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Studies in Rocky-Mountain Species of *Cymopterus* (Apiaceae)

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and support an alternate interpretation of species relationships within the group. Although the Lobati remains to be examined by the same techniques but in the broader context of the entire Aureoid assemblage, it is not anticipated that such studies will alter radically the present interpretation of the species-group.

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FUNK, VICKI A.* AND HAROLD ROBINSON. Department of Botany, National Museum of Natural History, Smithsonian Institution, Washington, D. C. 20560. - A phylogenetic analysis of *Leiboldia*, *Lepidonia*, and a new genus (Vernonieae, Asteraceae).
The traditional "core genus" *Vernonia* is a paraphyletic group defined by plesiomorphies. As such, its parts are much more closely related to other recognized genera than they are to each other. We argue for the recognition of well-defined generic segregates from *Vernonia* for two reasons first, if we add the segregate genera to *Vernonia* it cannot be defined except by characters of the tribe. If we remove the segregate genera *Vernonia* becomes a paraphyletic group defined by plesiomorphies at the generic, not the tribal level. Second, we view the recognition of these segregate genera as steps on the road to creating monophyletic groups in the Vernonieae. The genera we are discussing in this treatment are *Leiboldia*, *Lepidonia* and their relatives which have been included in *Vernonia*, in spite of pappus modifications that exceed the definition of the latter genus. Thirty apomorphies are used in this study including such characters as pollen type, differentiation of inflorescence, pappus condition and pubescence type.

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FURNIER, GLENN R., PEGGY KNOWLES*, MERLISE A. CLYDE, AND BRUCE P. DANCİK. Department of Forest Science, University of Alberta, Edmonton, Alberta T6G 2H1 Canada. - Effects of avian seed dispersal on the genetic structure of whitebark pine populations.
We used allozyme analysis to examine family structure, the spatial patterning of related individuals, in two populations of whitebark pine, a subalpine conifer that commonly displays a multi-stem form. We have demonstrated that individual stems within clumps are genetically distinct. Individuals within a clump are genetically more similar than individuals in different clumps, but individuals in neighboring clumps do not appear to be more similar than individuals in distant clumps. This family structure appears to be a direct result of the seed caching behavior of Clark's nutcrackers, the primary dispersal agent for whitebark pine seeds.

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HARTMAN, RONALD L. Department of Botany, University of Wyoming, Laramie, WY 82071-3165. - Studies in Rocky Mountain species of *Cymopterus* (Apiaceae).
Recent work by several investigators has led to the publication of seven new species of *Cymopterus*, the relegation of several others to synonymy, and the expansion of the generic limits to include *Oreoxis*, *Pseudocymopterus*, *Pteryxia*, and *Rhysopterus*. Recognition of two additional taxa from the Rockies appears warranted. Vegetatively *Cymopterus lapidosus* (M. E. Jones) M. E. Jones looks very similar to *C. longipes* S. Wats., but the fruit superficially resembles those of some species of *Lomatium*. Consequently, it was considered by Garrett to be congeneric with the latter. Because of putative intermediates, Mathias (1930) and subsequent workers have treated it in synonymy under *C. longipes*. Contrary to this view, consistent fruit and leaf features allow for its recognition. A second taxon, which is

undescribed, has been confused with C. bulbosus A. Nels. It ranges from northern Wyoming to central New Mexico. The bracts resemble those of C. purpurascens (A. Gray) M. E. Jones, to which it is thought to be most closely allied. The open (vs. congested) infructescens and the presence (vs. lack) of a functional carpophore are in keeping with C. bulbosus, with which it is partially sympatric. In areas of geographical overlap, C. bulbosus and the novelty are ecologically and phenologically separate.

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HARRIS, JAMES G.* and JOHN G. PACKER. Dept. of Zoology, Brigham Young University, Provo, Utah 84602 and Dept. of Botany, University of Alberta, Edmonton, Alberta, Canada T6G 2E9. - Systematic studies in the genus *Braya* (Cruciferae).

Braya is an arctic-montane genus of circumboreal distribution. The biology and relationships of the North American representatives of the genus were studied to determine species boundaries and the phylogenetic connections among the species. Results of the study indicate that Braya can be divided into three sections on the basis of differences in stem leafiness, silique shape, seed size and arrangement, and septal epidermal cell wall thickening type. Sections Platypetalum and Sisymbriastrum represent two distinct evolutionary lines, but morphological and cytological evidence suggests that section Braya arose through hybridization of the two preceding sections. Taxonomic difficulties in Braya have arisen primarily from attempts to classify each of the small, isolated populations of the genus, many of which exhibit a great deal of intrapopulation homogeneity but are somewhat distinct from other populations. Our study indicates that this peculiar pattern of distinctive, homogeneous populations is probably due to refugial survival of some populations during the Wisconsin glaciations and to random post-glacial reestablishment of other populations, coupled with autogamy. Thirteen taxa, including seven species, are recognized.

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HARVEY, MICHAEL J. Department of Biology, Dalhousie University, Halifax, NS, Canada, B3H 4J1 - Dichotomous keys - dinosaurs of a past era.

A survey of the success that people had in identifying plant specimens using dichotomous keys revealed that: a) beginning students with an inadequate vocabulary of descriptive terms made many mistakes, became discouraged and subsequently go to great lengths to avoid the use of keys, b) experienced professionals usually know the genus to which a species belongs and generally use only the last few couplets of a key to confirm a name. Thus neither group makes full use of keys. It will be maintained in this paper that the longer a key is the less value it has since the chance of error is a function of key length, and that any technique that reduces average search path length is to be encouraged. To this end, among non-computer alternatives, the use of polychotomies has been found to be one technique of greatly reducing path length. Polychotomies combined with dichotomies are readily accepted by students, indeed can generate an enthusiastic response and should be more widely adopted. An example of their use can be seen in L. Newcomb, Wildflower Guide, Little, Brown Co. 1977.

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HERSHKOVITZ, MARK H. Botany Dept., University of California, Davis, CA 95616. - Notes on leaf architecture and phylogeny in the Portulacaceae.

Cleared leaves of several Portulacaceae reveal a surprising diversity of venation features considering their gross morphological similarity. The Portulacaceae, a mostly western American herbaceous family, typically has basal, less often cauline, succulent leaves. venation patterns in Lewisia spp. are typically cladodromous, the secondary veins often recurved, with poorly developed areolation and open marginal venation. Calyptridium spp. are similar, but are