Southern California Botanists

34th Annual SCB Symposium

Problem Plant Groups: Difficult to Understand and Identify

Saturday, October 18, 2008
The Ruby Gerontology Center California State University, Fullerton

Symposium

9:00 – 9:15am Introductory Comments
Gary Wallace, SCB President

9:15-9:55AM
Ceanothus **- More than Two?**
Dieter Wilken, *Santa Barbara Botanic Garden*

Ceanothus is composed of ca. 50 species and is distributed throughout much of North America. The highest diversity is found within the California Floristic Province, including 22 of the 29 species of subgenus *Ceanothus* and 20 of the 21 species in subgenus *Cerastes*. *Ceanothus* has a reputation as being "difficult", owing to the inability to identify some specimens unambiguously and to discriminate adequately between closely related taxa. Surprisingly, if one compares taxonomic treatments over the past 125 years, one finds a high level of consensus among such authors as William Trelease, Sereno Watson, Katherine Brandegee, and Howard McMinn. What then contributes to the difficulty in recognition? Most species of *Ceanothus* are characterized by a combination of life form, leaf arrangement and morphology, flower color, and fruit morphology. For most species, unambiguous recognition depends on having all of these features available. However, most specimens, whether living or dead, do not provide all this material at the same time. Both primary and secondary intergradation also contribute significantly to local and geographic patterns of variation. Molecular studies have, in some cases, provided significant insight into evolutionary patterns, but have not necessarily enhanced the ability to refine "circumscriptions" of particular taxa. In fact, such studies may be pointing toward morphological convergence among some lineages. The consequence may be elucidation of a remarkable evolutionary diversification combined with further exasperation in the process of identification.

9:55-10:30AM
Why are *Cryptantha* **species hard to identify, or are they?**
Michael Simpson and Kristen Hasenstab, *California State University, San Diego*

Cryptantha (commonly known as "Cat's Eyes" or "Popcorn Flowers") is a genus in the Boraginaceae consisting of about 200 species (66 in California), distributed in the western regions of North and South America. The genus itself can be confused with closely related genera, and the species and infraspecies within the genus are viewed as taxonomically difficult, even by professional botanists. A major reason for difficulty in *Cryptantha* identification is that the corolla - a feature that we are perhaps most attuned to in plant recognition - is very similar to that of close relatives and quite uniform within the genus, mostly differing only by size in the complex. Nutlet features (number, size, shape, sculpturing, and heteromorphism), requiring dissection of mature fruits and viewing under magnification, have traditionally been used as the primary diagnostic feature in *Cryptantha* identification. But even nutlet characteristics can be difficult to convey in a written description; one picture is worth a thousand words. Other features of the plant, which may be more variable but which we can learn to use in pattern recognition, are difficult to analyze and are often omitted from taxonomic keys. These subtle features - 1) stem branching pattern, size, orientation, and posture; 2) leaf position, size, and shape; 3) trichome size, type, color, density, and orientation; and 4) calyx size, fusion, and shape - all contribute to our wholistic view of the plant. The many features that may be used in *Cryptantha* taxonomy are reviewed, and web-based keys (both dichotomous and polythetic) that are photo-illustrated are presented as models for plant identification.

10:30-10:45AM
BREAK

10:45-11:25AM
Sorting out the taxonomic chaos of *Camissonia***: Unseen patterns of relationship and chromosome doubling.**

Warren L. Wagner, *Department of Botany, Smithsonian Institution)*

The genus *Camissonia* has been difficult to understand for a long time. Its members have been considered to be part of *Oenothera*, *Camissonia* or

subdivided into a number of genera. The current classification based on recent molecular data and reinterpretation of morphological characters departs significantly from the most recent monograph by Peter Raven in 1969 where a broadly delimited *Camissonia* with 62 species was recognized. Based on molecular analysis eight genera are recognized in addition to a much reduced *Camissonia: Camissoniopsis, Chylismia, Chylismiella, Eremothera, Eulobus, Holmgrenia, Tetrapteron,* and *Taraxia*. Previous to Raven's approach Philip Munz treated all of the species as members of a very broadly circumscribed *Oenothera*. As we now circumscribe it, *Camissonia* consists of only 12 species, two of which (*C. kernensis*, *C. campestris*) are self-incompatible diploids and two (*C. pusilla*, *C. sierrae*) self-compatible diploids; one (*C. contorta*) is an autogamous hexaploid, and the other seven are self-compatible tetraploids. The tetraploid species *C. dentata* is also the only species that is endemic to South America (Peru to Chile and Argentina); all other species of *Camissonia* are endemic to western North America. A group of four closely-related species (*C. kernensis*, *C. pusilla*, *C. pubens*, *C. parvula*), marked by having sepals reflexed separately (rather than in pairs), occurs in the Great Basin. Of the remaining species, several (*C. campestris*, *C. sierrae*, *C. lacustris*, *C. benitensis*, *C. integrifolia*) have restricted ranges within California, or (*C. strigulosa*) extend also to Baja California, Mexico, or (*C. contorta*) to Washington and Idaho. Relationships within this group of seven species are especially close, and the group has previously been considered to be comprised of only two species, the self-incompatible .*C. campestris* and the self-pollinating *C. contorta*. Most species of *Camissonia* are difficult to identify, in part due to the polyploidy and hybridization involved in their evolution, but also because of current hybridization among some of the species and their diminutive size.

11:25-12:00PM
Delphinium **ID: Why a good key is hard to find**

Jason A. Koontz, Biology Department, Augustana College, Rock Island, IL

The larkspur genus, Delphinium, is large (300+ species world wide) and California is one of the centers of diversity (the others are Asia and the Mediterranean) with approximately 45 species/subspecies. In the field and herbarium, larkspur species may exhibit much variation; therefore, identifying larkspurs has been notoriously difficult. Most current keys rely on root characters that require sacrificing the plant or cannot be seen on herbarium specimens. Other characters used to identify larkspurs are often minute, difficult to discern, and overlap among species. Delphiniums are also known to hybridize adding to the mess by blurring species boundaries. The use of molecular data may shed light on the nature of this group and may be helpful in developing better keys. However, relationships among the North American larkspurs are also not well-resolved. With the upcoming revision of the Jepson Manual, I am attempting to make the Delphinium key easier to use and less reliant on single characters or those that are hard to assess in the field or from herbarium specimens. Will I be successful? You will judge this and your input is welcome. I also hope to offer some hints and suggestions to ease larkspur identification.

12:00-2:00pm Lunch
Picnic at the Fullerton Arboretum

2:00-02:40PM
A Crock of Gilia: The complex history and taxonomy of the Gilia in California.

Leigh Johnson, *Department of Biology, Brigham Young University* (presenting) and J. Mark Porter, *Rancho Santa Ana Botanic Garden and Claremont Graduate University*

Over the last 15 years the Phlox Family (Polemoniaceae) has undergone major upheaval. Nearly half of the members of this family have seen name changes, which can be very disheartening to botanists, both amateur and professional. These changes are particularly difficult because some genera of Polemoniaceae were already extremely trying to identify to species. At the center of the taxonomic turmoil, and particularly vexing to key, is the genus *Gilia*. At one time this genus included nearly half of all species of Polemoniaceae, but the most modern circumscription reduces the number to about 40. The biological basis for the difficulties in identification and classification are reviewed, which include phenotypic plasticity, cryptic species, hybridization, and morphological convergence and parallelism. The morphological features that show the greatest constancy for identification are also reviewed.

2:40-3:15PM
Acorn cups and trichomes: Oak identification.

Fred Roberts, Jr.

All oaks are members of the genus *Quercus* (Fagaceae). There are 19 species of oaks in southern California. As a group, the oaks are one of the most widely recognized plants in southern California. However, with the exception of a few, determining to which species a particular tree or shrub belongs can be challenging. Members within each of the three main groups--the black oaks, golden oaks, and white oaks--hybridize freely blurring species lines. The trick is in the leaf, the

trichome (a type of minute hair that is often branched), and the acorn cup. Learning to recognize and understand their variation and how they relate to each group or species is an important step in identification of our oaks. In white oaks the trichome is the most valuable tool for identification, and separating species can depend on its placement (above and below the leaf or only below), density (scattered or dense), size, and the number and length of its branches. During this presentation, the audience will be introduced to important features of oak identification and how to apply them.

3:15-3:30PM
BREAK

3:30-4:10PM
Grasses are easy!

J. Travis Columbus, *Rancho Santa Ana Botanic Garden and Claremont Graduate University*

The grass family (Poaceae or Gramineae) is rich in species (10,000+), is found on every continent, and occurs in a diversity of habitats from sea level to high elevations, sometimes dominating (grasslands, savannas). It is also the most important plant family for human survival, providing grains, fodder for domesticated animals, sugar, building materials (bamboos), and other products. On the downside, a number of species are serious weeds. Despite its large size, wide distribution, and ecological and economic importance, the grass family is poorly understood by many systematists and often ignored by field biologists. Why is this the case? Learning grasses is hindered by the same problems encountered in other groups of organisms, including uncertain and historically conflicting taxon circumscriptions, hybridization, and inadequate descriptions, illustrations, and identification keys. In addition, grasses have highly reduced flowers, lack conspicuous perianth, and are nearly uniform in phyllotaxy. Most collectors and persons conducting inventories are first drawn to plants bearing conspicuous corollas. Also, in a majority of plant groups, flowers provide many characters for taxonomy and identification, hence botanists are quite familiar and comfortable with floral variation and its associated terminology. In grasses, however, the flower itself plays a minor role in taxonomy and identification. Instead, the bracts associated with the flowers are important and have terminology unique to the family (glume, lemma, palea). Other structures/terms one must learn include floret and spikelet. In addition to unfamiliar terminology, the bracts making up a grass spikelet are usually closely appressed and are quite small in many genera, which often demands the use of a dissecting microscope and tools in order to observe the important details. However, with minimal training in basic morphology, along with the good literature resources (keys, descriptions), dissecting tools, and practice, grasses are not a difficult group to master.

4:10-4:30
Closing comments and announcements.
Gary Wallace, SCB President.

Vendors

California Native Plant Society – Orange County Chapter

F.M. Roberts Publications

Freedom Embroidery

Theodore Payne Foundation

Tree of Life Nursery

SCB Silent Book Auction proceeds go to the Susan Hobbs Grant for field research.

Registration Table

Please visit our registration table and…

- Suggest field trips
- Suggest next year's symposium topic
- Sign up to be on the Board of Directors
- Locate nearby restaurants

Bulletin Board

Please visit our Bulletin Board located near the posters. You may post job positions, events, and other announcements!
We also have an online bulletin board, please visit and join at http://socalbot.org/bb

SCB Membership

Membership to Southern California Botanists is for the Calendar year, and includes 6 issues of our newsletter Leaflets and 2 issues of our journal Crossosoma. If you wish to join Southern California Botanists, please visit out website.
http://socalbot.org