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

WYOMING NATIVE PLANT SOCIETY

3165 University Station
Laramie, WY 82071
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****** Note NEW ADDRESS! ******

Treasurer's Report - Balance as of May 15, 1992: $528.42; deposits: dues $169.00, scholarship fund $187.00; disbursements: newsletter printing $28.68, stamps $29.00, scholarship $300.00, Sec. State ann. fee $3.00; new balance as of Sep. 28, 1992: $523.74. **1992-93 Scholarship Fund:** $253.00. **Dues** - Dues are overdue; if a reminder is enclosed with your newsletter, this is your last chance.

Annual Meeting - The annual meeting was called to order by Robert Dorn, Secretary-Treasurer, at 8:30 am on June 27, 1992, at the Sweetwater Station rest area. The following officers were elected for the coming year: President - Walt Fertig, Vice-President - Nancy Kastning, Secretary-Treasurer - Hollis Marriott, Board Member (2 yrs.) - George Jones, Board Member (1 yr.) - Ernie Nelson. There was then a discussion concerning the formation of several new chapters, specifically at Rock Springs-Green River, Laramie-Cheyenne, and in the Sheridan area. Other ideas for expanding society membership were discussed as well as having more meetings, particularly in local areas. Possible places for the next annual meeting were considered and the Black Hills were chosen from several possibilities. The meeting was adjourned around 9:40 am. RD

WYNPS Loses Mainstay This year, Bob Dorn gave up his position as Secretary/Treasurer of the WY Native Plant Society after 10 years of service. We have appreciated Bob's willingness to repeatedly take on the one office of the organization that actually comes with responsibilities and a workload, and thank him for running the Society all these years.

Not every member who has sent their dues to and received newsletters from Box 1471, Cheyenne, WY, knows who "Bob Dorn" is. So as a not-so-fond farewell (nobody <u>really</u> wanted to take over as Sec./Treas.), we present a brief biographical sketch of The Man behind Box 1471. **NOTE:** Don't worry; Bob is still there, and still botanizing in WY.

Bob's early history is unclear. The most commonly heard story is that he was found and raised by a family of moose in a swamp in Montana. He was first spotted in Wyoming by a Game and Fish creel-counter, along the Powder River in northwest Campbell County. Bob was observed as having no fish, and wearing a backpack full of willow branches. The first concrete evidence we have of significant botanical contributions is a PhD dissertion completed in 1974 at the University of Wyoming, in which Bob solved the mysteries of willow taxonomy. Unfortunately, the general botanical public has yet to attain the same enlightenment, and Bob is regularly recruited to identify willow collections.

As the years passed, Bob ventured out of the wetlands and willow thickets, even venturing as far as Burns, Alva and Lonetree, WY. The results of these forays are impressive. Bob's discoveries range from rare, relic populations of boreal plants in the Black Hills, to narrowly-endemic, brand new species in southwest Wyoming. One of the more exciting discoveries is a recent one--a new **genus** in the aster family represented by one species: **Yermo xanthocephalum** ("yermo") on Beaver Rim in Fremont County.

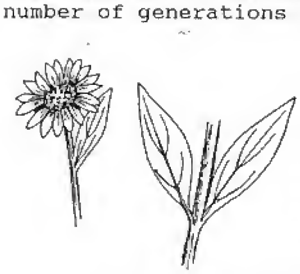
Bob probably is most widely known for his floras. "The Flora of the Black Hills" (1977), "Vascular Plants of Montana" (1984) and "Vascular Plants of Wyoming" (2nd ed. 1988) all follow the same format--lots of information packed into an affordable book that can be carried easily in the field. There is good news here: "Vascular Plants of Wyoming" has once again been revised, and the 1992 edition will be out this fall.

ANT-PLANT SYMBIOSIS IN THE ASPEN SUNFLOWER Western North America is home to a dozen species of sunflowers in the Composite genus <u>Helianthella</u>. Each species is characterized by subtle differences in leaf and floral morphology. The aspen sunflower, <u>Helianthella quinquenervis</u>, can be further distinguished by its unique means of defense against herbivory. Instead of relying on chemical or structural defenses, the plant utilizes aggressive ant guards for protection against insect pests. In return, the sunflower provides the ants with food in the form of nectar.

Similar ant-plant symbiotic relationships have evolved independently in hundreds of species of plants. In the majority of known cases, the plant utilizes ant defenders in place of more conventional chemical deterrents. Ant protection is often more economical than chemicals and is not as easily circumvented by insect pests. In order for the system to work, however, the plant cosymbiont must be able to attract a steady population of ant guards. Without its partners, an ant plant is left defenseless and will suffer from reduced reproductive fitness, defoliation and possibly even death.

Most Helianthella species utilize sesqueterpene lactones to defend against insect herbivores. The production of these toxins is a drain on the metabolism of the plant and reduces the amount of energy available for leaf, flower and seed production. Toxins are most successful in deterring generalist-style insect herbivores but may fail to discourage specialized feeders. A single mutation may alter the physiology of an insect pest, making it immune to existing chemical defenses. Lastly, chemical defenses are more often a reaction mechanism rather than a preventive one. Toxins are released only after physical damage has already been inflicted.

The use of ant defenders allows the aspen sunflower to invest a greater proportion of its energy towards increased seed production. Unlike chemical systems, ants provide a good generalized defense against both specialized and unspecialized herbivores and can act before damage has been incurred. Most importantly, insect herbivores must evolve behavioral modifications to overcome an ant defense. This is much more difficult and takes a greater number of generations to accomplish than acquiring chemical immunity.



To attract ants, the aspen sunflower secretes carbohydrate and amino acid rich nectar from nectaries located on the involucral bracts enclosing each developing flower head. It regulates ant activity and the cost of nectar production by secreting nectar gradually and only in small quantities. As a result, ants are constantly travelling about the flower head in search of nectar. Foraging ants react aggressively to all insects they encounter, including other ants and potential herbivores. It is this aggressiveness that the sunflower relies on to drive off its many insect pests.

Picture-wing flies and agromyzid flies are the major insect herbivores of Helianthella quinquenervis. In both species, adults mate on the plants and females lay their eggs on the immature flower heads. Fly larvae complete their life cycle in the developing ovules and seeds. Large numbers of larvae can greatly reduce the seed yield of a plant. Aggressive ants interfere with flies trying to lay eggs on the flower heads. Ants rarely kill flies outright, but can drive off egg-laden flies simply through their pugnacious behavior.

Experiments with sunflowers in which ants have been removed illustrate the success of the ant protection system. Sunflowers with ant guards lost an average of only ten percent of their seeds to insect predation, while unprotected plants exhibited seed mortality rates as high as ninety percent. In the absence of ants the system actually backfires, as the nectaries attract more insect herbivores.

Despite its overall success, the ant defense system of Helianthella quinquenervis is not foolproof. Any gravid female that eludes the ant guards will be able to produce many offspring because ants do not seek out and destroy fly eggs, larvae or pupae. Other insect pests, such as the Hemeosoma moth, can avoid ant guards alltogether by laying their eggs at night, when ants are less active. Larger vertebrate herbivores, such as elk, are unaffected by pugnacious ant behavior, although the unpalatability of the ants themselves may discourage grazing. Overzealous protection can also be a disadvantage if ants discourage insect pollinators.

Due to their reliance on ants, aspen sunflowers are restricted to areas where ants are abundant. Uneven distribution of ant colonies is probably the single most important factor in determining the survivability of seedlings. Transect studies following a gradient in ant density show that seed mortality rises with increasing distance from ant colonies.

The aspen sunflower has diverged from its close relatives by evolving a non-chemical defense system in conjunction with aggressive ants. The immediate benefit to the plant is improved energy conservation. Less metabolic energy is required for defense and more can be invested in reproduction. Drawbacks include lessened fitness in the absence of ants and a reduced ability to pioneer new habitats. For good or bad, the evolutionary path taken by the aspen sunflower has become intertwined with that followed by its ant cosymbionts.--**WF**

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Wyoming Plant Families

Family 13: Chenopodiaceae, Goosefoot Family

The thirteenth largest family of flowering plants in Wyoming is the Chenopodiaceae with 53 species. Common representatives include goosefoot (**Chenopodium**), saltbush and shadscale (**Atriplex**), hopsage (**Grayia**), halogeton, winterfat (**Krascheninnikovia**), Russian thistle (**Salsola**), and greasewood (**Sarcobatus**). Most are either annuals or shrubs. The family is characterized by simple, mostly alternate, leaves which are often succulent or gray-scurfy, no petals, 5 or fewer stamens, superior ovary, styles or stigmas 2 or 3, and the fruit an achene or utricle (one-seeded, does not split, thin covering around seed). The fruits are important for identifying many of the species. Many species grow in highly alkaline areas and several are poisonous to livestock. The family is well represented in the western half of Wyoming but not near so common in the eastern half. Most of the western basins are dominated by sagebrush and members of the Chenopodiaceae, particularly saltbush and greasewood. Late summer is the best time to find fruits for the majority of species. Find representatives of the family and examine the fruits. Compare the fruits with those in the figure. RD

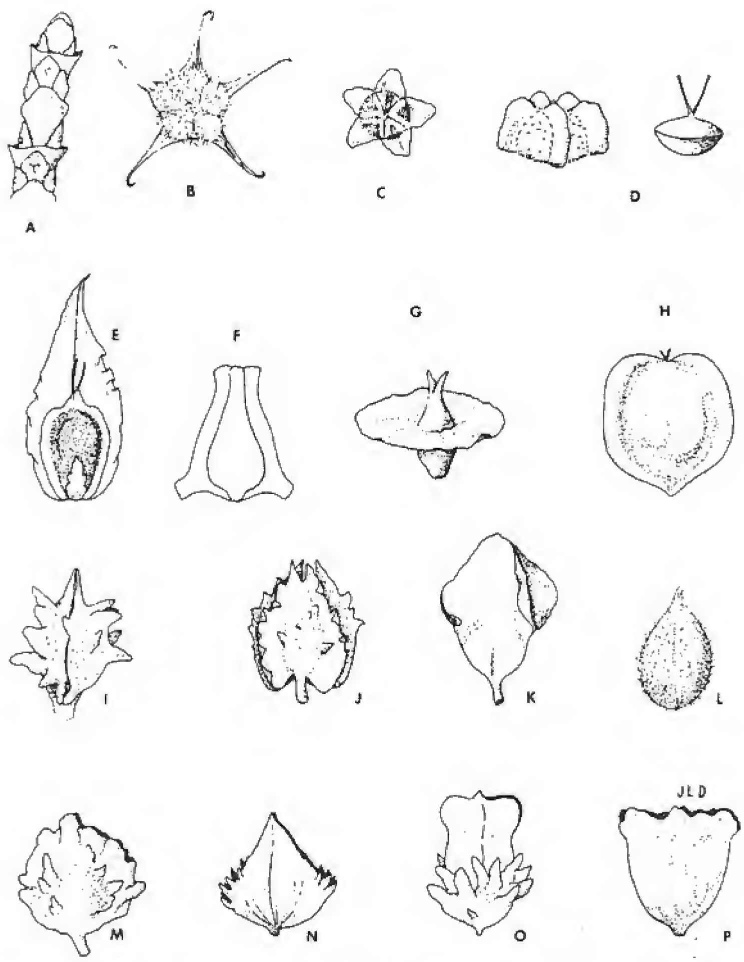

Figure. Chenopodiaceae. A. **Salicornia rubra**, portion of stem (x 4). B. **Bassia hyssopifolia**, flower (x 4). C. **Kochia scoparia**, flower (x 4). D. **Chenopodium berlandieri**, flower at left, fruit at right (x 11). E. **Corispermum hyssopifolium**, flower (x 4). F-P. Fruits: F. **Suckleya** (x 4); G. **Sarcobatus** (x 4); H. **Grayia** (x 2); I. **Atriplex argentea** (x 4); J. **Atriplex canescens** (x 4); K. **Atriplex confertifolia** (x 2); L. **Atriplex suckleyi** (x 7); M. **Atriplex gardneri** (x 2); N. **Atriplex subspicata** (x 4); O. **Atriplex powellii** (x 5); P. **Atriplex truncata** (x 7).

BOTANICAL BONERS We finish this issue of the newsletter with a new feature: Botanical Boners, graciously donated by John Baxter. These come from a collection of gems culled from Botany exams and quizzes during 30 years of teaching at three Midwestern universities and the University of Arizona. Each boner is reproduced exactly as originally written (and intended?) by the student. The Botany Boner topic for this issue is:

> **ROOTS.** The potato has tumors which form advantageous roots. The rizhone of quack grass is a unerdground stem with adventurous roots. The corn plant has haphazard vascular bundles and adjacent roots. The buttercup has facetious roots. In the groth of the root, the root cap acts as a bluffer. The best soil is lobe. Pete is also good because it contains lignus. The soil contains three kinds of water--gravational water, capitulary water and gyroscopic water. Decade organitic matter is called fungus. It enrichiches the soil for the groth of plants. The breakdown of living matter is called cannibalism.

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