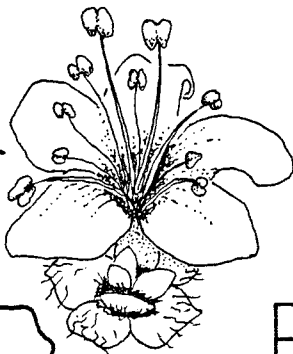


Kelseya uniflora



Kelseya

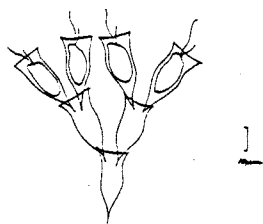
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Vol 4, No 3

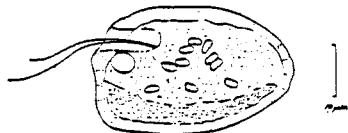
newsletter of the montana native plant society

ALGAE IN MONTANA WATERS: THERE'S MORE TO A STREAM THAN WATER AND FISH

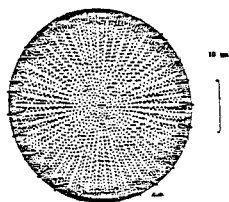
- Loren Bahls



Dinobryon sp. is an alga which may clog filters and flavor the water. Look for branching colonies made up of vase-shaped cells.



Cryptomonas sp. is an indicator of organic pollution as well as being a taste and odor alga. The cells are large and motile.



Stephanodiscus niagarae is large and disc shaped with many sharp marginal spines and radiating rows of dots on the cell surface. It is a potential taste and odor alga.

A refrain heard often these days from conservationists and forest ecologists is: "There's more to a forest than trees!" The idea and concern embodied in this phrase is that a forest is a complex ecosystem containing many species, but often only a few - the ones that have commercial value - dictate the way the entire ecosystem is managed.

This phrase also reflects a growing distress among natural scientists concerning the rapid loss of species from the face of the earth and the inexorable decline in biological diversity. Today's rate of extinction is unprecedented as humankind moves to develop and simplify the last great storehouses of genetic diversity: the tropical and old-growth temperate forests.

These same ideas and concerns apply to aquatic ecosystems - lakes and streams - right here in Montana. Montana's water bodies are ecosystems in their own right. Instead of air and soil, the basic environment is one of water and rocks, and the plants and animals are aquatic, not terrestrial.

When we think of life in a stream we typically think of fish, and usually only those fish that are fun to catch or good to eat, or both. Water and game fish are the most valued products of aquatic ecosystems and it should come as no surprise that most streams in Montana are managed, first and foremost, to maximize the production of these commodities.

But there's more to a stream than just water and game fish. There's a long list of "supporting actors" - species that are not valued by people, but which nevertheless play vital roles in the stream ecosystem.

First there are the non-game fish, usually scavengers and small fish that are eaten by larger fish. Then there are the animals without backbones, or macro-invertebrates as the "bugologists" call them. These include creatures like crayfish, snails, worms, even freshwater clams and sponges, and many different kinds of aquatic insects. These are the critters that fish eat. And then there are a variety of microbes - bacteria, fungi and protozoans - that serve to break down organic matter and recycle nutrients (it's a dirty job, but somebody's got to do it!), and the song birds, waterfowl, furbearers and other wildlife that use streams and streamside zones.

Finally, there are the plants, the producers of aquatic ecosystems. These typically include algae, mosses and "higher" or vascular plants (macrophytes) that resemble their land-based relatives.

-continued on Page 6



I recently had occasion to write to the Montana Community Foundation requesting a grant for computer equipment needed by our society. To introduce them to our organization I sent a recent copy of *KELSEYA* and a representative list of our activities. This turned out to be a rewarding exercise because it made me aware of the amazing range of activities that have been undertaken so successfully by our chapters and individual members. Besides the enjoyment we each derive, these projects enrich our local communities and instill an appreciation of Montana plant life. There is no point in printing the list I used, because such a small portion of the many worthwhile projects were actually represented. Many of you know what they are because you were there, and received the satisfaction of knowing that you made a trip, conservation project or educational program work.

So give yourself a pat on the back - any grants or gifts that our Native Plant Society receives will be a direct result of the hard work you have contributed to advancing an understanding and appreciation of Montana's flora. You hear a lot of talk about "grass-roots efforts" but few groups work on as local a scale as we do, and depend so entirely on the initiative and dedication of their members.

Forming a Chapter

It is sometimes difficult to organize programs and activities in areas of the state without local chapters. If you think you may be interested in forming a local chapter, here is what it involves:

Ten or more MNPS members can organize a chapter. To initiate the process, send a letter requesting designation as a chapter, with the names of the ten founding members, to: MNPS Board of Directors, P O Box 992, Bozeman MT 59771-0992. The Board of Directors meets in fall and winter (usually October and February or March), and at the Annual Spring Meeting.

Each chapter elects its own officers, including President, Vice-President, Secretary and Treasurer (or Secretary-Treasurer). One of these officers is designated to represent the chapter on the State Board of Directors.

Chapters may choose to adopt their own Bylaws, consistent with those of the Society, or may operate under the Society's Bylaws. The only requirements are:

- that all chapter members be members of the Society;
- that reports of meetings, chapter news, and scheduled activities be sent to the Newsletter Editor; and
- that chapter meetings be held at least four times annually. Scheduling of chapter meetings is determined by the local officers.

If you want to locate members in your area to see what sort of interest there is in forming a local chapter, you can get addresses from Jan Nixon at the above P O Box.

New Service Offered MNPS Members

A newly-available benefit of membership in MNPS is the ability to order plant-related books from Mountain Press in Missoula at 30% off the list price, and from University of Washington Press in Seattle for about 20% off.

Books available from Mountain Press include **Northwest Weeds** by Ronald J Taylor, and **Alpine Wildflowers of the Rocky Mountains** by J F Duft and R K Moseley. Juanita Lichthardt reviews both of these below. U of Washington Press publications include **Flora of the Pacific Northwest** and the five volumes of **Vascular Plants of the Pacific Northwest**, as well as **Gardening with Native Plants of the Pacific Northwest**, by Arthur Kruckeberg, who is our keynote speaker for the upcoming 4th Annual Spring Meeting. We have arranged to have copies of this book available at the Spring Meeting, which will enable you to save the postage/handling charge required by a mail order.

There is an order sheet enclosed in this mailing; all details are given on it. Your payment must accompany your order. Also, please note the cutoff date for order placement.

Northwest Weeds

Ronald J Taylor

How can anyone not be interested in weeds? Their success and tenacity make them as interesting to ecologists as they are frustrating to gardeners. In a new book from Mountain Press, Dr Ronald Taylor has made it as easy to identify weeds as you do wildflowers with your favorite field guide. He combines detailed, non-technical descriptions with 235 excellent full-color photographs of the wide range of Northwest plants properly considered weeds. The text emphasizes identifying characteristics, ecology and origin of each plant, and frequently explains the derivation of those curious common and Latin names. From the worst enemies of our native flora to our familiar Pearly everlasting, this collection will allow you to quickly locate that troubling unknown that you keep meaning to collect.

- JL

Alpine Wildflowers of the Rocky Mountains

Joseph F Duft and Robert K Moseley

Alpine ecologist Robert Moseley and photographer Joseph Duft team up to bring you this ambitious treatment of the alpine flora from Canada to northern New Mexico, including full color photographs and discussions of 300 flowering plants, timberline trees and ferns. Narrative descriptions include information on habitat, geographic distribution, identifying characteristics, natural history and derivation of names. Conveniently organized by flower color, and a handy size for field use, this book could enhance your next visit to the "land above the trees."

-JL

ANNOUNCEMENTS

GROUP FORMS TO ENCOURAGE OUTDOOR EDUCATION

Teachers, natural resource professionals and students met in Helena in January to organize the Montana Environmental Education Association. The nonprofit group seeks to foster education in and about Montana's incomparable outdoor environment.

"We all live under the Big Sky, and it's vital that our kids base their future decisions about our natural resources on good information. We want to encourage more instruction about Montana's natural resources and environment," said Jack de Golia of Dillon, the group's interim

president. "...Our goal isn't to become an advocate for one side or another in a particular environmental debate. We just want our kids to know more about Montana's natural environment and resources and how humans interact with and use them."

The group's first annual meeting will be April 11-13 at Big Sky, sponsored by Project Wild and Project Learning Tree (two curricula for teaching about wildlife and forestry). Anyone interested in learning more about outdoor and environmental education is welcome. Contact de Golia at MEEA, PO Box 928, Dillon MT 59725; or Kurt Cunningham, at Dept of Fish, Wildlife & Parks, 1420 E 6th, Helena MT 59620.



4th ANNUAL MNPS SPRING MEETING

May 3-4-5, 1991 *** Glacier National Park

NATIVE PLANT LANDSCAPING AND REVEGETATION



LOCATION: Turn north off US Highway 2 at West Glacier to enter Glacier National Park. Proceed north about .75 mile, crossing the bridge over the Middle Fork of the Flathead River.

Turn right at the Park Headquarters sign and follow the MNPS signs to the Community Building, a large wooden building from the 1940s.

REGISTRATION:

\$5 per individual for the weekend.

SCHEDULE

Friday, May 3

6-9:30pm

Set up posters and displays

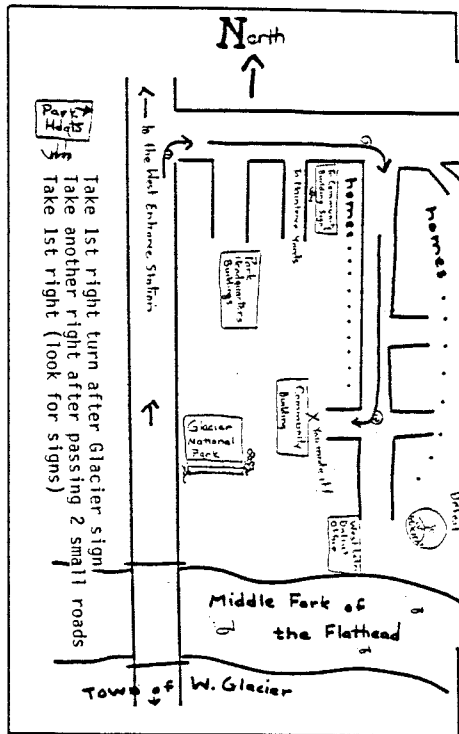
Check in Silent Auction items

7-9:30pm

Wine, cheese & juice
Social Hour

Visit with poster presenters

Tour Glacier Park's Native Plant Nursery (repeated Saturday)



POSTER SESSION space should be reserved with Kathy Ake before April 22 (755-7693 after 7 pm). All chapters and individuals are encouraged to bring posters and/or displays. **BABYSITTING** is available. Call Terry Divoky at 387-5527

before April 26.

HOUSEGUESTS are welcomed by Flathead Chapter members. Call Terry Divoky at 387-5527 for arrangements. A good way to meet new friends!

CAMPING is available at Apgar Campground in GNP, at the foot of Lake McDonald. There may be a campground fee - we're checking to see if that can be waived.

HOTELS/MOTELS

nearby:

Vista Motel, 888-5311,
pool - \$34 double;
Glacier Highland,
888-5664 - \$38;

Apgar Village Lodge, 888-5403 - \$48; Isaak Walton Inn, Essex, 888-5700 - \$60 shared bath, \$79 private bath.

SILENT AUCTION

Flathead Chapter is calling on all members to do your part to make the Silent Auction bigger and better than ever. This is a major fund-raising event for the Spring Meeting, so we need participation and representation from all over Big Sky Country.

Start planning now who you might contact: individuals and/or businesses who would like to donate anything from plants, photos, books, gardening supplies, to homemade items, weaving, gift certificates, refrigerator magnets. We will accept anything and everything in good taste. Please check your local nurseries, bookstores, galleries and gift shops to give all your merchants an opportunity to donate. All donors who make a commitment to give something by April 22 will be acknowledged and thanked! in the Annual Conference Program. Send names of your donors to Pattie Brown, address below.

YOU MAY WISH TO BRING:

Potluck dish and eating/serving utensils for Saturday night:

Out-of-towners, bring salad or dessert

Flathead members, bring main dish;

Something to share for wine, cheese and juice social on Friday;

Posters and displays re: native gardening or revegetation;
Silent Auction items;

Your ideas, questions and experiences for the roundtable discussions;

Rain gear and bag lunches for field trips;

Good cheer!

For more information, contact Pattie Brown, 560 Wolf Creek Dr, Bigfork MT 59911, or phone 837-5018.

Saturday, May 4

8-9am Registration, check in Silent Auction items

9am-noon Keynote speaker: Dr Arthur Kruckeberg, "Gardening with Natives: from Rock Gardens to Habitat Restoration"

Panel discussions:

"Revegetation around Montana"

"Ethics in Native Plant Gardening and Revegetation"

noon-1pm Lunch on your own (GNP Native Plant Nursery tours available)

1-3pm (Running concurrently)

Wildflower Photography Workshop

Roundtable discussions (bring your ideas and experiences to share):

"Backcountry/Wilderness Revegetation"

"Gardening with Natives"

3-4pm Committee Meetings - you do not have to be formally appointed to a committee to attend...choose the one you're interested in

4-5pm Membership Meeting, Committee Reports

5:30pm Silent Auction closes

6:30 pm Potluck Dinner

8pm Dinner Speaker: Jerry De Santo, "Gardening with Alpine Plants of the Northern Rockies"

Sunday, May 5

8:30 am Field Trips - your choice:

Red Bench Fire area - all day, bring lunch

Spring Wildflowers of the Apgar Slopes - half day

FOOD: One restaurant and a mini-store open in West Glacier; more restaurants and grocery stores open 7 to 9 miles away.



CALENDAR

MEETINGS

THURSDAY, MARCH 28, CLARK FORK CHAPTER HERBARIUM NIGHT: 7:30 pm, Room 303, Natural Science Bldg, UM Campus. "Rays and Disks: an Introduction to the Sunflower Family," with Peter Lesica.

THURSDAY, APRIL 4, VALLEY OF THE FLOWERS CHAPTER: 7:30 pm, Plant Growth Center, MSU Campus. Slide program on the Lee Metcalf National Wildlife Refuge in the Bitterroot Valley - its plants, birds and animals. Nearly 400 species of plants on the Refuge provide food and shelter to a wide range of wildlife.

MONDAY, APRIL 8, CLARK FORK CHAPTER: 7:30 pm, Rm 207 Health Sciences Bldg, UM Campus. Joint meeting with Five Valleys Audubon. Penny, Kukuk, Research Professor, UM Division of Biological Sciences, will discuss "How Sweet It Isn't: The Effects of Exotic Honeybees on Australia's Native Flora and Fauna."

WEDNESDAY, APRIL 17, FLATHEAD CHAPTER: 7 pm, Fish, Wildlife & Parks Bldg, Kalispell. Dr Meyer Chessin, Professor Emeritus of Botany at U of M will discuss "Botany East and West," showing slides of his travels around the US and in Eastern Europe.

THURSDAY, APRIL 25, CLARK FORK CHAPTER HERBARIUM NIGHT: 7:30 pm, Rm 307, Natural Science (Botany) Bldg, UM Campus. John Pierce will present "An Introduction to the Common Willows of Western Montana."

THURSDAY, MAY 2, VALLEY OF THE FLOWERS CHAPTER: 7:30 pm, Plant Growth Center, MSU Campus. "Drought Resistant Grasses - Alternatives to Kentucky Bluegrass"

TUESDAY, MAY 7, MUSEUM OF THE ROCKIES: 7-9 pm, "Basic Plant Identification" with Jan Nixon. Learn the basic plant characteristics which will aid in identifying what you see next time you're out hiking. Call the Museum's Education Dept, 994-5282 for reservations; small fee.

THURSDAY, MAY 9, KELSEY CHAPTER: 7 pm, Lewis & Clark Public Library meeting room, Last Chance Gulch. Presentation by Lisa Schassberger of the Montana Natural Heritage Program.

THURSDAY, MAY 9, CLARK FORK CHAPTER: 7:30 pm, Room 307, Natural Science Bldg, UM Campus. Dr Meyer Chessin, Professor Emeritus in the UM Division of Biological Sciences, will show slides and speak on "Botany East and West."

SATURDAY, MAY 18, GREAT FALLS: 11 am at the Fish, Wildlife & Parks headquarters, 4600 Giant Springs Rd. Wayne Phillips and Dana Field will describe a native seed collection project to benefit the Lewis and Clark National Historic Trail Interpretive Center which will be built near Giant Springs. The Interpretive Center will involve extensive revegetation with native prairie species. After a picnic lunch (bring your own) we will explore the proposed construction area and try to identify the early bloomers and other plants in the area. This will be a summer-long project, so if you miss the first meeting, contact Wayne (453-0648hm, 791-7743wk) to help out later in the season.

Also at this meeting we will discuss the possibility of starting a Great Falls Chapter of MNPS. In addition to the

Native Plant revegetation around the Interpretive Center, we could develop a natural history trail on Park Island, hold plant identification workshops, learn about rock gardening with native plants, and take botanical field trips to the surrounding prairies and mountains. The options are wide open to your suggestions.

TUESDAY, MAY 21, FLATHEAD CHAPTER: 7-9 pm, Rm 131, Science & Technology Bldg, Flathead Valley Community College. Basics class on plant identification for beginners, conducted by Kathy Ake.

SATURDAY, MAY 25, FLATHEAD CHAPTER: 1-4 pm, Rm 131, Science & Technology Bldg, Flathead Valley Community College. Kathy Ake will present practical use of the plant key to identify plants - intermediate skills.

SUNDAY, MAY 26, VALLEY OF THE FLOWERS CHAPTER: Join us for VoF's Annual Spring Brunch, to be held this year at Pine Creek Campground in the Paradise Valley. Cost is \$3.50 for adults, \$1.50 for kids - pancakes, sausage/bacon and eggs, peach cobbler ... all you can eat! Make reservations no later than Thursday, May 23, with Renee Cook (994-3703). After we eat, we'll take a healthy hike to a nearby lake to check out what's blooming. Meet at the Chamber of Commerce parking lot on E Main in Bozeman at 9 am for carpooling, or at Pine Creek Campground, off the East River Rd south of Livingston, at 10 am. Bring plates, cups and eating utensils.

THURSDAY, JUNE 6, CLARK FORK CHAPTER: 6:30 pm, Annual Spring Potluck, in Peter and Suzann Stickney's yard at 2312 Duncan Dr (turns into Greenough Dr). Bring a salad, dessert or main dish, eating/serving utensils, plus folding chairs and tables if you have them. Have a look at the native plants in Peter's garden or take a hike on Waterworks Hill. For more information call Peter at 549-0063.

TUESDAY, JULY 9, VALLEY OF THE FLOWERS CHAPTER: 6 pm til dark, Kirk Hill Nature Area on S 19th Rd, Bozeman. Annual "Knapweed Pullout" which is a joint project of VoF Chapter, Sacajawea Audubon and Museum of the Rockies. This is an ongoing project aimed at getting rid of the spotted knapweed infestation along the trails of Kirk Hill. Bring a digging tool (screwdriver works well) and gloves if you want them; ice cold lemonade will be provided. We need your help!



ANNOUNCEMENT

PHOTOGRAPHY WORKSHOP: MT BIRDS & WILDFLOWERS

Renowned Montana photographer Tom McBride will present two workshops on Close-Up Photography of Montana Birds and Wildflowers on Saturday, June 1 (basic), and Sunday, June 2 (easy intermediate), in the Helena area. The amazingly low cost of either of these sessions is \$15, or \$25 for both. The workshops are jointly sponsored by MNPS Kelsey Chapter and Last Chance Audubon Society, and registration is only open to MNPS or LCAS members until Tuesday, April 2, after which registration will be open to the public if space remains. Call Kim Schleicher at 442-9449, or write Last Chance Audubon, P O Box 924, Helena MT 59624. Payment must accompany your registration.

A NATIVE COLUMBINE HYBRID: *AQUILEGIA* x *ELATIOR*

- Dee Strickler



In his *Flora of Glacier National Park, Montana*, Standley describes *Aquilegia jonesii* as a plant standing 5-10 cm (2-4 inches) high. He further describes *A. jonesii elatior* as growing 10-20 cm (4-8 inches) high with "leaflets somewhat larger than the species,...the petals often white." He continues, the variety "grown with typical *A. jonesii* and at first glance appears quite distinct." One specimen in the GNP Herbarium was first labeled "ssp [subspecies] *elatior*" in 1947 by A

Schmitz and subsequently changed in 1965 by P Harvey to "var [variety] *elatior*." Later floras give the height of *A. jonesii* as 5-20 cm and do not recognize any variety or subspecies.

In 1989 I chanced upon a pale blue and yellow *Aquilegia* in the headwaters of the Teton River on the Rocky Mountain Front west of Choteau. It did not fit the description of any native species except for the height (about 12-15 cm) and occasional color variations assigned to *A. jonesii* by Moss and Packer. However, since *A. jonesii* and *A. flavescens* both occur commonly in the immediate vicinity, the probability of a hybrid of those two species came to mind.

In 1990 I found two almost identical plants in Glacier Park above Iceberg Lake where the GNP Herbarium specimen was collected. Also depauperate plants of typical *flavescens* (about 10-20 cm high) flourish in that immediate vicinity as well as typical *A. jonesii*.

Comparing differences between typical specimens of the two species: *A. jonesii* normally has straight spurs 5-10 mm long, but spurs of *flavescens* are 10-20 mm long and incurved; the biternate leaves of *jonesii* are tightly crowded, overlapping, leathery and glandular-pubescent on both sides, while *flavescens*' leaflets are open (mostly lying flat), thin, usually glabrous above to somewhat pubescent below and more-or-less glandular; *jonesii* leaves all sprout from the root crown, while *flavescens* has reduced stem leaves; and finally, *jonesii* blossoms are blue to purplish and *flavescens* yellow.

The hybrids show the following characteristics attributable to *jonesii*: straight spurs 10-15 mm long and leaves, though larger than *jonesii*, with leaflets overlapping and pubescent (but generally not so as strongly so as *jonesii*). Attributes assignable to *flavescens* include: one bractlike leaf on the flower stem, and petiole side branches 5-10 mm long. The immediately obvious character of the hybrid is the mixture of floral colors. On balance, therefore, the mix of characteristics is about equal between *jonesii* and depauperate specimens of *flavescens*. On the other hand, if one draws the comparison between typical *flavescens* from a lush forest or subalpine

habitat and typical *jonesii*, the influence of *flavescens* on the hybrid is not so readily apparent.

Other indicators of hybridization include: all the hybrids observed by the author have been in close proximity to both parents and in or near snow-retention zones. Since *jonesii* only prospers on well-drained limestone gravel or scree substrate, the hybrid has only been observed in that situation. This habitat also tends to dwarf *flavescens*. Since *jonesii* normally blooms two-four weeks earlier than *flavescens* and has a very short blooming period, the two species can hybridize only if snow retention delays the blooming of *jonesii*, while *flavescens* blooms nearby at its normal time.

Because of Standley's publication, the most appropriate binomial for this blue and yellow hybrid would therefore seem to be *Aquilegia* x *elatior*. Several specimens labeled *A. jonesii* in the U of Montana Herbarium show characteristics of x *elatior*. Consequently, two other sites on the Rocky Mountain Front and two more in GNP need further exploration. I hope to document several more locations for *Aquilegia* x *elatior* in the future.

References:

- Standley, P C, 1921. *Flora of Glacier National Park*, Vol 22, Part 5, Contributions from the U S National Herbarium, GPO, Washington.
- Aquilegia jonesii* var *elatior* (Standl.) Boothman. *Gard. Chron.* Ser.3, 95:352. 1934.
- Moss, E H, *Flora of Alberta* 2nd edition, J G Packer, editor, 1983. University of Toronto.

Dr Dee Strickler is author of several excellent books on the wildflowers of our region. The most recent is *Alpine Wildflowers*.

1991 MNPS BUDGET

Beginning balance (checking balance minus outstanding bills) \$ 900
EXPENSES

Newsletter	
(paper, printing, postage, PO Box rent etc)	\$1700
Annual conference	
Facilities	150
Honorarium	200
Incorporation fee	20
Officer expense reimbursement	140
Other (check charges, misc. reimbursements etc)	300
Total Expenses	\$2510

INCOME

Membership	\$1800
Ammia; conference fundraiser	300
Annual conference registration	300
Interest income	140
Donations	—
Total income	\$2540

Projected ending balance \$930

SAVINGS (Lifetime memberships)

First Federal Savings & Loan, Missoula \$1478

Aquatic mosses and vascular plants are locally common in many of Montana's lakes and streams, but they are not nearly as widespread nor as diverse as the third of major group of aquatic plants: the algae. Algae are simple plants best defined by that they don't have: true roots, stems, leaves, flowers, or other specialized tissues such as the vascular systems that transport water and nutrients in higher plants. (The term "higher" connotes a sense of anatomical complexity, not botanical superiority.)

There are several reasons why algae can do without these specialized structures. The denser world of water gives buoyancy and support, hence there is less need for rigid stems or trunks. Most commonly, algae reproduce vegetatively, by cell division, so there is no need for flowers. Each cell absorbs water and nutrients, including carbon dioxide, directly through the cell wall, making roots and vascular systems superfluous. Stream algae often have holdfasts to keep them in place; others float passively or live close to the stream bottom out of the current. And each cell has chlorophyll, enabling the entire plant to gather light and perform photosynthesis, a process usually reserved for leaves in vascular plants.

For many of these same reasons, algae are usually very small and rarely more than one cell thick. In the majority of species, the plant consists of a single, microscopic cell. In others, the plant is a loose assemblage of cells, or a long filament in which the cells are attached end-to-end. One notable exception to the usual small size is the green alga *Cladophora*, whose branched filaments attain a length of several feet in nutrient-rich rivers like the Clark Fork.

Algae are generally classified by their color and the kinds of pigments they contain. There are four major phyla of algae represented in Montana waters:

1. Blue-green algae or Cyanobacteria (Cyanophyta);
2. Green algae (Chlorophyta);
3. Yellow-green algae (Chrysophyta)
4. Red algae (Rhodophyta).

Other Montana phyla include the euglenoid algae (Euglenophyta), dinoflagellates (Pyrrophyta), and algae of uncertain classification (Cryptophyta). The brown algae, the phylum that includes the largest of all algae - the California Kelp - is not represented in Montana.

Blue-green algae are actually blue-green colored bacteria. They have very primitive cells. While blue-greens are common in Montana streams, they are most obvious in nutrient-rich reservoirs, where they often "bloom" and turn the water into a mixture resembling pea soup. One species (*Anabaena flos-aquae*) has produced several toxic blooms in Montana reservoirs.

Green algae include the ubiquitous *Cladophora* ("the carp of the algae world") and the common pond scum *Spirogyra*. Some rather complexly-structured algae that superficially resemble higher plants (*Chara* and *Nitella*) are included in this phylum. Desmids - tiny but beautifully proportioned plants that compose one of the most diverse groups of algae - are also included in this phylum. They do best in soft-water bogs and ponds in western Montana.

Red algae are predominantly marine. There are only a few species of red algae in Montana, but one - *Audouinella violacea* - is widespread. Most freshwater genera in this phylum, including the easily identifiable *Batrachospermum* and *Lemanea*, are sensitive to pollution.

The yellow-green algae would be an unremarkable phylum were it not for the class Bacillariophyceae, the diatoms (see KELSEYA, Spring 1989). Although individual plants are microscopic, diatoms are elegant in their shape and ornamentations, and collectively they are the most diverse group of aquatic plants in Montana. Each cell is encased in a clear shell of silica dioxide, which is ornamented with processes, pores and grooves in a unique pattern that is characteristic of the species. There are perhaps 2,000 species of algae in Montana and about one-half of these are diatoms.

A riffle in a typical Montana stream will contain 25 to 30 species of diatoms and half again as many species of soft-bodied algae. Each

of these species has different water quality requirements and pollution tolerances. When a lake or stream is polluted - by organic wastes, toxic metals, acid, salts, pesticides or some other contaminant - the number of algae species will decline in proportion to the degree of pollution. This is one of the basic principles of aquatic pollution biology; plant and animal diversity is inversely proportional to the severity of pollution.

At the same time, one or a few of the most pollution-tolerant species may flourish, resulting in very large populations and giving the appearance of an aquatic monoculture. A single species of blue-green algae and three species of pollution-tolerant diatoms account for practically all of the plant biomass in Silver Bow Creek, Montana's most polluted stream. Highly regulated and somewhat-polluted rivers, such as the Clark Fork, are often dominated by nuisance growths of *Cladophora*. In relatively clean rivers like the Blackfoot, a large number of species share equitably in the task of primary production. The warm and nutrient-rich surface waters of large reservoirs, such as Hebgen, Canyon Ferry and Fort Peck, will usually produce summertime monocultures of blue-green algae, which are sometimes toxic.

Algae, microbes, macroinvertebrates and fish compose a diverse community of aquatic life forms, each with a different function. This community is part of a complex life-support system of physical forces and chemical qualities called an aquatic ecosystem. The health or integrity of this ecosystem is measured by the ability of the biological, physical and chemical components to interact harmoniously over time to efficiently sustain long-term processes like energy transfer and nutrient recycling. Remove a key link or gear (i.e. species) from the system, and these processes get scrambled and break down.

When people and government agencies manage streams and adjacent lands to maximize the production of water and other commodities, intangible resource values like species diversity are generally overlooked, even though they are critical to the health of the aquatic ecosystem. And the environmental results of commodity management are all too evident in Montana.

Most of Montana's water quality problems can be traced to sedimentation, thermal modification, stream dewatering, channel alterations and other forms of non-point-source pollution originating from agriculture, forest practices, mining and water storage projects. These sources of damage are significant not just because they deplete and contaminate water and reduce habitat for valued sport fish, but because they also eliminate key species from the food chain. Blooms of blue-green algae, dominance by rough fish (squawfish, carp etc), and marginal populations of game fish are end products of these depleted, short-circuited and dysfunctional food chains.

What is the value of a diverse community of aquatic plants and animals? Of a smoothly-running aquatic life support system? You may ask yourself instead: What is the value of clean water? Of a self-sustaining population of sport fish? Of an attractive, healthful environment? The questions are the same and the answer is equally elusive.

As Aldo Leopold noted in *A Sand County Almanac*, the economic parts of the biotic clock will not function without the uneconomic parts. The commodities that we value in lakes and streams, like game fish and clean water, are products of complex ecosystems and interactions among a host of plants and animals that seem to be without economic value when considered individually. A system of water resources management that addresses only the valued end product is hopelessly lopsided. It tends to ignore, and thus eventually to eliminate from the aquatic community, many species that are (as far as we know) essential to its healthy functioning.

Suggested reading:

- Hutchinson, G.E. 1975. *A Treatise on Limnology, Volume III: Limnological Botany*. John Wiley & Sons, New York.
- Palmer, C.M. 1977. *Algae and Water Pollution*. EPA-600/9-77-036. US Environmental Protection Agency, Cincinnati.
- Prescott, G.W. 1968. *The Algae: A Review*. Houghton Mifflin Co, Boston.
- Prescott, G.W. and G.E. Dillard. 1979. *A Checklist of Algal Species Reported from Montana - 1891 to 1977*. Monograph #1, Montana Academy of Sciences, Supplement to the Proceedings, Volume 38.
- Round, F.E. 1965. *The Biology of the Algae*. Edward Arnold Ltd, London.

MONTANA NATIVE PLANT SOCIETY MEMBERSHIP APPLICATION/RENEWAL

Date _____

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STATEWIDE MEMBERSHIP WITH CHAPTER AFFILIATION*

- ___ \$12 I. Individual
- ___ 16 II. Family
- ___ 28 III. Business/Organization
- ___ 4 IV. Yearly chapter dues for Lifetime Members

MEMBER-AT-LARGE (Statewide membership only)

- ___ \$ 8 I. Individual
- ___ 12 II. Family
- ___ 25 III. Business/Organization
- ___ 150 IV. Lifetime member (one-time payment)

*AREAS COVERED BY CHAPTERS:

CLARK FORK CHAPTER - Lake, Mineral, Missoula, Powell and Ravalli Counties

FLATHEAD CHAPTER - Flathead and Lake Counties plus Glacier National Park

KELSEY CHAPTER - Lewis & Clark and Jefferson Counties

VALLEY OF THE FLOWERS CHAPTER - Gallatin, Park, Madison and Sweet Grass Counties plus Yellowstone National Park

All MNPS chapters welcome members from areas other than those counties indicated - we've listed the counties just to give you some idea of what part of the state is served by each chapter. More chapters are in the planning stages for other areas; watch for announcements of meetings in your area. Ten paid members are required for a chapter to be eligible for acceptance in MNPS.

Membership in the MONTANA NATIVE PLANT SOCIETY is on a calendar-year basis, March 1 through the end of February of the following year. New-member applications processed before the end of June each year will expire the following February; those processed after the first of July will expire in February of the year after. Membership renewal notices are included in the Winter and Spring issues of KELSEYA. Anyone who has not renewed by the time the Summer edition of KELSEYA is ready to mail will be dropped from the mailing list/MNPS roster.

Your mailing label tells your

CLASS OF MEMBERSHIP (I, II, III, IV - see above)

CHAPTER AFFILIATION, if any (CF = Clark Fork; F = Flathead; K = Kelsey; VoF = Valley of the Flowers)

DATE YOUR MEMBERSHIP EXPIRES: If your label reads "x2/91" your membership expires February 28, 1991...please send in your renewal today! New memberships received since July 1, 1990, are good through 2/29/92, and your label should read "x2/92." Please drop us a note if any information on your label is incorrect.

MAKE CHECKS PAYABLE TO:

MONTANA NATIVE PLANT SOCIETY

MAIL TO: Montana Native Plant Society
P O Box 992
Bozeman MT 59771-0992

EARLYBIRDS, continued from Page 8:

now [late February when she wrote] the round yellow-tinged buds are showing in some of the more exposed areas. By the first week of March the first ones should be in full bloom. Last year they bloomed later, March 15-20."

Peter Lesica (a frequent contributor to KELSEYA's pages), reports that sagebrush buttercup is also the earliest species in the Missoula area, often on south or southwest-facing slopes of the foothills around town. The delicate woodland-star, *Lithophragma glabrum*, is often the second species to appear. Anne Garde, also of Missoula, suggests that she often sees yellowbells coming along after the buttercups.

I recently had an opportunity to examine a group of plant specimens at the Museum of the Rockies collected by a Mrs J H Griswold, Belgrade, between 1889 and 1892. This collection is interesting on several counts: most have the date collected and location noted, and several sheets contain additional notes about Native American or pioneer usage, or comments from botanists of the day, such as Francis Kelsey or "Prof Greene." Since towns have now engulfed many of the locations where she collected, these also provide documentation about the original flora of the Gallatin Valley.

Mrs Griswold's earliest specimens were collected on April 7, 1889, from "Rocky Canyon," where the Interstate now exits the east end of the Valley. They were: an unidentified umbellifer which appears to be *Lomatium cous*; mountain bluebells (*Mertensia oblongifolia*); shooting star (*Dodecatheon meadia*); *Phlox canescens*, and an early mustard, *Draba alpinus*. On April 16 and 23, she collected in the same general area ("foothills east of Bozeman," and "above Fort Ellis"): sagebrush

buttercup; pasqueflower; blue violet (*Viola canina* var *adunca*); and springbeauty (*Claytonia caroliniana* - appears to be what we today call *C. lanceolata*). It would be interesting to correlate the weather records for that period of 1889 with what was in flower, and compare that to my own notes about how the weather affects the progress of the blooming season.

I hope this will encourage you to start getting out and looking for "earlybirds" on your own, and keeping a record of what you see, where and when - and what the weather is doing.

PLEASE WELCOME THESE NEW MEMBERS: MONTANA

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Peter Lesica
P O Box 8944
Missoula MT 59807

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x2/92

MONTANA NATIVE PLANT SOCIETY

The Montana Native Plant Society is a 501-C-3 (non-profit) corporation chartered for the purpose of learning more about plants native to our state and their habitats, and to share that knowledge. Contributions to MNPS are tax deductible, and may be designated for a specific project or chapter, or may be made to the general fund.

Your yearly membership fee includes a subscription to KELSEYA, the newsletter of MNPS, which is published quarterly. We welcome your articles, clippings, field trip reports, meeting notices, book reviews, cartoons or drawings - almost anything, in fact, that relates to our native plants or the Society. Please include a one- or two-line "bio" sketch with each article.

Drawings should be done in black ink with a fine-point pen. If you send clippings, please note the source, volume/issue and date. We especially need short (one to three paragraph) items which can be tucked in anywhere.

Changes of address and inquiries about membership or MNPS should be sent to MNPS, PO Box 992, Bozeman, MT 59771-0992. All newsletter material should be mailed to Jan Nixon at the same address.

Advertising space is available in each issue at \$5/column inch. Ads must be camera-ready, and must meet the guidelines set by the Board of Directors for suitable subject matter: that is, be related in some way to plants or the interests of MNPS members.

Deadline for the Summer issue is JUNE 10; please include meeting/field trip notices through late September. The Summer issue of KELSEYA will be mailed the third week of June.

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THE EARLYBIRDS: MONTANA'S EARLIEST SPRING WILDFLOWERS



Every late winter, seems like the twin maladies of cabin fever and spring fever attack me, and I'm driven outside at the first hint of warmth and melting snow to search for those glimpses of yellow, white or purple that signal that the spring flower symphony is tuning up. And after several seasons of jotting down what I was seeing, where and when, I started to recognize a typical pattern of emergence. Probably you catch the same 'disease,' and have made your own observations of the earliest species in your area.

My early "winner" year after year has turned out to be biscuitroot (*Lomatium cous*), blooming on south-facing gravelly slopes east of Bozeman at about 5100' elevation, where the snowpack never lasts for long. I find it in micro-depressions, with the typical umbel (umbrella-shaped flower head) barely clearing the leaves, often with a lot of the reddish pigment anthocyanin in the leaves, stems and flowers. The shallow depressions provide some protection from cold winds, and help concentrate warmth from sunlight, giving the plants a competitive edge. In open, mild winters (like this year) I find it as early as mid-February, and always have located a few by the Spring Equinox without fail. After biscuitroot come

three or four other species, with no clear front-runners in this pack; some years one is first, some years another. Sagebrush buttercup (*Ranunculus glaberrimus*), Hood's phlox (*Phlox hoodii*) and Pasqueflower or prairie crocus (*Anemone patens*), plus yellowbell (*Fritillaria pudica*) fall into this group.

Many years when I've started spotting blooms in our area east of town, I've headed to the western part of the county, which is both lower and drier, expecting to see things even further advanced than around Bozeman. Perhaps because of lack of moisture, nothing seems to get started earlier than the south-facing ridges where I find the biscuitroot, even though the ridges are a couple of hundred feet higher than town.

In the last issue of KELSEYA, I asked readers to send in their observations from other areas of the state. Dolores Myllymaki of Florence, reports:

"Sagebrush buttercups (*Ranunculus glaberrimus*) are the earliest spring flowers in the Sweeney Creek area of the Bitterroot Valley. Right

- continued on Page 7