2012 program for the Southern California Botanists' 38th Annual Symposium:
From the Ground Up: Edaphic Factors & Plant Diversity
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.
"Garn A. Wallace" gaw@wlabs.net

Abstract: Managing a Thriving Plant Community in Urban and Desert Soils.
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.

Bio: Garn A. Wallace, Ph.D. University of California, Los Angeles, 1972 (biochemistry)
BS, Brigham Young University, 1968 (chemistry)
Postdoctoral Fellow, UCLA, School of Medicine (Department of Surgery), 1972-1975
Staff member UCLA, Laboratory of Biomedical and Environmental Sciences, 1975-1990
Employed by Wallace Laboratories, LLC, 1990 - current
Published about 100 articles in the following areas:

- Soil chemistry and nutrient interactions
- Land reclamation
- Plant analysis to assess mineral needs of plants
- Environmental effects on plants
- Special problems of iron nutrition in plants
- Trace element excesses on plants
- Role of mineral elements in plant growth
- Development of fertilizers and chelating agents for plants
- Growth of plants with hydroponic nutrients in solution culture
- Soil conditioning, soil conditioners and mechanisms
- Revegetation and restoration of disturbed lands

10:00-10:45 - The Current Role and Future of Biological Soil Crusts in Face of Global Change by Jayne Belnap, Ph.D.
"Jayne Belnap" jayne_belnap@usgs.gov

Abstract: The Current Role and Future of Biological Soil Crusts in Face of Global Change.
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.

Bio: Dr. Jayne Belnap has been a Research Ecologist with the U.S. Government since 1987. Dr. Belnap's work has focused on dryland and rangeland ecosystems. Because many types of land uses can reduce the fertility and stability of these ecosystems, her main research foci is on how these lands can be managed sustainably while still used for grazing, recreation, and/or energy/mineral exploration and development. Specifically, her work has looked at ways to use mosses, lichens, and cyanobacteria to stabilize soils and to restore normal nutrient cycles in soils via their input of carbon and nitrogen. She has also been actively engaged in studies on how climate change will affect drylands ecosystems and in developing adaptation options for people using and managing these lands. Dr. Belnap has been involved in many creative, successful, and cost-effective restoration efforts aimed at reducing soil erosion and restoring plant productivity using local materials and labor. These research efforts have been conducted around the world, including Iceland, Australia, the western U.S. and East Africa. She has led many large interdisciplinary teams and excels at bringing people together. She travels extensively throughout the world, training federal, state, and private land managers/pastoralists on best management practices for dryland ecosystems. Dr. Belnap has published over 200 peer-reviewed articles and the results of her research have led to major changes in management of large parts of the western U.S. and other countries. Most recently in East Africa, she was part of a team that developed a manual for the assessment of rangeland condition useable by pastoralists with limited formal education or tools. Dr. Belnap's expertise is sought from countries around the world, including South America, Mexico, South Africa, China, Ethiopia, Kenya, Tanzania, Zimbabwe, Mongolia, Siberia, Australia, and Iceland, where she trains and advises scientists and land managers. Dr. Belnap is the past president of the international Soil Ecology Society, the Ecological Society of America (ESA) Soil Ecology section, and member of the ESA governing board. She is currently on multiple ESA committees. She is an assigning editor and subject editor for the journal Ecological Applications, and is a subject editor for Ecohydrology and the Journal of Rangeland Ecology and Management. She has served on National Academy panels and participates in many other professional capacities as well. In 2008, she was recognized by the ESA as one of their most outstanding ecologists.

10:45-11:00 - Morning Break

11:00-11:30 - Gabbro Soils, a Botanical Enigma by Earl B. Alexander, Ph.D.
"Earl Alexander" alexandereb@att.net

Abstract: Gabbro Soils, a Botanical Enigma.
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 (Whittaker 1960, Dayton 1966, Hunter and Horenstein 1992, Obenbauer 1993, Wilson et al. 2010, Burge and Manos 2011). Explanation of this uniqueness of gabbro soils is illusive (Alexander 2011, 2012).

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.

Bio: Earl B. Alexander is a retired pedologist (soils) and currently active geoecologist who has worked for several agencies in several states and countries from Colombia and Central America to Alaska, including 3 or 4 decades in California. His main occupation has been in soil mapping and the development of interpretations to make the maps and other soil information more useful for forest and rangeland management. He has edited a book and written many published articles on the serpentine soils and geoecology of western North America. His work and publications on gabbro soils are complimentary to his experiences with serpentine soils and plant communities.

11:30-12:00 - A Rough Guide to Dynamic Evolution of Mycorrhizae in the Californian Ericaceae by Diana D. Jolles, Ph.D. Candidate
"Diana Jolles" diana.jolles@gmail.com "Diana Jolles" djolles@rsabg.org

Abstract: A Rough Guide to Dynamic Evolution of Mycorrhizae in the Californian Ericaceae.
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.
"Timothy Krantz" timothykrantz@gmail.com

Abstract: Plate Tectonics, Ice Ages, and Endemism: Edaphic Endemism in the San Bernardino Mountains.
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.

Bio: Dr. Timothy Krantz, Professor, Environmental Studies Program, University of Redlands.

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.
"Brian L. Anacker" blanacker@ucdavis.edu

Abstract: Serpentine Soils and Plant Diversity in California: Insights from a Combined Evolutionary and Ecological Perspective.
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.

Bio: Brian Anacker’s research interests include plant community ecology, conservation biology, climate change, phylogenetics, and functional traits, especially regarding serpentine soils, coastal grasslands, and rare plants in California. He completed his Ph.D. in Dr. Susan Harrison's lab at the University of California, Davis, on habitat specialization and community assembly of plants on serpentine soils. Currently, he is a post doc with Dr. Sharon Strauss at UC Davis. His work with Dr. Strauss is an experimental test of phylogenetic relatedness and ecological similarity at Bodega Marine Reserve on the Sonoma Coast of California.

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.
"Thomas Huggins" huggins@ucla.edu

Abstract: A New Edaphic Endemism? The Strange and Wonderful Case of the Lane Mountain Milkvetch. By: Thomas Huggins, Barry Prigge, Rasoul Sharifi, and Philip Rundel. 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.

Bio: Thomas R. Huggins, Ph.D. was born and raised in Los Angeles CA, and spent his formative years exploring the canyons and ridges of the Santa Monica Mountains. He attended the University of Santiago de Compostela in Galicia Spain and Hampshire College in Amherst MA where he studied Theatre and Film. In a brief television career, he penned several one-hour crime dramas with his future wife Charlotte Clay. Huggins received his PhD at UCLA where he studied the community ecology of *Asphondylia* gall midges on *Larrea tridentata* in the Mojave Desert. Huggins is currently a post-doc in Phil Rundel's lab investigating various aspects of Lane Mountain milkvetch ecology including the modeling of population dynamics. His population study, "The effects of long-term drought on host plant canopy condition and survival of the endangered *Astragalus jaegerianus* (Fabaceae)" was published in Madrono in 2010.

3:45-4:15 - Shell Middens of Baja California by Sula E. Vanderplank, Ph.D. Candidate
"Sula Vanderplank" sula.vanderplank@gmail.com

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
"Scott McMillan" Scott.McMillan2@aecom.com

Abstract: The Distribution, Ecology, and Conservation of Clay Soil Endemic Plants of Southern California and Northwest Baja California, Mexico.

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.

Bio: Scott McMillan has over twenty years of experience with Southern California's native flora and fauna. Scott has worked on almost every type of habitat that our region has to offer, but much of this work has been on the sensitive plant species, particularly those that are associated with clay soils. Not only has Scott been involved in the assessment and evaluation of these species, but also their management and monitoring for conservation.

5:00-6:00 - Poster Session

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

Abstract: Plants and Earthquakes - What's the Connection?
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 terranes, 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.

Bio: Dieter H. Wilken, Director of Conservation, Ph.D., FLS, Santa Barbara Botanic Garden.

Our backup speaker for the day is:
David Bramlet

Halophytes of the San Jacinto River.

REGISTRATION AND BANQUET RESERVATIONS
Pre-registration: $45.00
Registration on site: $55.00
Student registration (with approved Student ID): $15.00
Student registration (with approved poster presentation*): FREE

Banquet reservation (add this figure to your symposium registration): $40.00

* For all poster submissions, contact Sarah Ratay (email: "Sarah Ratay" <sratay@ucla.edu>) or Naomi Fraga (email: "Naomi Fraga" <nfraga@rsabg.org>).