Borealis

the newsletter of the

Alaska Native Plant Society

PO Box 141613, Anchorage, Alaska October-November 2015

Join us at our Next Meetings!

Monday, Oct. 5, 6:00 p.m

Slide Show & Potluck

Everyone is invited to share up to 10 photos of their activities this past summer. The food is always yummy!

Monday, Nov. 2, 7:00 p.m

Main Topic: "Highlighting Dutch".

Speaker: Glenn Brown will coordinate highlights of the summer field trip to Unalaska Island.

Plant Family Study: *Chrysosplenium*

Leader: Marilyn Barker

Mini-Botany – Rare Plants: *Gentiana aleutica*

Presenter: Mike Monterusso

For the latest information on ANPS events and field trips, go to www.aknps.org/

"Like" Us on Facebook!

Station Identification

The New Season Lineup

As surely as summer turns to autumn, the activities of the Alaska Native Plant society begin to move from field studies to indoor education and socializing. First we must stop to offer our many thanks to those volunteers who led field trips this summer. October's slideshow will highlight some of those trips and in November we'll hear more about the group's trip to Unalaska Island in June.

Special thanks also to Verna Pratt and all volunteers who put in time this and previous years on AKNPS's ongoing *Tragopogon dubious*(western salsify) removal efforts. Overall, AKNPS weed warriors noted the presence of fewer plants through the area, suggesting that ongoing efforts to remove *T. dubious* by hand pulling are contributing towards eventual statewide eradication.

Also, here's a loud shout out to the AKNPS volunteers who help keep the **Campbell Creek Science Center native gardens** well maintained while simultaneously earning volunteer hours to offset room rental for the monthly meetings. A special thanks to BLM staff and high school volunteers as well.

Just as commercial TV always begins their fall season with new programming, the Alaska Native Plant Society, begins our annual indoor meeting programs by highlighting different aspects of native Alaskan botany. As always, our meetings are held on the first Monday evening of the month, from October through May, and except for the October potluck meetings begin at 7PM. You can look forward to a great list of key-note speakers as well as short presentations by fellow members.

The Mini-Botany Series: Alaska's Rare Plants

Plant Family: The plant "family" for the fall-winter 2015-16 will be *Saxifragaceae*. Thanks in advance to the volunteer speakers.

MYSTERY PLANT

This plant may not be a mystery to many of you but the different races of it can cause confusion. The combined varieties grow over most of Alaska except in moist coastal areas and major river beds. They seem to prefer dry, gravelly or sandy soil, so are often seen along roadways, but can occasionally be seen in some alpine areas. There are 3 variants in Alaska, and are sometimes called different subspecies. Two have light yellow flowers the other white. We will concentrate on the yellow flowered specimen that is most common in Alaska. It is common in South Central, Interior Alaska, eastern Alaska and as far north as the Brooks Range. This species has pinnately divided leaves with 15 to 35 opposite leaflets that are covered with silvery hairs. The raceme of many, irregular shaped flowers is tight to begin with but elongates in age. The plant is quite stiff and upright (4 to 6in.) and blooms over a long period of time. The calyx is very hairy and the seed pod stiff and upright. The persistent stipules are light tan colored. The variant in central Alaska has white flowers with a purplish tinge and is overall a more robust plant and grows up to 8 inches tall.

ANSWER on Page 6 – Don't Peek!

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- **You still earn your Rewards Points, Fuel Points, and Rebates, just as you do today.**
- If you do not have a Rewards Card, they are available at the Customer Service desk of any Fred Meyer store.
- For more information, please visit www.fredmeyer.com/communityrewards.

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ALASKA NATIVE PLANT SOCIETY

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President	Beth Baker
Vice President	Dennis Ronsse
Secretary	Mike Monterusso
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Anchorage Chapter Program Coordinators

Membership	Bernadine Raiskums
Plant Family	Dennis Ronsse
Mini-Botany	Dennis Ronsse
Field Trips	Marilyn Barker

Newsletter ("*Borealis*")

Editor	Ginny Moore	345-1355

Borealis is published bi-monthly, fall through spring. Articles may be sent to Ginny Moore, 14530 Echo Street, Anchorage, AK 99516. Phone or FAX: 345-1355, E-mail: elfinwood@gmail.com

Plant Family Study

The Saxifragaceae Family

A core mission of The Alaska Native Plant Society is education. Each season we select a plant family to study and at each meeting members present different species within that family. The plant "family" for the fall-winter 2015-16 will be *Saxifragaceae*. Thanks in advance to the volunteer speakers.

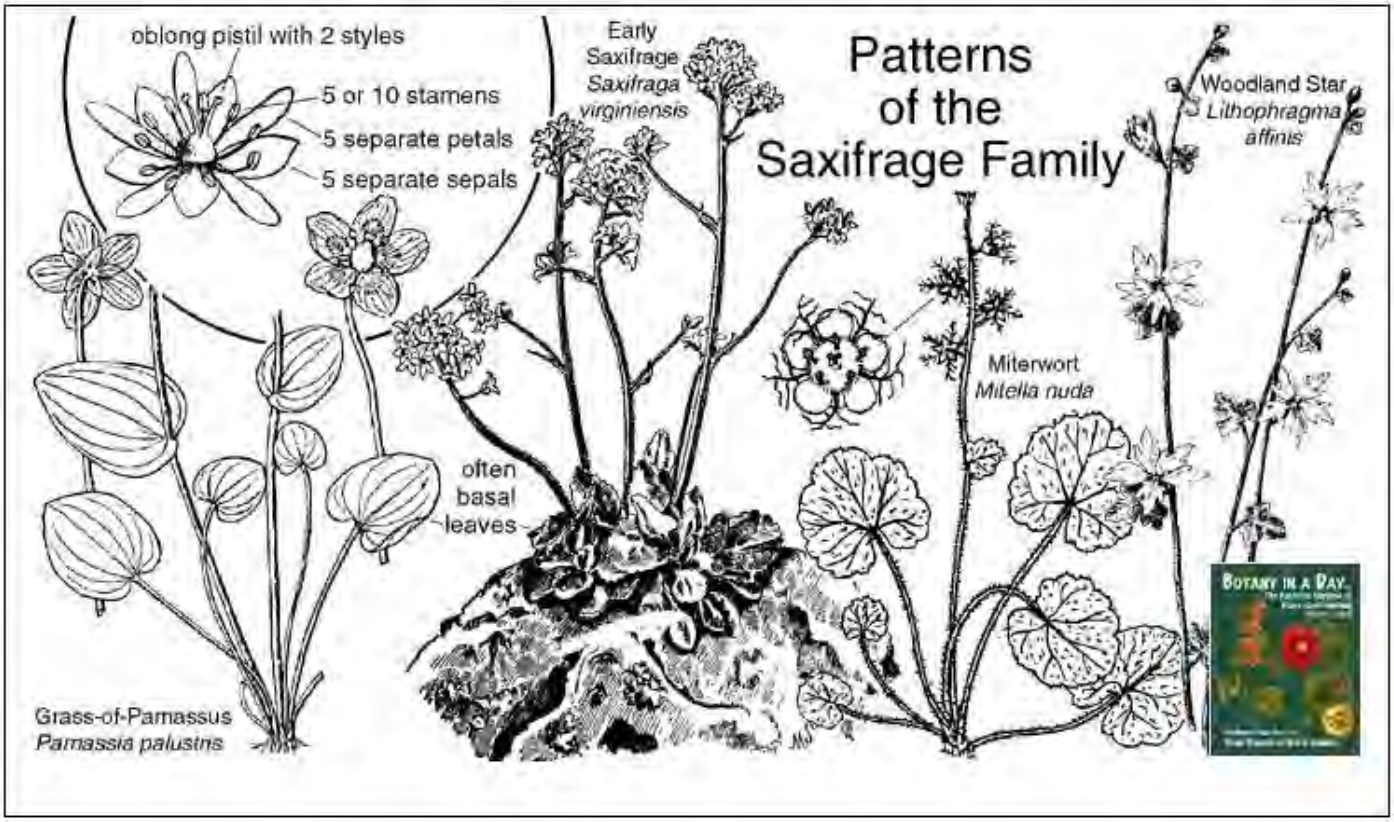
Classification of Saxifragaceae has been varied and controversial . If you Google “Saxifragaceae” on the internet you’ll find great variation in the number of genera that are considered part of this family. While some sources claim that the family is comprised of 43 genera and around 650 species worldwide, DNA analysis has led to a list of 33 genera generally accepted as belonging to the family.

Some of the genera which were listed by Hultén in Flora of Alaska as part of the Saxifragaceae have found new botanical homes. The shrubby genus *Ribes* now belongs to the Grossulariaceae, the gooseberry family, which is closely related to the Saxifragaceae. The non-woody genus *Parnassaia* has moved to the Celastraceae.

DNA analysis further hypothesizes a split between members of the genus *Saxifraga*, creating a new genus *Micranthes*. This molecular data shows that genera are pretty much divided into two groups, Saxafraga genus and the heucheroid clade. Almost all of the variation in the family in numbers of sepals, petals, stamens, and carpels occurs in the heucheroid clade. *Saxifraga* has a relatively uniform floral morphology (radially symmetric flowers, which consistently have the same number of sepals, petals, stamens, and carpels).

Saxafrages belong to a family of herbaceous perennials, biennials and annuals which are predominantly plants of the northern temperate and subarctic zones and *Saxifraga* is by far the largest genus in the family. The name, from Latin, means “rock-breaker” because ancient traditions ascribed medicinal properties to them – the treatment of urinary stones – rather than because of their supposed habit of growing in and fragmenting rocks. The species to which the name was given by Dioscorides was *S. Granulaga*, a meadow plant, not one which usually grows on rock. It is worth noting that while *Saxifraga* derives from the Latin for “rock+breaker”, the name of another genus in the family *Lithophragma* means almost the same, “stone-breaker” but is derived from Greek.

In Alaska 13 genus names including 80 species/infraspecies names have been accepted. *Saxifraga* is by far the largest genus represented here with fully half of those names. Join us throughout the year as we explore the many different family members!



Diversification in Arctic *Oxytropis:*

If you tried to guess the answer to our mystery plant, described on Page 2, maybe you already have some idea why this plant might be called loco-weed!

Oxytropis (loco-weed, Fabaceae) are typical members of the Arctic flora and include 20 species in Alaska occurring in a wide range of habitats (e.g. forest, meadow, tundra) with some species being narrow endemics. Most of the Alaskan species of *Oxytropis* have been assigned to two major polyploid complexes, the *O. arctica* and *O. campestris* complexes. Only few morphological characters have been used to separate these two complexes: flower color (blue vs. white), flower size (small to large), number of flowers per inflorescence (few to many), and plant size and habit (tall or erect to small or procumbent). But botanists in Alaska have long noticed a high degree of morphological variation within well-established taxa. This has resulted in a great deal of taxonomic controversy. It makes you loco just trying to sort out the possibilities.

Other people have been concerned as well, and at the University of Alaska Herbarium which is part of the Museum of the North in Fairbanks they are devoting a great deal of attention to the Oxytropis genus.

Understanding taxonomic relationships between species of *Oxytropis* and generating predictions of range extensions and/or contractions in conjunction with current climate models will be important for conservation decision by land managers. The curator of the ALA Herbarium, Steffi Ickert-Bond, as well as Zachary Meyers a master's candidate at the University of Alaska Fairbanks are currently investigating the genus *Oxytropis*, to study post-glacial dynamics in a landscape genetic context in Alaska. High levels of morphological plasticity, coupled with a lack of definitive taxonomic characters, have led to a plethora of synonyms from early 20th century botanists. A combination of morphological and novel molecular techniques are being applied to resolve the phylogenetic and phylogeographic questions. https://www.uaf.edu/museum/collections/herb/projects/

Rose LaMesjerant, an undergraduate at the University of Alaska Fairbanks, investigated difference in seed micromorphology within *Oxytropis* species with the support of an Alaska EPSCoR undergraduate research fellowship. This project seeks to determine differences in surface features and anatomy of seeds of ca. 13 species of *Oxytropis* (loco-weed, Fabaceae) that occur in Alaska. The study is based on dry herbarium specimens from the University of Alaska Museum Herbarium (ALA). Observations made using scanning electron microscopy indicate that seed surface micromorphology is primarily rugulate, with either 1) tightly interwoven thin rugae, 2) thick rugae, or 3) thick raised primary and thin recessed secondary rugae. For anatomical studies, dry seeds were rehydrated in equal parts of glycerol, water and ethanol and then sectioned by hand. The seed coat in *Oxytropis* is well differentiated and exotestal with the outer integument providing the mechanical layer of the seed. Anatomically, seeds of *Oxytropis* show atypical leguminous organization with prominent macrosclereids in the epidermis. She concluded that *Oxytropis* seed coat micromorphology and anatomy can be used to distinguish *Oxytropis* from its sister taxon *Astragalus*, but that additional characters are needed to help differentiate species of Alaskan *Oxytropis* and evaluate diversification within the Arctic. Rose presented the results at Botany 2008 in Vancouver, Canada. http://2008.botanyconference.org/engine/search/index.php?func=detail&aid=1143

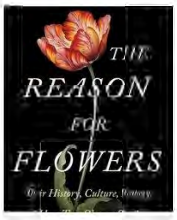
Mystery Plant Answer:

Oxytropis campestris ssp gracilis – now listed instead as *Oxytropis campestris* var. *spicata* or *Oxytropis monticola*

Field Oxytrope or Yellowflower Locoweed

Fabaceae/Legume Family

FROM OUR BOOKSHELVES

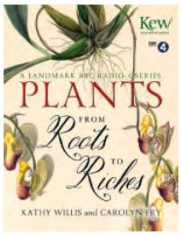


The Reason for Flowers

Their History, Culture, Biology, and How They Change Our Lives
by Stephen Buchmann
Simon & Schuster 2015

In Biology 101 we learned that the reason for flowers is sex. But once the "dirty deed" is done, the flowers can go on to become fruits and seeds. In this fascinating book, Stephen Buchmann takes us along as he explores the roles flowers play in the production of our foods, spices, medicines, perfumes, while simultaneously bringing joy and health. Flowering plants serve as inspiration in our myths and legends, in the fine and decorative arts, and in literary works of prose and poetry. Flowers seduce us - and animals, too - through their myriad shapes, colors, textures, and scents. And because of our extraordinary appetite for more unusual and beautiful "super flowers," plant breeders have created such unnatural blooms as blue roses and black petunias to cater to the human world of *haute couture* fashion. In so doing, the nectar and pollen vital to the bees, butterflies, and bats of the world, are being reduced. Buchmann explains the unfortunate consequences, and explores how to counter them by growing the right flowers. He integrates stories about the many colorful personalities who populate the world of flowers, and the flowers and pollinators themselves, with a research-based narrative that illuminates just why there is, indeed, a *Reason for Flowers*.

Stephen Buchmann is a beekeeper and an associate professor of entomology at the University of Arizona in Tucson. He served on a National Academy of Sciences committee on the status of pollinators in North America and is a member of the Pollinator Partnership. He is also an author of *The Forgotten Pollinators* and *Letters from the Hive: An Intimate History of Bees, Honey and Humankind*, and a picture book, *The Bee Tree*.



Plants: From Roots to Riches

by Kathy Willis, Carolyn Fry
John Murray Press 2014

Our obsession with plants and gardening goes back a long way and *Plants: From Roots to Riches* takes us on a journey through the scientific life of a uniquely British institution across 25 vivid chapters, this book explores how the last 250 years have transformed our relationship with plants for good.

Kathy Willis, Director of Science at the Royal Botanic Gardens, Kew, and Carolyn Fry, an acclaimed science writer, delve into Kew's archive and its world-class collections – from Carl Linnaeus and his invention of a universal language to name plants, through Joseph Banks' exotic discoveries and how Charles Darwin's fascination with orchids helped convince doubters about evolution. As the British Empire set out to conquer the world, explorers, adventurers and scientists risked their lives to bring the most interesting plant specimens and information back to London, and to Kew. From the lucrative races to control rubber, quinine and coffee to understanding the causes of the potato famine, the science of plants has taught us fascinating and enormously valuable lessons.

Full of amazing images from the archives, and packed with history, science, memorable tales of adventure and discovery, politics and conflict, changing economic and social preoccupations, each chapter tells a unique and fascinating story, but, gathered together, a great picture unfolds, of the development of a most remarkable science, the magic and beauty of plants and ultimately our dependency on them.

From What We Gather – Around the Web

First Plants May Have Bloomed on Water – Not Land

Indiana University paleobotanist David Dilcher and colleagues in Europe have identified a 125 million- to 130 million-year-old freshwater plant as one of earliest flowering plants on Earth. "The 'first flower' is a bit of a poetic concept, but that aside, we do believe this is the oldest we have discovered so far," says Dilcher.

The finding was reported in August in the Proceedings of the National Academy of Sciences. "Because it is so ancient and is totally aquatic," the study authors wrote, this extinct freshwater plant "raises questions centered on the very early evolutionary history of flowering plants."

These illustrations based on fossil remains of *Montsechia vidalii*, show long-and short-leaved forms of the plant and a single seed. By Oscar Sanisidro

This new analysis of the fossilized remains from central Spain and the Pyrenees show that the plant, *Montsechia vidalii*, was probably around at the same time as feathered dinosaurs. It is thought to have grown underwater in shallow lakes, and resembles the modern-day "coontail" or hornwort, which is commonly used in aquariums.

Their conclusions are based upon careful analyses of more than 1,000 fossilized remains of *Montsechia*, whose stems and leaf structures were coaxed from stone by applying hydrochloric acid on a drop-by-drop basis. The plant's cuticles -- the protective film covering the leaves that reveals their shape -- were also carefully bleached using a mixture of nitric acid and potassium chlorate. Examination of the specimens was conducted under a stereomicroscope, light microscope and scanning electron microscope.

The plant appears to have had no roots or petals. Its leaves were arranged in two forms: either in a spiral or opposite one another along an axis. The plant sprouted several tiny flowers, each of which contained a single seed. Since animals in this time period didn't have a role in the dispersal of seeds, it seems likely that the seeds, from separate male and female flowers, were released directly into the water where they could float off to fertilize another plant.

Sometime in the middle of the Cretaceous period the diversification of the flowering plant population exploded, developing into the beautiful blooms we know today, as well as influencing the wildlife that evolved alongside. Dilcher says that we wouldn't be here at all if it weren't for plants like *Montsechia vidalii*. "We are a product of the many stages of evolution that went hand-in-hand with the evolution of flowering plants," he says.

Bernard Gomez of Claude Bernard University, Lyon, and co-author of the paper, which is published in August in PNAS, says that there may yet be an even older flowering plant. There's evidence of pollen dispersed in fossils that are around 140 million years old, he says.

The authors say that, "we need to understand as much as we can about flowering plant evolution because right now we're facing a world crisis." Most modern flowering plants need animal pollinators to reproduce, with bees serving that role for many of our most important crops. Yet bees are declining in the US and Europe.

"This plant shows us where it all began," says Dilcher. "If we know more about their evolution, we might come across alternative pollinators that are hidden out of sight today but played a role in the past that we could encourage again."

THE GEOGRAPHICAL ORIGINS AND MIGRATION HISTORY OF CREEPING SUBBALDIA, *SIBBALDIA PROCUMBENS* (ROSACEAE)

Many arctic-alpine plants have very large geographic ranges, often extending almost completely around the Northern Hemisphere. Some of these geographic distributions are nevertheless highly discontinuous, suggesting a long history with multiple cycles of range expansion and contraction. Molecular methods have become widely used to elucidate the geographic history of such groups.

Arctic tundra habitats became widespread at the end of the Tertiary, approximately 3 million years ago. Some arctic species date back to the late Tertiary, whereas others colonized the arctic much more recently. Phylogeographic approaches (integrating genetic analyses of DNA data with spatial information) are now being used to ask questions about the geographic origins of species, the locations of Pleistocene refugia, the role of long-distance dispersal, and (in combination with other evidence, such as dated macrofossils) the timing of all these events.

To investigate these questions for a low-arctic plant with a fragmented geographic range, a team of botanists from the University of Victoria, British Columbia examined genetic patterns in the montane to arctic–alpine creeping perennial *Sibbaldia procumbens,* based on DNA sequences from three regions of the chloroplast genome. They sampled *Sibbaldia* from 176 localities. They carried out Bayesian phylogenetic analyses and statistical parsimony analyses on the combined sequences, using these to analyze genetic diversity (based on plastid haplotype frequencies) and geographical patterns of divergence over the entire geographic range.

Sibbaldia has historically been a genus of uncertain taxonomic definition and affinities, with recent studies resulting in a much narrower circumscription. A broader traditional circumscription is polyphyletic and consists of multiple divergent lineages. The most widespread of these lineages is the *Sibbaldia procumbens* clade, consisting of *S. procumbens* and a few closely related species (including the central to south Asian *S. parviflora* and *S. cuneata*). This clade probably originated in the vicinity of the Qinghai-Tibetan Plateau in China. The team identified two highly distinct subclades within *S. procumbens*, one centered in Europe and the other in North America. These two subclades overlap on oceanic islands of the North Atlantic, indicating that this species has long-distance dispersal capability although its achenes lack any obvious dispersal adaptations. Similar patterns have been reported for other arctic species.

The North American subclade was further divided into two lineages, one restricted to California and the other widely distributed across the continent and North Atlantic. In the widespread lineage, genetic diversity was low in the north and markedly higher to the south. This suggests that following the spread of *S. procumbens* into North America, a mid-to-late Pleistocene southward displacement of North American populations occurred, with subsequent migration northward into previously glaciated regions. The sampling of the European subclades, though less extensive than in North America, showed that disjunct geographical regions generally harbored distinct haplotypes.

There is evidence for multiple Pleistocene refugia for *Sibbaldia procumbens* in both North America and Europe. North American refugia existed in California and in the southern Rocky Mountains. Beringia has long been considered to be a critically important Pleistocene refugium for arctic-alpine plants. However, in contrast with results for most widespread arctic–alpine species, they found no evidence that *S. Procumbens* persisted in a Beringian refugium. Geographic distributions of some haplotypes suggest that cryptic refugia may have existed within the Cordilleran Ice Sheet. Episodes of range expansion and contraction and long-distance dispersal have all contributed to the genetic structure and widespread but fragmented distribution of this species.

FROM: BEN, the Botanical Electronic News published by Dr. A. Ceska in Victoria, British Columbia, Candada, July 21, 2015
http://www.ou.edu/ca s/botany-micro/ben/

ANNUAL MEMBERSHIP APPLICATION/RENEWAL

The Alaska Native Plant Society was organized in 1982 by an enthusiastic group of amateur and professional botanists. It is a non-profit educational organization with the goal of uniting all persons interested in the flora of Alaska. Membership is open to any interested individual or organization. If you wish to join us, pleas indicate the category of membership you desire, fill in the form below and mail it with the appropriate remittance to:

Alaska Native Plant Society,
P.O. Box 141613,
Anchorage, AK 99514

STATUS ☐ New ☐ RENEWAL

CATEGORY

☐	**Full-time Student**	**$12**
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Membership is on a calendar year basis.

Would you rather receive the newsletter by e-mail instead of by snail mail?
It will save ANPS some postage and you'll always receive your newsletter in a timely manner.
Let us know when renewing or by e-mail to elfinwood@gmail.com.

EARLY REMINDER: Be sure to maintain your membership in order to support the Society and receive the Borealis newsletter and field trip announcements. Membership is on a calendar-year basis. The calendar year starts in January!

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