Oxytropis nana Nutt., a Wyoming endemic collected by Thomas Nuttall on his journey across Wyoming in 1834

WYOMING NATIVE PLANT SOCIETY

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Treasurer's Report - Balance as of October 10, 1986: $464.22; deposits: $75.00; disbursements: newsletter printing $13.57, membership flyers $5.67; new balance as of February 15, 1987: $519.98. RD

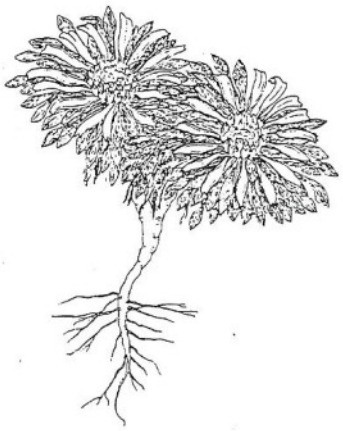
Annual Scholarship - One application was received for the scholarship. The Board will likely be considering this in the next month.

1987 Annual Meeting - The annual meeting is scheduled for July 18 and 19 primarily in the Laramie Range between Cheyenne and Laramie. This is also the opening weekend for Cheyenne Frontier Days. Details will appear in the next newsletter, probably in May. RD

Election - Nominations or volunteers are needed by the next newsletter for President, Vice-President, Secretary-Treasurer, and Board Member. RD

Botanical Novelties

Townsendia nuttallii Dorn Nuttall's Daisy



This member of the sunflower family was apparently first collected by F. V. Hayden with the Raynold's Expedition probably in or near Sink's Canyon near Lander in 1860. It was next collected by Peter Dunwiddie in 1973 near Boulder in Sublette County, near South Pass in 1977 independently by Robert Dorn and Barry Johnston, and in Teton County the same year by Robert Lichvar. It was described in 1979. The plant is perennial and about 2 inches high with basal leaves and flower heads mostly sessile among the leaves. The ray flowers vary from white to pink or lavender. It flowers in spring. The species is now known from Big Horn, Carbon, Fremont, Hot Springs, Johnson, Lincoln, Park, Sublette, Teton, and Uinta counties. How it was overlooked for so long is a mystery. It is named for Thomas Nuttall who discovered four of Wyoming's other eleven species of Townsendia on his trip which crossed Wyoming in 1834.

Cymopterus williamsii Hartman & Constance Williams' Cymopterus

This member of the carrot family was apparently first collected by Frank Tweedy in the Big Horn Mountains in 1900. It was recollected by Beverly Albee in 1975 and by Ronald Hartman and Ann Odasz in 1979. Since then it has been found in many locations in the southern Big Horn Mountains in Big Horn, Johnson, Washakie, and Natrona counties. Hartman and Constance described it in 1985. The plant is a perennial about 5 inches high with tiny yellow flowers. It flowers in spring. The species is named for Dr. Louis O. Williams, one of our members who collected in the northern Big Horn Mountains in the 1930's and discovered at least one new species there. RD

Willows - Willows are members of the genus Salix in the family Salicaceae. They are all woody plants but their growth form ranges from large trees to creeping alpine or arctic shrubs less than an inch above the ground. There are only two other generally recognized genera in the family, Populus, which includes cottonwoods, poplars, and aspen, and Chosenia, a willow-like plant of northeast Asia. For many years the family was thought to be related to other amentiferous (catkin-bearing) families like the birches, walnuts, and oaks, but more recently the concensus has shifted them far up the evolutionary scale to near the violets and heaths. This does not mean that they are closely related to these groups or that they were derived at a late date. Salicaceae is the only family of the order Salicales so they are not especially closely related to any other plants. As for age, there are willow fossils from the Cretaceous about 100 million years ago, shortly after the flowering plants first appeared.

The genus Salix probably arose in a warm temperate or subtropical region of eastern Asia and subsequently expanded mostly into the temperate and arctic regions. There are about 300 species of willows distributed throughout the world except for Australasia and most of the Malayan Archipelago. In the western hemisphere, there are about 100 species, but only one occurs in South America and only three are known south of Mexico. In the United States, Alaska and Montana have the most native species of any state with about 33 each followed closely by Wyoming with 32.

Willows are primarily pioneering species of mostly moist habitats. Each species tends to have unique ecological requirements so they tend to grow in different microhabitats. They are dioecious, that is, there are male plants and female plants. This makes them

obligate outcrossers. They are well known for hybridization, but hybridization is not particularly common in North America. It is much more common in Europe where native habitats have been more drastically disturbed for centuries.

Willows are the natural source for salicylic acid ($C_7H_6O_3$), a major ingredient in the production of aspirin.

Those interested in more information on willows can refer to the following publications.

Taxonomy and Evolution - Dorn, R. D. 1976. A synopsis of American Salix. Canad. J. Bot. 54:2769-2789.

Ecology - Brunsfeld, S. J. and F. D. Johnson. 1985. Field guide to the willows of east-central Idaho. Univ. Idaho For., Wildl. & Range Exp. Sta. Bull. No. 39. RD

Sagebrush in the Laramie Basin

The Laramie Basin is an anomaly among the basins of Wyoming: while the surrounding hills and the northern part of the Basin support a shrub and grass vegetation typical of most of Wyoming, the southern part of the Basin is nearly devoid of shrubs. Especially striking is the rarity of big sagebrush (Artemisia tridentata) and black sagebrush (A. nova). Black sage is common on the rocky hills around the Laramie Basin and Wyoming big sage grows over much of the northern part of the Basin, but a person has to look carefully to find either species out in the southern part of the Basin.

The distribution of Wyoming big sagebrush and black sagebrush around the Laramie Basin, and the scarcity of both species in the Basin itself, have been the subject of my work on a PhD under Dennis Knight of the U. W. Botany Department for the past several years. My research is directed at answering two questions. First, why does black sagebrush commonly grow on rocky, coarse textured soils and big sagebrush on more favorable sites? (This pattern is common in the western U. S.) Second, what makes the southern Laramie Basin inhospitable for these two species?

A shortage of soil moisture seems the most likely reason for the virtual absence of big and black sagebrush in the southern Basin. The terrain in the area is flat, which should allow the strong westerly winds to sweep snow off the uplands. Snowmelt in the spring supplies much of the soil moisture, so areas blown clear of snow should be relatively short of moisture. The restriction of the few black sagebrush stands in the southern part of the Basin to east-facing slopes, where snow drifts, supports the hypothesis of soil moisture shortage. To investigate this idea, I've planted seeds of both sagebrush species at several sites in the Basin, in watered and unwatered plots, to see if recharging the soil moisture artificially allows sagebrush seedlings to become established. I plan to take soil samples from throughout the Laramie Basin to see if soils where sagebrush grows do in fact receive more moisture than do soils of sage-free areas. Finally, I hope to use newly-available digital terrain data to compare the sagebrush distribution I've mapped with topography.

Various authors have attributed the occurrence of black sagebrush on coarse-textured soils of rocky hills to this species's ability to withstand drought better than can big sagebrush. I'm testing this idea by measuring water loss from big sagebrush and black sagebrush seedlings (in the greenhouse) and adult plants (in the field). If black sagebrush is the better of the two species at tolerating drought, it may be able to control water loss better and survive on less soil moisture. Soil texture may also influence habitat differences between the two species through mechanical resistance to root growth or through aeration, and I hope to investigate these factors in my greenhouse experiments.

I hope these research approaches will help us better understand some important, and interesting, inhabitants of our Wyoming landscape. GJ

Grasses of Wyoming - A new book on the 250 species of grasses in Wyoming is scheduled for publication this spring, according to one of the authors, Quentin Skinner, a University of Wyoming range management professor. Skinner said the book will contain a floral key and a vegetative key based on elevation and wetness of the site and associated trees, shrubs and grasses. The book will also include pen drawings, textual descriptions and pinpoint distribution maps of each species. The 400-page hardbound book, authored by Gregory Hallsten, A.A. Beetle and Skinner, is being published by the University of Wyoming Agricultural Experiment Stations and will cost about $30, Skinner said. PW

Apparent State Records in 1986 - Introductions: Carbon Co., Dianthus deltoides; Laramie Co., Echium vulgare; Goshen Co., Gleditsia triacanthos; Niobrara Co., Setaria italica. Natives: Albany Co., Salix serissima; Goshen Co., Asclepias arenaria, Dalea villosa, Euphorbia geyeri; Crook Co., Lechea intermedia; Sweetwater Co., Physocarpus alternans. An additional record from Yellowstone Park initially misidentified in 1980 is Euphorbia supina. RD

Alpine Floras - The following article is reprinted with permission from the Northern Nevada Native Plant Society Newsletter, Vol. 12, No. 7, September 1986. It should be of interest to many of our members.

NOTES FROM THE MAY 20 SPECIAL NNNPS MEETING -- by Susan Koniak

Dr. Dwight Billings' presentation of "Alpine Floras Along the Cordillera from the Arctic to the Equatorial Andes" was both entertaining and informative. A number of interesting points were brought out which I will briefly summarize. The term "alpine" is not synonymous with "arctic" when referring to vegetation. Alpine or high mountain environments stretch from the equator to the Arctic and Antarctic. Generally alpine zones occur above timberline. Arctic zones occur far north and are not necessarily at high elevation. Both areas are characterized by low air temperatures during the growing season. Only a relatively small number of different kinds of plants have adapted to growing and reproducing in these cold environments.

While the Antarctic has only two native plant species, the Arctic has around 1000. Some plants are endemic to the Arctic, but a great many more are endemic to alpine regions. Low vegetation, mainly shrubs and perennials, with its treeless landscape is designated, in a general sense, as "tundra." Annuals are very rare. A relatively large group of tundra species are widespread and occur in both arctic and alpine locations.

Most alpine vegetation in the Northern Hemisphere is similar both floristically and in structure. However, differences are apparent between the alpine vegetation of the Rocky Mountains and the Sierra Nevada. The Sierra Nevada is a young mountain range compared to the Rockies. It has low precipitation in the summer, favoring relatively drought tolerant plants (i.e. Lupinus, Eriogonum, and Castilleja). In the Rocky Mountains, precipitation is relatively high in the summer and there is a higher percentage of arctic species than in the Sierra Nevada. However, the Sierra Nevada has a larger number of endemic alpine species. And, interestingly, the Sierra Nevada has more species with red flowers that usually are associated with hummingbird pollination.

In eastern Nevada, the Ruby Mountain alpine vegetation is more closely related to the alpine vegetation of the Rockies than it is to that of the Sierra Nevada. The Toiyabe and White Mountains have a distinctive Great Basin alpine vegetation. Precipitation patterns in the Great Basin alpine areas are intermediate between those of the Sierra Nevada and the Rocky Mountains.

Northern Hemisphere alpine vegetation is a mosaic of communities, generally aligning along gradients commonly controlled by topographic exposure and distribution of snow and meltwater. Cushion and rosette plants, such as Phlox caespitosa and Arenaria obtusiloba, are found on the exposed ridges. Herbaceous and grass-like vegetation dominate the slopes (i.e. Geum, Minuartia, and Carex). Below melting snowdrifts, dwarf shrubs with herbaceous dicots and graminoids often form meadows and bogs (i.e. Deschampsia caespitosa, Poa, Carex, Salix, and Caltha).

The Southern Hemisphere alpine vegetation is similar in form, though not in species composition, to that in Northern Hemisphere alpine areas. In contrast, equatorial alpine vegetation has little similarity in either form or floristics with other alpine vegetation. The tropical alpine environment is under diurnal control rather than annual, with great differences in day and night temperatures. Frost is a nightly event and snow may occur at any time, but doesn't accumulate very much. The days are consistently warm enough (a few degrees above freezing) to allow year-long growing seasons.

There are two distinct high elevation zones near the equator: the puna and the páramo. The puna regions are grasslands, often associated with cacti and shrubs. In the páramo, alpine vegetation below 15,000 ft is commonly dominated by columnar or arborescent life-forms. One important genus with a columnar form is Espeletia (frailejón). The principal advantage of these giant rosette plants, which are never dormant, is that the buds are protected at night by the leaves closing around them. At 15,000 to 16,000 ft, the Espeletia páramo gives way to communities of cushion plants, rosette plants, and tufted grasses. The colder, windier, and snowier environment promotes greater similarity with more northern alpine areas, and higher percentages of genera shared in common (i.e. Arenaria, Draba, and Poa).

In both the Northern Hemisphere and the equatorial areas, the alpine taxa appear to have moved up from lower elevations, adapting to the colder environments. Once the plants adapted to the alpine environment, many of the taxa appear to have migrated north and south along the Cordillera. The main vector for dispersion is most likely birds. This would explain a number of disjunct species occurrence patterns.

We were very pleased to have Dr. Billings speak to NNNPS members. Perhaps another time when he returns to continue working on altered andesite areas he will honor us with another interesting talk.

Contributors This Issue - RD = Robert Dorn, GJ = George Jones, PW = Phil White.

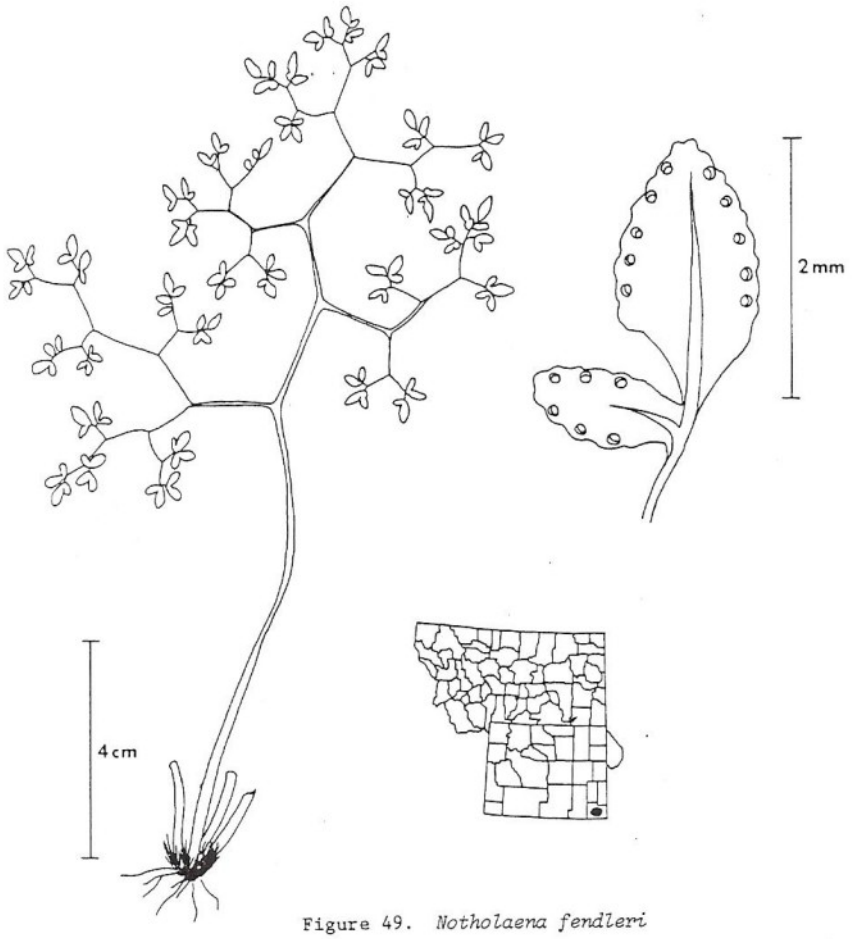


Figure 49. *Notholaena fendleri*

Zig-zag Cloak Fern, a dryland fern which we hope to see at our annual meeting this year. Drawing by Jane Dorn.

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