BOREALIS

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ALASKA NATIVE PLANT SOCIETY

P.O. BOX 141613, Anchorage, Alaska 99514

MAY 1989

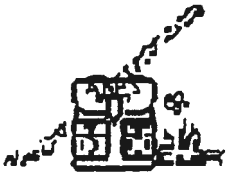
Announcing

MEETING NEWS---The May meeting of the Anchorage Chapter will be held on **Monday, May 1st, at 7:30PM** in the cafeteria meeting room of the National Bank of Alaska, corner of Northern Lights and C Street. The parking lot is behind the building with acces s from No. Lts. or C St. Enter the building thru the back door off the parking lot, sign in, and take elevator to 2nd floor. Turn left to cafeteria.

BOARD MEETING---The **Board of Directors** will meet at **6:45PM** immediately prior to the general meeting. Board members please be prompt as this is our last meeting until October.

SPEAKER---ANPS Member and Naturalist, John Wenger will present "Flora and Fauna Overview". This slide program will be a photographic "walk through" of various Parks and Wild areas. It will concentrate on our native plants and wildlife species seen i n the Denali area of Southcentral Alaska. John teaches Natural History courses and leads summer field trips thru UAA each summer.
Fliers will be available at the meeting for any interested persons.

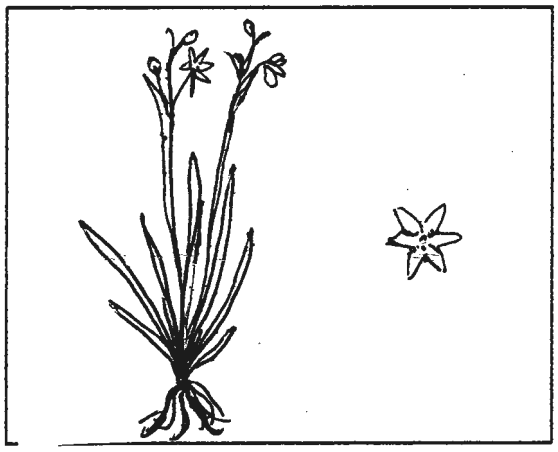
PLANT FAMILY---ANPS Member, Sally Karabelnikof, will lead a discussion of the Urticaceae or Nettle family. This family consists mostly of herbaceous plants and is represented in Alaska by the Urtica or Stinging Nettles genus which includes 2 native and 1 introduced species. The leaves, which often times have stinging hairs, are frequently opposite on the long stems, and have stipules. The greenish flowers, which are toothed, very small and rather inconspicuous, are unisexual. Male (staminate) flowers have 4 or 5 sepals and 4 or 5 stamens. Female (pistillate) flowers have 4 or 5 sepals and an ovary with one carpel. Some species have been used economically, for their long, strong fibers. Urtica, our local member, has opposite leaves, grows 2 to 6 feet tall, with flowers produced at the axis of the leaves. New young stems and leaves may be picked (with gloves) in the Spring, cooked, and used as a very tasty and nutritious vegetable.



COMING SOON
1989
FIELD TRIP
SCHEDULE

RECIPE---The following dish appeared at our last Potluck and is superb:
BAKED HALIBUT ("Halibut Olympia?")
Bake filet of halibut 15 min. at 325 deg. (for moist fish, cover during baking time). While baking, mix mayonaise and 1/2 as much grated parmesan cheese. Amount not critical, you will want it to spread 1/4 to 3/8 " thick on fish. Spread on topping. Bake 15 additional minutes, then broil until golden brown.

MYSTERY PLANT---This small, tufted, sedge-like plant could easily be missed when not in bloom as it has only a few narrow leaves. Although generally found in moist shoreline places and meadows, it can be found on slopes where the Spring run-off is high. Flowering stems can be 6" to 8" high and produce a small cluster of small, light blue, weak stemmed flowers that are subtended by a bract. These inconspicuous flowers have 3 sepals, 3 petals, 3 stamens and a 3-parted ovary. This plant grows in coastal areas of Southeastern and Southcentral Alaska, including Kodiak Island and the Cook Inlet area.



MAY FIELD TRIPS---Below listed are Field Trips and Work Parties for May. The Summer Field Trip Schedule will be mailed to you shortly.

MAY 13---(SAT)---KIWANIS PARK OVERLOOK

Leader---Verna Pratt---
Time Allotted---3 to 4 hours
Meet---10 AM at the Overlook, on Hillcrest, just west of Minnesota Bypass, just before West High School.
Bring lunch if desired.
Level of Difficulty---easy

This is a work party to improve an area frequently seen by tourists. Trees were cleared by the Municipality to provide a view of Westchester Lagoon and the City, leaving a large scarred area. Last year, the Wildflower Garden Club started a project to improve the area, but found it overwhelming for their small organization, considering their other projects. We will continue the project by planting more shrubs and meadow plants. Anyone interested should show up with gardening tools, jugs of water, native plants and shrubs, etc. *Nothing really choice*, as pilferage has been a real problem. Let's plant it with fast spreaders and undesirable garden species, such as, Devil's Club, Wild Roses, and Cow Parsnips.

MAY 18---(THUR)---JOHNSON TRAIL

Leader---Frank Bogardus and Verna Pratt---
Time Allotted---3 or 4 hours (an evening trip)
Meet---6 PM---N.E. corner Sears parking lot, at Northern Lts. and Seward Hiway. ---OR---6:20 PM---at north end of Johnson Trail, south on Seward Hiway, just past Potter Section House.
Level of Difficulty---easy

A nice beginning of season trip. Bring a sack lunch for evening meal, if desired. Be sure to bring sturdy shoes, raingear, and bug repellant. Nice to have items include: camera, binoculars, walking stick, hand lens, and notebook. THIS IS STATE PARK LAND----NO COLLECTING!!!

MAY 21---(SUN)---EKLUTNA LAKE RANGER STATION

Leader---Verna Pratt---
Time Allotted---all day
Meet---9 AM---N.E. corner of Sears parking lot, at Northern Lts. and Seward Hiway.---OR---9:30 AM at Weigh Station on north-bound Glenn Hiway.
Level of Difficulty---easy

(cont'd)

This in another Work Party and a Field Trip. We will continue a project that we started last year; a planting around the Ranger Station. This year we will concentrate more on planting Native Berry-bearing Shrubs. If you can find us any Wild Currants, Highbush or Lowbush Cranberries, etc., please bring them. After the planting, we will picnic by the lake and go on a Field Trip in the area.

MAY 29---(MON---MEMORIAL DAY)---NANCY LAKE RECREATION AREA (NLRA).

Leader---John Wenger---
Time Allotted---3 hours
Meet---9 AM at Tulik Trail.
Directions---take Parks Hwy north to Mile 67.2, then take park road to Nancy Lake Recreation Area (large sign on Parks Hwy). Go approx. 2-1/4 miles on park road and look for sign on left- "NATURE TRAIL". Meet at parking lot. Bring binoculars, spotting scopes, field guides, lunch, bug repellant and raingear.
Level of Difficulty---easy

This is an easy 2 mile trail where we will see Orchids, Coral Root and Goodyeara. This is a combined Audubon Society and ANPS outing to see both plants and birds. Highlights are the Pacific Loons and Coral Root Orchids. THIS IS STATE PARK LAND---NO COLLECTING !!!

LOTIONS, NOTIONS and POTIONS---by Old Doc

This month we'll take a look at Horsetail (Equisetum arvense). This strange looking plant, which resembles miniature lodgepole pines, grows in moist loamy or sandy soil. A fertile, flesh-colored stem grows up first to 4 to 7 inches, and is topped by a conelike spike which contains spores, this dies quickly. A green, sterile stem grows up to 18 inches and features whorls of small branches. In the dinosaur era, they grew to 40 feet or more!

No other herb is so rich in silicone. Silicon is the material of which collagen is made. Collagen is the "body glue" that bonds our skin and muscle tissues.

It is said that osteoporosis is reduced when horsetail is added to the diet. Some folk healers recommend it for sprains, pulled ligaments, etc. Some believe that when taken internally, it also improves the texture and tone of hair, nails and skin. A tea made from horsetail is said to reduce minor bleeding. It is also a reliable diuretic.

Studies in some European clinics have determined that fractured bones heal much more quickly when horsetail is taken. It is apparently available in tablet and capsule form. **(This information partially extracted from Heinerman's Encyclopedia of Fruits, Vegetables, and Herbs.)**

*** Old Doc reviewed Heinerman's in the March newsletter, but would not give out the book's recipe for the "old Jewish remedy from Brooklyn that quickly knocks out cold and flu miseries"; suggesting that readers should buy the book, it's sucha deal .

Well, it seems that everyone wants "sucha deal", but a lot of us want it right now. So, here's "sucha deal" for you, and a chance to get ready for the Field Trip season. To the first 10 persons who greet Old Doc at the May meeting with the words, "Hi Doc, I'm aching just thinking about Field Trips"

Doc will give a sample of his Sore Muscle Liniment!

Don't know who Old Doc is?
Check your March Newsletter!
Can't find it?
Ask a friend!!
Can't find a friend?
Come to the May meeting, there'll be a whole bunch of them there!!!!

QUIZ ANSWER--- *Sisyrinchium litorale,* Blue-Eyed Grass of the Iridaceae or Iris Family.!

BOTANICAL NAMES by Marilyn Barker

Some of you have commented that the choosing of a botanical name is like selecting letters at random from a boiling pot of vowels and consonants!

Hopefully, this column will begin to make these names easier to remember. Todays names are the first of a series on color. Since it is spring, I think of the golden Drabas along the Seward Highway, I'll start with yellow.

There are lots of ways to say yellow:

aureus--golden yellow
aurantiacus--yellowish orange
croceus--saffron yellow (named after the spice from Crocus pollen)
flavescens--becoming yellow
flavidulus--slightly yellow
flavidus--somewhat yellow
flavus--pale yellow
fulvus--tawny, dull yellow
luridus--dull yellow, brownish yellow
luteolus--pale yellow
lutescens--becoming pale yellow
luteus--deep yellow
vitellinus--egg yolk yellow

From the Editor's Desk:

This is the last newsletter until the October issue. The editor and staff hope that all of our readers have a very pleasant summer. We hope to see you on some of the Field Trips.

The following article was extracted from *Douglasia*, the newsletter of the Washington Native Plant Society.

BOTANICAL SALMAGUNDI

Castilleja's "Underground" strategy

What follows is really a western story, not just for California. Castillejas are widespread in the West, and so far as we know, all are partial root parasites. So curiosity is whetted when we ask how and why about this curious phenomenon. The article that follows is from *Fremontia* for Oct. 1988; just to get this fine journal is worth the price of membership in the California NPS.

A springtime walk through the chaparral rewards the adventurous hiker with an astonishing display of forms and colors. The landscape in the Southern California mountains is dominated by the blue flowers of white-bark lilac (*Ceanothus leucodermis*) and white-flowered cupleaf lilac (*C. greggii*). Against this background a small shrub with bright scarlet flower spikes stands out. Crimson-tipped floral bracts contrast with gray-green foliage to make Indian paintbrush (*Castilleja foliolosa*) one of the most striking and attractive plants in the chaparral throughout the state.

Gazing at this colorful beauty the student of biology might recall that the Indian paintbrush is a partial parasite. But how can such a beautiful shrub lead such a free-loading lifestyle?

Parasitism in Vascular Plants

Parasitic vascular plants are generally divided into two broad groups. Those that lack chlorophyll and depend on the host for all of their water, mineral, and nutritional requirements are often called holoparasites. Holoparasites are obligate parasites; they cannot survive and reproduce in the absence of a suitable host plant. Familiar examples are dodder (*Cuscuta*) and broomrape (*Orobanche*). Many plants, however, are only partial parasites. They depend on their hosts for only part of their metabolic requirements or during only part of their life cycles. A partial parasite (also called a hemiparasite) usually contains chlorophyll and may be an obligate or a facultative parasite (which can complete its life cycle without a host).

In many instances the relationship between parasite and host is obvious. The climbing stems of dodder and the debilitating and deforming brooms of the mistletoes (*Arceuthobium* and *Phoradendron*) are common examples of parasitism that have been recognized since the days of Theophrastus (about 300 B.C.). The ordinary appearance of some parasites, however, gives no clue to their dependent habits.

The Parasitic Castillejas

Parasitism is not unusual in the Scrophulariaceae, or figwort family, to which the Indian paintbrush belongs. Members of this family illustrate the entire array of parasites, from complete parasites to those that show no outward signs of parasitism but resemble self-supporting plants with green leaves. Below ground, however, they all make parasitic connections with the roots of various host plants. These connections are made by finger-like projections of parasite tissue called haustoria that penetrate the host and transfer substances to the parasite.

The genus *Castilleja*, consisting of facultative parasites, is widespread in western North America; about thirty-four species are native to California. Although studies by Heckard (1962) have shown that some *Castilleja* species are capable of surviving and reproducing in the greenhouse without a host, plants grown in this fashion are must less vigorous than those grown with hosts. These are the kinds of situations that bring the terms obligate and facultative into question. Should *Castilleja* be considered an obligate parasite because it is not known to occur without a host in its natural environment? Or is it a facultative parasite because it can be grown in the laboratory without a host?

The association between parasitic plants such as *Castilleja* and their hosts is finely tuned and highly integrated. Seedling establishment and haustorial bridge formation are important early events in the life cycles of parasitic plants, which have necessarily evolved fast and efficient methods for locating and attaching to suitable host tissue.

Although most hemiparasites, including *Castilleja*, lack specific germination requirements, others will germinate only in the presence of host roots, in response, apparently, to some yet unidentified root exudate of the host plant. The host-recognition response of *Castilleja* begins after germination in the young seedling root tips. At this stage a host root exudate may be the important stimulus for haustorial formation.

Baird and Riopel (1985) successfully induced haustorial initiation in *C. coccinea* using host roots or haustoria-inducing chemicals and made detailed observations of the initial haustorial formation. The first indication of haustorial formation is a lateral enlargement of root cells near the root apex. Around the base of this "haustorial mound" appear many short haustorial hairs. The haustorial hairs are single-celled structures that elongate from epidermal cells of the growing haustoria. Haustorial hairs were only recently shown to be distinct from ordinary root hairs. Unlike the latter, which have a smooth, homogeneous surface, haustorial hairs have an outer coating of globular material that forms a sticky sheet when the hairs contact host roots or other structures. Thus haustorial hairs appear to attach the haustorium to the host root. Although initiation of the haustorium may require the presence of a host root or root exudate, attachment of the haustorium apparently is non-discriminatory. Haustorial hairs will readily attach to artificial substrates in the laboratory, and plants in the field have been excavated with haustoria attached to rocks, pipes, and even other roots of the same plant. As one might guess, *Castilleja* does not appear to be host-specific.

As the growing haustorium presses against the host root tissue, a peg-shaped structure called the endophyte develops from the haustorial tissue at the host surface, penetrates the host, and forms a connection with the host's vascular system. At its tip is a series of large, elongate, finger-like cells called digitate cells, with a high capacity for enzymatic activity. These cells are the first to invade host tissue. A single digitate cell may intrude between two host cells and then divide and expand, crushing host cells in the process. Their action probably involves a combination of physical parting and enzymatic digestion. After penetrating the host water-conducting tissue (xylem), the digitate cell will become a conductive element called a vessel member. Meanwhile, haustorial cells will already have formed a vascular core of vessel members that will conduct water and dissolved minerals to the main body of the parasite.

The association described here seems to allow only for the transfer of water and minerals. In fact, it has generally been believed that, while non-green parasites depend on the host for photosynthetic products as well as water and minerals, green parasites rely on the host only for water and minerals. The evidence for this is ambiguous. The haustoria of root parasites only rarely contain

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phloem, the typical vascular food-conducting tissue in plants. However, haustoria of the parasitic Scrophulariaceae consistently possess a certain cell type, the function of which is not completely understood. These cells were discovered near the turn of the century and were named phloeotracheids in reference to their presumed dual function as water- and food-conducting elements. It has also been speculated that materials being transported in host phloem might be transferred to adjacent digitate cells of the parasite and eventually to the parasite's main root.

Stermitz and Harris (1987) recently discovered that *Castilleja* takes up secondary plant compounds such as alkaloids from the host plant. This phenomenon is of special interest because secondary plant compounds may be used as poisonous or repulsive defenses against plant-eating insects.

Effects on the Host Plant

The effect of *Castilleja* on the host plant has not been adequately studied. This effect has been assumed to be negligible when water is abundant. Certainly it is to the parasite's advantage not to kill the host, or even to greatly decrease its vigor. However, parasitism does no damage only in the case where the host has more than it can use of whatever the parasite takes. Such luxury uptake probably occurs in some plants at certain times of the year or during certain periods of the plant's life cycle, but not all of the time. Thus, parasitism is likely to decrease the host's growth and vigor in most cases. The few experiments that have been done indicate that parasitism results in lower biomass of host plants as compared to non-parasitized controls.

Chaparral natives such as chamise (*Adenostoma fasciculatum*) and California buckwheat (*Eriogonum fasciculatum*) are frequently parasitized by *Castilleja foliolosa*. Chaparral plants are growth-limited during much of the year by drought and by poor soil nutrient (especially nitrogen) capacity. The extraction of water and nitrogen from chaparral shrub roots by *Castilleja* undoubtedly has a negative effect on these shrubs. Shrubs that are prone to being parasitized would be at a competitive disadvantage in this resource-limited community. Parasitism by the Indian paintbrush is a frequently overlooked factor that might be considered along with fire, drought, temperature, competition, nutrient stress, and herbivory by plant ecologists attempting to explain the dynamics of chaparral plant communities.

References

Baird, W.V. and J.L. Riopel. 1985. Surface characteristics of root and haustorial hairs of parasitic Scrophulariaceae. *Bot. Gaz.* 146:63-69.

Heckard, L.R. 1962. Root parasitism in *Castilleja*. *Bot. Gaz.* 124:21-29.

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