smith) Miquel 1863
Horsfieldia horrida (Smith) Seemann 1867
Fatsia horrida (Smith) Hemsley 1873
Echinopanax horridus (Smith) Decaisne & Planchon ex Harms 1894 (this is the name I learned it as at Humboldt State)
Ricinophyllum horridum (Smith) A. Nelson & J.F. Macbride 1916

Notes: It is hard to mistake this plant in any season of the year.



Stems The winter stems stand bare, straight and unbranched (except at the base) but completely covered with incredible armor of yellowish spines 5-10 mm long giving it a completely different look than all other plants. The plant can reach 3 meters tall and about a 10 cm in diameter but are usually much less. These spines are insidious in that they are stealthy in their attack. Incredibly sharp, the puncture skin with ease, but in reality they are weak and break off the plant and stay in skin. If they were stiff, they'd be easy to pull out, but they aren't and it is nearly futile to try as some of the spine invariably remains in the skin and one has to simply wait for it to fester and fall out. Most fabric gloves are no match for them.

Leaves When the leaves expand their maple shape is unlike anything else. They are 10-35 cm wide, larger than any other leaf in our area. They reach maximum size by mid-June. They have five primary lobes, two on each side and one at the peak. Each of these often has one much smaller lobe on the lower side. On nearly every walk, someone asks about the "big maple leaves" unless I've already talked about the plant. The petiole and all the major veins are armed with spines on the abaxial (under) side which remain green until the leaf falls off.

Flowers The inflorescence is usually a spike of ball-like umbels. Occasionally it will be a raceme with branches off the main stalk on the lower portion. The flowers are green and inconspicuous and very short-stalked. When the stamens are ripe, insects abound on the flowers.

Fruit The 5-8 mm wide berries ripen to a bright red and have 2-3 large seeds. Being so bright and attractive, it commands a taste! To my taste, they are incredibly bitter and mealy. The single seed occupies nearly half of the fruit, so there really isn't a great deal of fruit flesh. Curiously, while telling folks this only young folks dare to try them. From that I've found the unripe green ones taste better. Not good, just better.

My wife and I enjoyed watching a black bear eating copious inflorescences on the East Glacier Trail in 2014 at the "Devil's club bridge". He stood on two legs and pulled the inflorescence to its mouth and bit the whole thing in one bite. It did this for about 20 minutes before wandering off and I don't think it ever knew we were watching. 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 Neary, who managed Admiralty Island National Monument, he thinks the bear are possibly using the bitter fruits as purgatives, cleaning out their digestive system of the many parasites picked up from eating rotting salmon.




Fall colors 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.

The colors range from spectacular to blah, even the same year. Color is usually a buffy yellow but can be a dull orange, bright yellow or even bright red, but usually only on parts of the leaves. Some years the yellow is very bright and visible at great distances.

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 Herbert Glacier Trail where the understory is almost entirely devil's club. It is in view everywhere while in the forest on the East Glacier Trail and just before climbing the stairs there is an entire slope covered with it.

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

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)

Taxonomy: 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!

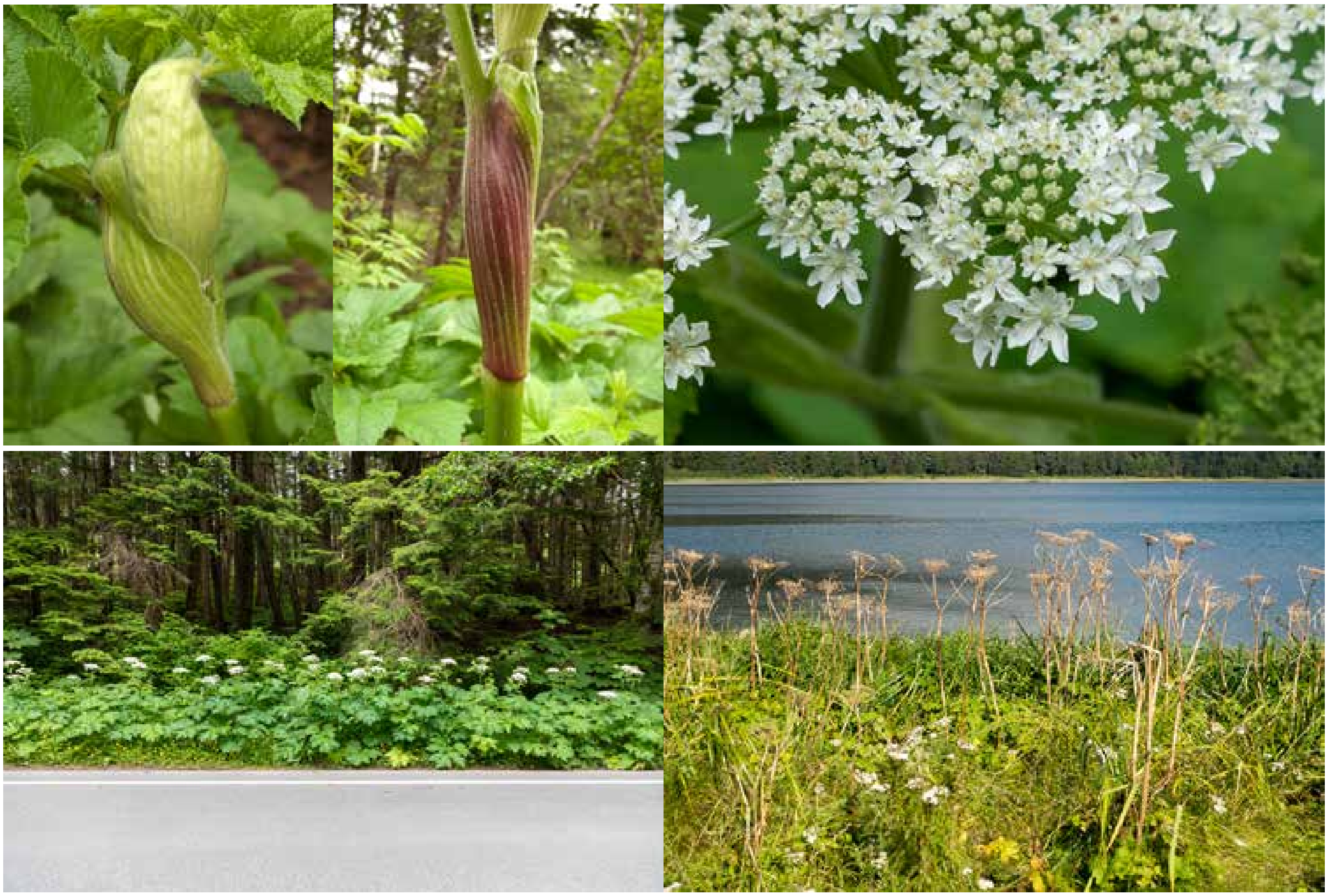
Notes: Scattered along the seashore section of the Rainforest Trail on Douglas Island as well as the Airport Dike Trail, it's parsely-like leaves make it distinctive in this flora. There are a couple of plants along the East Glacier Trail where it leaves Nugget Creek and enters the Mendenhall Valley along the cliff face above Nugget Falls (leaf and flower photograph).

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

<u>Taxonomy</u>: 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.

<u>Notes</u>: 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.

<u>Ethnobotany</u>: 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.

<u>Toxicity</u>: 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, sweet 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 berteroi De Candolle 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 is part of as a wide-ranging variable complex that includes *O. depauperata* Philippi 1894 and *O. purpurea* (J.M. Coulter & Rose) Suksdorf 1906 with the name for all three being commonly used as *Osmorhiza chilensis* Hooker & Arnott 1830. However this name was published in December and becomes a junior synonym to *O.berteroi* which was published in September. This makes it very difficult to determine if the name is *sensu latu* or *sensu strictu*!

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.

Osmorhiza purpurea (J.M. Coulter & Rose) Suksdorf 1906, purple sweet cicely

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

I first spotted the sweet-cicely in fruit on the lower portion of the Bessie Creek Trail on June 9, 2020 and assumed it was what I've seen before, *O. chilensis*. Just before the first "meadow" (really a mukeg) I spotted this plant in flower and looking closely at it discovered the flowers are not white but purple! Had I carefully looked at the fruits, I would have found them to be long tapered and bristly, quite different from *O. chilensis*. Like most of us, my attention was more on the flower than the fruit, especially an upalatable fruit!

Several references consider it and *O. chilensis* "common" but I don't. While I'm not surprised to find sweet cicely, I don't find it on every hike in appropriate habitat (wet coniferous woods) which is a definition of "common" I like, something I *usually* find. It is an easily overlooked plant, but when in fruit the rather spare architecture is almost striking and easily spotted. I've missed the purple form for more than a decade, so it either isn't very common or I've just not been a careful enough observer.

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