OREGON FLORA *Newsletter*

VOLUME 16 NUMBER 1 OREGON STATE UNIVERSITY JUNE 2010

16 Years of Oregon Flora Project News!

by Rhoda Love, Editor

This spring, as we reached the end of the first decade of the new century, I asked Linda Hardison if I might briefly look back on sixteen years of editing your *Oregon Flora Newsletter.* Linda graciously expressed enthusiasm for the idea; however, little did we realize how vast would be the number of people we would want to thank for their help and support over the past decade and a half! Reviewing my archival set of 41 OFN issues, I soon realized that the list of helpers and contributors would be in the hundreds, and that clearly it would not be possible to thank each of you who has taken part since we began publishing in January 1995.

Although I plan to mention a few names, many important contributors must remain anonymous -- but certainly not unappreciated. I wish to express my gratitude to each person who has written an OFN article, submitted artwork, taken part in research, assisted with layout, proofing, publishing, and mailing, and otherwise helped make my job as editor a joy for me for over a decade and a half.

See 16 Years, page 2

Photo by Cindy Roché

Rhoda Love demonstrates a tin vasculum used to collect plants before the availability of plastic bags.

Exciting News

by Linda Hardison

Today I bring exciting news for all our loyal Oregon Flora Project supporters: with the Atlas and Photo Gallery completed, and the Checklist ready for review, we are poised to begin writing your new *Flora of Oregon*! This summer, we will commit fully to this objective with the hiring of a full-time taxonomic director.

To kick off this new phase of the Oregon Flora Project, we are here announcing a special fundraising campaign. Our goal is to raise $53,000 -- the amount needed to fully support the new Director's position for one year. Existing and projected OFP resources can maintain our current staffing as well as support a new full-time taxonomist for one year. To have the assurance of a taxonomist's position funded for multiple years is money in the bank, both literally and figuratively. This security will provide the confidence we need to meet our long-term goals without the worry that progress may be interrupted. Continuity in funding keeps our momentum growing and results in more of what our Flora Project is about -- creating a peerless botanical resource that meets the needs of Oregon plant lovers. A successful fund drive at this time will bring closer the exciting day when we will hold in our hands the new *Flora of Oregon*!

Please give generously in support of this goal. For those who are Oregon Flora Project sustaining donors, a gift now is testament to your persistence in nurturing an important project to fruition. For the individuals, professionals, and agencies that have not yet shared their financial support, your donation offers a large return on your investment -- existing OFP products, such as the Atlas and Photo Gallery, continue to be available, and the reality of a new *Flora of Oregon* draws increasingly closer with new resources. We are very grateful for your support.

Checks in support of the new taxonomic director's position can be made payable to the Agricultural Research Foundation (include "OFP 4482" on the memo line) and mailed directly to:

ARF, Oregon State University
100 Strand Ag Hall
Corvallis, OR 97331-2219.

16 Years, continued from front page

I had recently retired from teaching botany at Lane Community College in Eugene in 1994 when I learned that a new Flora of Oregon was being compiled at Oregon State University. The previous year, the herbaria of the University of Oregon and OSU had been combined in Corvallis under the directorship of botanist Aaron Liston, who had employed Scott Sundberg to implement the integration. Through his intensive work with the Oregon collections, Scott seized the opportunity to begin work on a new Flora. This was exciting news and I could not resist driving to Corvallis on a sunny autumn morning to ask if I might be part of the endeavor. I was thrilled when Scott asked me if I would edit a new publication, the *Oregon Flora Newsletter*, to be launched early the following year.

Scott and I put together Volume 1 Number 1 in January of 1995, with lead articles by Scott and Kenton Chambers. That first issue was a "cut-and-paste" job; however, by the time the next issue appeared in April, Scott had acquired desktop publishing software and found student helpers who were familiar with this up-to-date technology. Also, happily, as early as our second issue, we were able to publish a list of financial contributors to the Oregon Flora Project.

Looking back on the years that followed, I wish to honor several key individuals. Once again, however, my sincere gratitude to everyone who has contributed time, articles, artwork, and other talents to our publishing enterprise, and to the entire Oregon Flora Project effort to bring forth the much-anticipated new Flora of Oregon. Specifically I want to thank Aaron Liston and the late Scott Sundberg who together fathered the Oregon Flora Project, Linda Hardison who now guides the Project, and Kenton Chambers who has thus far submitted over 30 newsletter articles presenting important up-to-date taxonomic information for our readers. Many thanks to our many regular contributors: Henrietta Chambers, Aaron Liston, Charlene Simpson, Thea Cook, Barbara Wilson, and others too numerous to catalogue here. Our *Erythronium* logo was designed by Linda Vorobik and re-designed by Tanya Harvey. Thanks also to our talented layout artists over the years: Camille Tipton, Alisa Anderson, Aaron Hodges, Miko Nadel, and our present, faithful volunteer artist Rena Schlachter who has prepared our layout for eight years. Rena now assists us from Eugene where she is a Master's candidate in Landscape Architecture at the University of Oregon.

Thank you, everyone, for 16 great years!

Photo by Louise Ballmann

Rena Schlachter has been the OFN Assistant Editor for eight years.

Please help us conserve resources!

If you prefer to receive this newsletter electronically via an email notice, or would like to be removed from our mailing list, please let us know. Send us an email at: *ofpflora@oregonflora.org*, or contact us using the information below.

The *Oregon Flora Newsletter* is published two times a year by the Oregon Flora Project and the Oregon State University Herbarium. **Beginning in 2010, the *Oregon Flora Newsletter* is reducing its publication to two issues per volume.**

The Editor is Rhoda Love and the Production Assistant is Rena Schlachter.

Erythronium oregonum logo and masthead designed by Tanya Harvey.

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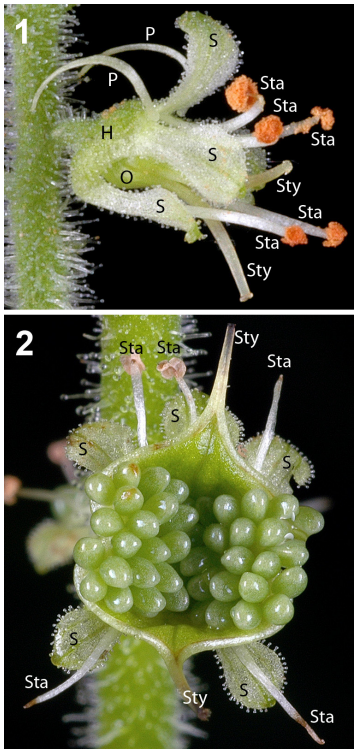
Focus on Bensoniella oregona

by Gerald D. Carr

As a plant photographer I am constantly amazed by what my macro lens captures in the field that I do not appreciate until the camera's files are downloaded and images visualized on my computer monitor. Often the revelations are not particularly gratifying, such as the materialization of thrips, aphids, or mites that I could swear were not present in the viewfinder when the shutter was released. Frequently, however, I am rewarded with a view of some marvelous structural feature of great beauty or significance that cannot be fully appreciated or even detected by the unaided eye. Made large enough, even the smallest flowers often reveal such features or give up useful information about their structure that has gone undetected or underappreciated. This article describes one such example in the Saxifragaceae.

The plant that we know today as *Bensoniella oregona* (Saxifragaceae) was first described as *Bensonia oregona* by Abrams & Bacigalupi in 1929. This name persisted for many years until C. V. Morton discovered that the generic name *Bensonia* was preempted by application to a fossil genus in 1845. In accordance with the rules of botanical nomenclature, Morton (1965) proposed a new generic name, *Bensoniella*, to harbor the species described in 1929, thus creating the scientific name (binomial) that is formally designated *Bensoniella oregona* (Abrams & Bacigalupi) C. V. Morton. This binomial remains in force today, although "*oregana*" has been inappropriately substituted for "*oregona*" in at least two recent floristic treatments.



Figs. 1 & 2. Bensoniella oregona. 1. Flower, oblique lateral view; H=hypanthium, O=ovary, P=petal, Sta=stamen, Sty=style. 2. Fruiting stage, note persistent sepals and stamens.

Bensoniella oregona is restricted to mountainous SW Oregon and a few sites in Humboldt Co., California. It is usually found around the fringes of wet meadows or boggy areas, ranging from 750-1600 m in elevation. On June 6, 2009, I was kindly guided by Ted Schattenkerk to a site at about 760 m elevation in Douglas County, Oregon where I was privileged to observe this rare species in the field and capture many images, including those reproduced here (Figs. 1 & 2) and posted on the worldwide web (Carr 2010).

The photographs immediately reveal a flower with pronounced bilateral symmetry, much more so than implied in most descriptions of the species, in which the floral symmetry has often been characterized as slightly bilateral. However, the conspicuous variation in placement, number, and shape of floral components evident in these photographs imparts a striking bilateral symmetry that distinguishes flowers of *B. oregona* (Figs. 1&2; Carr 2010). This degree of departure from radial floral symmetry is rare in Saxifragaceae, otherwise occurring only in the genus *Tolmiea* which has larger flowers with 5 sepals, 4 recurved petals (instead of 2), and 3 stamens (instead of 5).

My review of the original description and subsequent floristic treatments of *Bensoniella oregona* indicates that there is considerable confusion about the flowers of this species. The descriptions often disagree and in some cases present erroneous information about such basic features as floral symmetry, ovary position, fusion of floral parts, and even the color and number of petals. Though my images provide a means to assess each of these points of confusion, the remainder of this article addresses only the most obvious ones, petal number and color.

In their original description, Abrams & Bacigalupi (1929) attribute 5 petals to *B. oregona*, however, their accompanying illustration depicts only 4. A later description by Bacigalupi (1944) again gives the number of petals as 5 but his new floral drawing clearly shows only 2 petals. Subsequent *B. oregona* descriptions of which I am aware either fail to cite a petal number or accept 5 as basic for the species, in some cases indicating that the petals are ephemeral, variable in number, or entirely absent. Neither Peck (1961) nor Elvander (1993) mentions the number of petals or their color. The recent treatment of *B. oregona* by Wells & Elvander (2009) states "petals absent or 5, purple or pink". However, their illustration shows only 2 petals in the flower. The attribution of purple or pink coloration to the petals of *Bensoniella* by Wells & Elvander (2009) appears to be unique. No hint of such coloration appears in any of my numerous (full color) images (Carr 2010) nor has it been seen, even in old or fading flowers, in any of several populations observed by an experienced field person (Pers. Comm., Veva Stansell, Pistol River). Furthermore, contrary to published accounts, all flowers of *B. oregona* that I have studied consistently had 2 petals. This includes live plants in the field at one site plus all of the suitable herbarium material of the species at Oregon State University (OSC 96574, 153957, 161747; ORE 41863, 41864, 41865).

Bensoniella flowers are small and often closely spaced, and the filaments, style branches, and petals are of similar dimensions. Thus, it is easy to mistake one floral structure for another, especially in flattened herbarium specimens. Also, although the petals are not extremely ephemeral, the stamens persist much longer, even into the fruiting stage (Fig. 2). Collectively, these floral characteristics probably have contributed to confusion about the number of petals and perhaps other aspects of floral morphology of this species. However, all of my images of fresh material and observations of herbarium specimens of B. oregona have revealed the constant condition of 2 petals, one on each side of the enlarged

See B. oregona, *page 6*

Some surprising taxonomic changes in Saxifragaceae

by Kenton L. Chambers

The family Saxifragaceae hardly needs introduction to plant lovers of the Pacific Northwest; in fact, our region of the country is a major center for evolutionary diversification in the family. Some genera are endemic to Oregon and adjacent states, and of these, *Bensoniella, Bolandra, Darmera, Elmera, Leptarrhena, Saxifragopsis, Suksdorfia, Tellima, Tiarella*, and *Tolmiea* have only one or two species each. Other familiar native genera, such as *Boykinia, Chrysosplenium, Heuchera, Lithophragma, Mitella*, and *Sullivantia*, are larger and more widespread. The largest is *Saxifraga*, also well represented in our flora, which comprises some 300 species in its wide circumboreal range (but see below!). *Parnassia*, formerly placed in this family, has been removed to a separate group, the Parnassiaceae (for example, see *Intermountain Flora*, volume 3A, page 60).

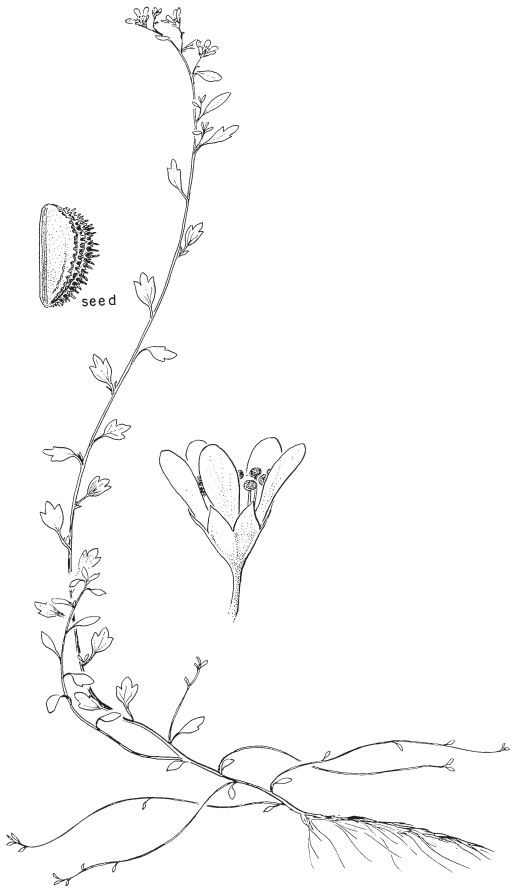
The genera in Oregon are all herbaceous perennials, either rhizomatous or taprooted, which may appear quite similar in habit, with their small, usually white or pink flowers in racemes or cymes, and their clustered basal leaves whose blades are often palmately veined and lobed. Their flowers provide most of the key differences, such as whether the petals are lobed or entire, the styles 2 or 3, the stamens 5 or 10, the ovary superior or inferior, the hypanthium cup-like or spreading, and so on. The flowers are nearly always regular, that is, radially smmetric, but two genera *Tolmiea* and *Bensoniella* are bilaterally symmetric and have a reduced number of petals (see the accompanying article by Gerald Carr on *Bensoniella*).

In the last two decades, the taxonomic relationships of our saxifrage flora have been the focus of intensive studies in molecular evolution, principally by Drs. Douglas and Pam Soltis working at Washington State University. Using comparisons of DNA sequences in selected genes from the chloroplast and nucleus, they have revealed unsuspected patterns of generic relationships, and these in turn have led to a number of novel taxonomic changes.

The DNA-based phylogenies of the family (Soltis et al. 1996 and 2001) showed that Oregon species of *Saxifraga* should be divided into three genera: *Saxifraga* itself, plus *Micranthes* and *Cascadia,* two old names that have not previously been in use. Generic changes became necessary when the phylogenetic data showed that not all members of the genus *Saxifraga* have a common ancestral origin; they are not, to use the technical term, monophyletic. Species of *Saxifraga* that are now removed to *Micranthes* share a closer evolutionary history with *Heuchera, Tolmiea, Tellima, Darmera,* and other genera, than with *Saxifraga*. Nonetheless, the phylogenetic connections detected by these DNA studies must be very ancient, going back millions of years into the Tertiary Period. The monophyletic genus *Micranthes* has 18 species in Oregon, as now recognized (Brouillet and Elvander 2009). I hope to discuss this group further in a later Newsletter.

As now understood, the genus *Saxifraga* includes the following Oregon species: *S. adscendens, S. bronchialis* (2 varieties), *S. cespitosa* (no recognized varieties), *S. hyperborea (S. rivularis), S. mertensiana, S. oppositifolia,* and *S. sibthorpii* (a rare, introduced taxon). *Cascadia*, the third genus mentioned above, contains the single species *C. nuttallii*, formerly *Saxifraga nuttallii*. This species is a delicate, leafy-stemmed, colony-forming plant growing on wet, mossy rocks and river banks west of the Cascades, from Del Norte County, CA, to Grays Harbor County, WA. It is perennial from slender rhizomes, rather than being an annual species as it is sometimes described. Like *Micranthes, Cascadia nuttallii* is well separated from *Saxifraga* by its chloroplast and nuclear DNA. However, it shares a so-called "sister relationship" phylogenetically with *Saxifragodes*, a rare monotypic genus endemic to Tierra del Fuego, South America. Their connection was discovered only recently, when DNA samples from *Saxifragodes* became available for molecular study (Soltis et al. 2001). *Cascadia* and *Saxifragodes* are each others' nearest relatives, by far, yet they are separated geographically by a gap of 8,000 miles. According to Soltis and coauthors, the species are morphologically distinct but share "similar habitats (wet, moss-covered soils and rocks), as well as a similar creeping habit unusual in the family."

Such wide disjunctions in the range of related species are a long-standing puzzle to plant geographers [see my article "Tarweeds and silverswords Californians on a



Cascadia nuttallii. *Note spiny seed. Illustration by Jeanne Janish. From Hitchcock* et al., Vascular Plants of the Pacific Northwest Vol. 3 p. 52.

Changes in Saxifragaceae, continued from page 4

Hawaiian vacation," *Oregon Flora Newsletter,* vol. 10(1)]. According to Soltis et al. (2001), "the data … suggest a possible ancient long-distance dispersal event, in this case from the Pacific Northwest of North America to southern South America." It seems likely that migrating birds can, on rare occasions, transport seeds over a wide geographic gap such as this. My hypothesis is that the uniquely spiny seeds of *Cascadia nuttallii* (see illustration) assist in animal dispersal, as has been proposed for the rough-surfaced achenes of asteraceous tarweeds, which found their way from western North America to Hawaii, by bird dispersal, at least 5 million years ago.

Photo by Gerald Carr, courtesy of Oregon Flora Project

Saxifraga mertensiana, *from Douglas County, east of Wilbur.*

There are some other problems concerning non-monophyletic (hence "polyphyletic") genera in the Saxifragaceae, which were discovered during Doug Soltis's molecular studies but have not yet been fully resolved. An example is *Mitella*, containing 20 species in North America and eastern Asia. The 9 North American species whose nuclear DNA was examined by Soltis & Kuzoff (1995) fell into 5 distinct groups, but in some analyses, these groups did not have a monophyletic origin. Because their results were not clear-cut, and their sampling of species was far from complete, these authors did not draw taxonomic conclusions that would divide *Mitella* into separate genera, as happened to *Saxifraga*.

Such divisions had been forecast, on morphological grounds, in references like *Illustrated Flora of the Pacific States* (Abrams 1944). Abrams recognized three genera, *Mitellastra, Pectiantia,* and *Ozomelis* for our 7 West Coast species of *Mitella. Mitella caulescens,* representing the genus *Mitellastra*, and the trio of *M. trifida, M. stauropetala, and M. diversifolia*, of genus *Ozomelis*, are two groups that stand well apart from the species-cluster of *Mitella* and *Pectiantia* in the DNA-based phylogeny. If further studies, especially of the numerous Asian species, support the separation of *Mitellastra* and *Ozomelis*, we may have to add these two genera to our already rich representation of saxifragalian taxa in Oregon. The lesson in all this is that minor floral differences which up to now have been considered to be variations between species in a single genus, may actually mark well-defined evolutionary lines deserving of separate generic status.

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The Agricultural Research Foundation and the OFP

by Dorothy Beaton, Executive Director, ARF

Editor's note: Donation of funds to the Oregon Flora Project through the Agricultural Research Foundation is a mechanism used to transfer dollars into an OSU account which supports staff salaries and other operating expenses that must be spent through the state system.

The Agricultural Research Foundation (ARF) is the custodian of privately and publicly donated funds used to support agricultural research, such as the Oregon Flora Project, at Oregon State University. The Agricultural Research Foundation was established seventy-five years ago to encourage and facilitate research in all branches of agriculture and related fields for the benefit of the citizens of Oregon. This foundation also conducts a competitive grant program to support basic and applied scientific research at Oregon State University. We are pleased to interact with the Oregon Flora Project by providing a mechanism to ensure all and every possible dollar contributed on its behalf is made available for the Project and not absorbed in administrative expenses.

Oregon State University is recognized as the Land Grant University for the State of Oregon. The Oregon Flora Project supports this aspect of the university through its research on plants indigenous to Oregon's numerous diverse growing regions. The services that ARF provide facilitate connections between OSU and OFP by helping to bring quality scientific data to research scientists seeking assistance and the general public wanting accurate information.

Our New Flora of Oregon

by Linda Hardison

Oregon plant lovers have not had a new Flora of Oregon since Morton Peck's revised *Manual of the Higher Plants of Oregon* appeared fifty years ago! Now what we have all been waiting for: Oregon Flora Project botanists have begun to write our comprehensive new Flora!

As loyal Oregon Flora Newsletter readers realize, the preliminary work has been completed: Checklists have been written, herbarium vouchers designated, the Photo Gallery and Atlas mapping program are available online. Thus the next step begins: the writing of our brand new Flora of Oregon!

As you have read in "Exciting News" on the front page, we are poised to hire a Taxonomic Director to oversee the writing of the new Flora. This person will oversee the work of our many experts who will write the individual treatments of families, genera and species of Oregon's ~4,500 plants. The final result will be both a hard-copy book as well as an online version with multiple-entry keys. Floristic treatments will be posted online free for all users as they are completed. We invite you to view on our Oregon Flora Project website (*http://oregonflora.org/flora.php*) our first online installment: dichotomous keys and descriptions of the Oregon gymnosperms prepared by Stephen Meyers. Also online is a draft key to the genera of the Poaceae (grasses) authored by Carex Working Group members Barbara Wilson, Nick Otting and Dick Brainerd.

As is obvious from the above, your Oregon Flora Project is making great progress thanks to you, our many loyal members, and our dedicated staff and volunteers. Your support and contributions have made this progress possible. Thank you.

Photo courtesy of the Carex Working Group.

Carex Working Group members (left to right) Nick Otting, Barbara Wilson, and Dick Brainerd, are the authors of the Grass Family (Poaceae) treatment for our new Flora of Oregon.

B. oregona, *continued from page 5*

and reflexed upper sepal (Fig. 1).

In this example, the focus of my macro lens on *Bensoniella oregona* has resulted in images that challenge some of the basic notions about the flowers of this species, perhaps most notably, the number of petals. However, is it possible that some individuals or populations of *Bensoniella* actually have flowers with 5 petals as originally described? Perhaps one of our readers with a focus on *Bensoniella* has the answer. If so, the OFP staff would be grateful to receive such documentation.

Author's note: I thank Ken Chambers for enthusiastic discussion and editorial skills generously contributed to this effort.

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Thanks

We thank the following for their recent financial support:

To honor the privacy of our donors, we do not publish names in the online version of the Newsletter.

Gifts were given in memory of Bonnie Hall, and in memory of Dorothy Terry of the Glide Wildflower Show.

Grant support from the John and Betty Soreng Environmental Fund of the Oregon Community Foundation and the OR/WA Bureau of Land Management is gratefully acknowledged.

Volunteers share their expertise and time to help the OFP succeed; we are fortunate to have them as a part of our team. Special thanks to the following individuals who quietly and consistently support our efforts: Ken Chambers, Richard Halse, Gene Newcomb, Charlene Simpson, Rhoda Love, Rena Schlachter, Gerry Carr, Bruce Newhouse, Tanya Harvey, and Jeff Cook. Thank you all!

How can I contribute?

Donations to the Oregon Flora Project are a critical part of our operating budget. Funds are routed to the OFP through the Agricultural Research Foundation (ARF). The ARF is a non-profit organization that raises funds to support scientific research and programs at OSU. All contributions are tax-deductible.

Your checks to the Oregon Flora Project can be made payable to the Agricultural Research Foundation. Please include "Oregon Flora Project—4482" on the memo line.

Mail your check to:
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With your contribution, please let us know if you do not wish your name listed in our newsletter "Thanks" column.

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TIME DATED MAIL

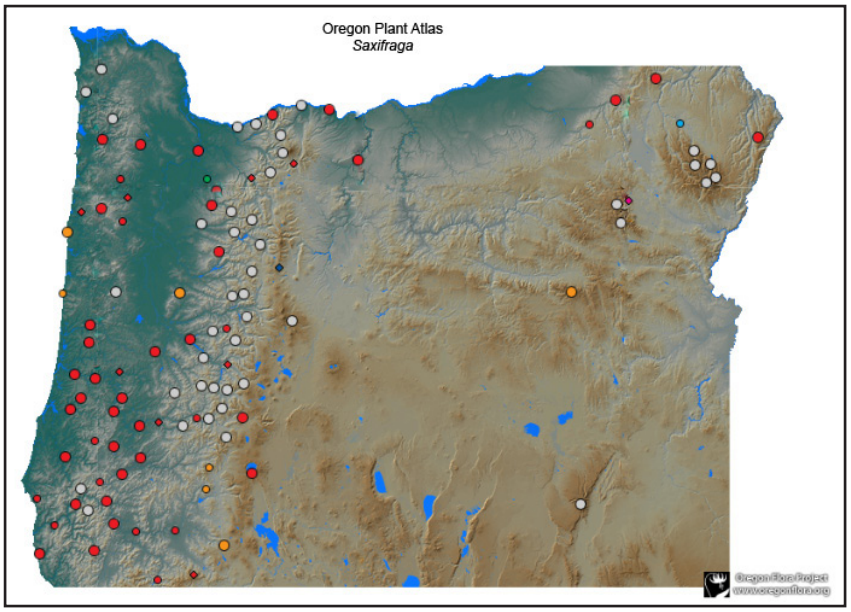
Did you know?

- With 20 genera and only 64 species (subspecies and varieties brings the number of taxa to 75), Saxifragaceae is among the most diverse families, at the generic level, in our state flora.

- *Parnassia*, Grass-of-Parnassus, has been removed from Saxifragaceae, but the DNA evidence is equivocal as to whether it should be merged with Celastraceae or raised to family level as Parnassiaceae. The OFP Checklist places it in the Parnassiaceae.

- *Tolmiea menziesii*, Youth-On-Age, is now split into two species. All the populations from Lane County south to California are diploid, and have half the chromosome number of those from Benton County northward. The southerly plants have been assigned the name *Tolmiea diplomenziesii.*

- The rare Siskiyou Mountains endemic species *Saxifragopsis fragarioides* (formerly *Saxifraga fragarioides*) was discovered in 1992 and 1995 at two disjunct sites 400 miles to the north in Chelan County, Washington.



Distribution of the recognized species of the genus *Saxifraga*. From the Oregon Plant Atlas, http://www.oregonflora.org/atlas.php.