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Leaflets of the
Southern California Botanists

Editor – Leaflets

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LEAFLETS

of the Southern California Botanists

Volume **21** Number 5 September-October 2012

2012 SCB Symposium
Saturday, October 6th, 2012
The Huntington Botanical Gardens

From the Ground-up: Edaphic Factors & Plant Diversity

Symposium Schedule

8:00 - Registration begins

9:00-9:15 - Introductory comments

9:15-10:00 - Managing a Thriving Plant Community in Urban and Desert Soils by Garn A. Wallace, Ph.D.
Since urban soils have been highly modified from the natural conditions, beneficial and detrimental changes need to be identified in order to augment the beneficial changes and to correct the detrimental alterations. Common problems include the use of subsoils as topsoils, infertility as well as the negative effects of excessive fertility which is more common (toxicity, high salinity and excessive acidity), presence of non-essential trace metals, improper site management without considering the most advantageous management practices, and more. Specific site conditions and projects will be discussed for urban soils and desert soils.

10:00-10:45 – The Current Role and Future of Biological Soil Crusts in the Face of Global Change by Jayne Belnap, Ph.D.
Biological soil crusts can completely cover plant interspaces in dryland regions, and can constitute 70% or more of the living ground cover. These soil crusts fix carbon at high rates, supporting soil food webs. They can be the dominant source of nitrogen for desert ecosystems. They are critical for soil stability and aggregate formation, which is important in carbon storage. They also affect carbon and nitrogen gas fluxes from soils. In areas where precipitation is low and soils have low fertility, native plants often rely on intact biological soil crusts to provide increased water and nutrient flow to the broadly scattered vegetation. Thus, there are many ways in which biological soil crusts influence biogeochemical cycles and the structure and productivity of the vascular plant community. Soil surface disturbance, invasive plants, and climate change have the potential to dramatically alter the species composition and thereby function of biological soil crusts. Trampling and invasion generally results in reduced cover and a loss of lichen and moss species. Changes in climate regimes, such as an increase in temperature or a shift in the amount, timing, or intensity of rainfall, will influence the composition and physiological functioning of biological soil crusts, as various crust components have different photosynthetic and respiration responses to temperature and moisture. In addition, some species fix nitrogen, whereas others cannot and a loss of the former will reduce nitrogen entering dryland soils. Changes in the flora will also lead to changes in ecosystem processes such as decomposition, soil moisture, and nutrient availability to vascular plants. This, in turn, can have regional and national implications.

10:45-11:00 - Morning Break

11:00-11:30 - Gabbro Soils, a Botanical Enigma. by Earl B. Alexander, Ph.D.
Some plants that grow on gabbro soils do not grow on other kinds of soils and some plants grow on both gabbro and serpentine soils, but on no other soils. Gabbro soils in the California Region, from Baja California to southwestern Oregon, are cold to warm Inceptisols, Mollisols, and Alfisols. They are in loamy-skeletal, fine-loamy, clayey-skeletal, and fine families. Gabbro soils with special plants range broadly in physical characteristics and the same physical characteristics are found in soils with other parent material. Therefore, it has been assumed that the unique character of gabbro soils is related to their chemistry. Relative to diorite, which has soils that are more favorable for most plants, gabbro has low K and P contents. The greatest elemental differences among gabbro soils, however, is the Ca/Mg ratios. These ratios range from an extreme of 0.03 for olivine gabbro to two or more for gabbros with compositions bordering those of diorite. Soil differences in Ca/Mg ratios are the most likely causes of special plant distributions among gabbro soils, but gabbro soil sampling has been inadequate to discern differences that are related to special plant distributions.. Experimentally controlled soil chemical environments may be required to show the differences that have the greatest effects on plant species distributions.

11:30-12:00 - A Rough Guide to Dynamic Evolution of Mycorrhizae in the Californian Ericaceae by Diana D. Jolles, Ph.D. Candidate
The natural history and evolution of family Ericaceae are driven in part by physiological associations with a wide taxonomic range of mycorrhizal fungi. In southern California, Ericaceous plants inhabit several ecological zones, including those dominated by chaparral, mixed

conifer and oak forest, wetland and alpine environments. Successional cycles that characterize each of these environments, underlying mineral substrates, and qualities of local soil matrices all influence the symbiotic relationships among mycorrhizal fungi and Ericaceous plants. These dynamic ecological and symbiotic associations have likely influenced the evolutionary trajectories of the particular environments in which Ericaceous species are prominent.

12:00-1:30 - Lunch Break

1:30-2:15 – Plate Tectonics, Ice Ages, and Endemism: Edaphic Endemism in the San Bernardino Mountains by Timothy Krantz, Ph.D.

The San Bernardino Mountains exhibit the highest rate of floral endemism in the continental United States for an area of its size, with 30 strict endemics and another 88 near-endemic plant taxa with only one or two other occurrences outside the range. The story of their isolation and endemism is told by the plate tectonics of the San Andreas Fault over the past 30 million years; of uplift and Ice Ages over the past million years; and edaphic islands within montane islands, all conspiring to create the unique endemic plant communities found therein.

2:15-3:00 - Serpentine Soils and Plant Diversity in California: Insights from a Combined Evolutionary and Ecological Perspective by Brian L. Anacker, Ph.D.

A significant amount of plant diversity in California is associated with infertile serpentine soils. Serpentine hosts a large number of endemic species and contributes to the structure and composition of plant communities. In my research, I have investigated the evolutionary origins and consequences of serpentine endemism. I found that serpentine plant endemism is associated with decreased rates of diversification and evolutionary transitions towards mesic climates. At the community level, I found that the phylogenetic diversity of communities is determined primarily from the “top down” by historical and evolutionary forces, despite the strong "bottom up" filtering effect of serpentine soils on plants.

3:00-3:15 - Afternoon Break

3:15-3:45 - A New Edaphic Endemism? The Strange and Wonderful Case of the Lane Mountain Milkvetch by Thomas R. Huggins, Ph.D.

The genus *Astragalus* (Fabaceae) is the world’s largest genus of flowering plants, and exhibits an extraordinary capacity for edaphic specialization, often leading to highly restricted geographic ranges and rarity. As a consequence, the genus *Astragalus* has the highest number of protected species in the continental United States. One of these endangered astragali is the Lane Mountain milkvetch, *Astragalus jaegerianus* Munz, a narrowly endemic plant that exists in small fragmented populations restricted to shallow, granitic soils in the central Mojave Desert. *Astragalus jaegerianus* is a climbing, herbaceous perennial that belongs to a relatively unstudied group of desert plant species whose life histories occur largely within the canopies of desert shrubs (thamnophytes). Our previous studies have suggested that *A. jaegerianus* has no preference in its selection of host shrub species, except in its antipathy for *Larrea tridentata*, in which it rarely occurs and appears to be incompatible. This incompatibility with the regionally dominant *Larrea* appears to restrict *A. jaegerianus* to patches of shallow-soiled habitat where the density of *Larrea* is reduced, and the density of compatible host shrubs is high. Thus, *A. jaegerianus* could to be the first known example of a novel type of second-order edaphic endemic whose distribution is indirectly controlled by edaphics through the effect of edaphics on its community of host shrubs. This complex form of endemism is ultimately responsible for its rarity, and may make *A. jaegerianus* particularly vulnerable to the effects of rapid climate change in the central Mojave.

3:45-4:15 – Plants of the Shell Middens of Baja California, Mexico by Sula E. Vanderplank, Ph.D. Candidate

Indigenous peoples of Baja California spent winters on the coast avoiding the cold of the mountains, and taking advantage of the protein-rich resources of the ocean and adjacent areas. Their activities resulted in the deposition of large quantities of mollusk shells in their frequented fishing grounds. In Baja California these ‘middens’ are visible along the coast. Midden composition varies with their position e.g., those adjacent to rocky shores are composed primarily of muscle and abalone shells, whereas those adjacent to sandy shores are composed predominantly of clam shells. These shell-rich soils often show variation in plant species composition, although the patterns are often not obvious at first glance. Some of the larger middens appear to harbor unique plant assemblages in NW Baja California, and often include many rare and endemic species. The impact of the shells on these plant communities varies considerably with shell composition and soil properties. Clam shells on clay or silt soils have the most significant impact on plant communities, presumably as a result of the additional calcium to the soil, which adjusts nutrient availability. These archeological sites (mostly ~ 5,000 years old) have become part of the landscape, and form islands of unique habitat within the heterogeneous matrix of the region. Conservation efforts in this region may be furthered by identifying the overlapping biological and archeological priorities to enable a multi-disciplinary approach to habitat preservation in these cultural landscapes.

4:15-5:00 - The Distribution, Ecology, and Conservation of Clay Soil Endemic Plants of Southern California and Northwest Baja California, Mexico by Scott C. McMillan

Southern California and Northwest Baja California are home to numerous rare and endangered plant species. San Diego County alone has more listed sensitive plant species than any other county in the continental United States, and many of these plant species are closely associated with specialized clay soils that are limited in distribution as well. This presentation discusses the status, historical and current distribution, and ecology of some of these species, including the importance that the clay soils play in all aspects of the biology of these species. The last ten years has shown that the management and conservation of these clay endemics is a substantial challenge. Many of this species have seen disturbances and impacts that have led to a decline in their status and distribution. Disturbances and impacts include increased fragmentation from development, nonnative plant invasion, recreation use, catastrophic fires, and potential climate change. Extensive monitoring and management has been conducted for some of these clay endemics and the results and lessons learned are discussed. Future changes in approaches for monitoring, management, and restoration will need to address not only the ecology of these species, but also our understanding of the soils that these species are associated with.

5:00-6:00 - Poster Session

6:00-9:00 - Banquet [Dinner Speaker from 7:00-8:00 Plants and Earthquakes - What's the Connection? by Dieter H. Wilken, Ph.D., FLS]

Much of the California flora has been and continues to be shaped by climate, physiography, and geological history. In many cases, the distribution of species and vegetation often appears correlated to landscape patterns that have been shaped by colliding plates, exotic terrains, and exposure of geological formations, sometimes with an unusual mineral composition. The proximate causes of some these geological phenomena appear invariably related to the existence of faults, an inevitable outcome of geological dynamics at the edge of a mobile continent.

Some faults serve as conduits of water, some notable effects including the distribution of fresh water marshes, fan palm oases, and, in at least one case, aspens. Faults certainly expose formations that contribute to substrate diversity. Faults also serve as foci for earthquakes. Perhaps not too surprisingly, plants also can be connected to earthquakes in their contribution to seismology. They have become a tool to provide critical evidence for historic earthquake events, and, as a result, providing seismologists with an enhanced ability to predict future events.

Backup topic and speaker for the symposium: Halophytes of the San Jacinto River Basin by David Bramlet.

Submissions for Poster Session

This year the SCB will again have a poster session before the banquet in an effort to encourage networking and to have a venue for members and students to present their work. If you are interested in submitting an abstract for this years poster session please send an e-mail to posters@socalbot.org with your abstract. Please keep your abstract to a maximum of 300 words. Posters should be no more than 4'x4'. Poster abstracts should be submitted electronically before October 1th 2012.

Information to be included in the next issue of LEAFLETS (Vol. 21, No, 6) should be sent to the editor by September 20th, 2012. Please email material to sratay@ucla.edu , *or mail to:*

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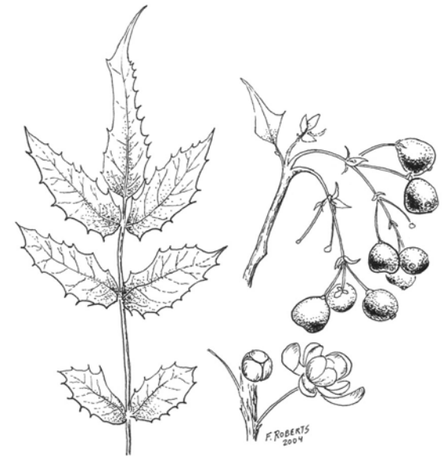

Berberis nevinii or Nevin's barberry is an uncommon yellow-flowered shrub in the Barberry Family (Berberidaceae). It occurs on sandy or gravelly soils in riparian scrub, coastal sage scrub, chaparral, and woodlands in Los Angeles, Riverside, and San Bernardino Counties. It is both a federally and state listed as endangered due to low numbers and loss of habitat. Illustration by Fred M. Roberts.