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DAVIS BOTANICAL SOCIETY

LASTHENIA

NEWSLETTER OF THE DAVIS BOTANICAL SOCIETY

CENTER FOR PLANT DIVERSITY PART OF INDONESIAN INVENTORY PROJECT

The Center for Plant Diversity Herbarium will participate in a five-year project to be supported by a recently awarded $4 million ICBG (International Cooperative Biodiversity Group) grant, funded by NIH (National Institutes of Health) and USDA. This is an interdisciplinary and multi-institutional project that will involve biodiversity surveys in tropical forests on the island of Sulawesi, Indonesia. Plants and microbes collected will be screened for compounds with potential therapeutic and bioenergy applications. The project also includes outreach and education programs to promote conservation, sustainable use of natural resources, and ethical international exchange of knowledge and materials. Dr. Daniel Potter, Director, Center for Plant Diversity, is the overall principal investigator for the project, but the project involves the participation of many other individuals here on the UC Davis campus, at UC Berkeley and UC San Francisco, and at three institutions in Indonesia: the Indonesian Institute of Science (LIPI), the Indonesian Ministry of Forestry, and the Bandung Institute of Technology.

Members of the Indonesia project team, from left: Kyria Boundy-Mills, Lynn Kimsey, Dan Potter, and Andy Engilis. Photo: K. Garvey

The project is organized into six associate programs: macro-organism surveys, led by Elizabeth Widjaja (LIPI); microbial surveys, led by Kate Scow, UCD Department of Land, Air and Water Resources; discovery of energy solutions, led by Kyria Boundy-Mills, curator of the UCD Phaff Yeast Culture Collection; discovery of human health solutions, led by Len Bjeldanes, UC Berkeley; conservation research and vertebrate surveys, led by Andrew Engilis Jr., curator of the UCD Museum of Wildlife and Fish Biology; and conservation partnerships, training and ethics, led by Jeanine Pfeiffer, Research Director for social sciences at the Earthwatch Institute in Massachusetts. Additional participants include: Ellen Dean, whom I trust

continued on page 4

NO FALSE MODESTY HERE!: THE CONSERVATORY'S CARNIVORES

**Dr. Barry Rice, author of this article, will be our featured speaker at our Spring Meeting on May 14 and leader of our field trip to Butterfly Valley on June 27.*

This last October, my wife Beth and I spent several days vacationing in coastal Virginia. This trip was focused mostly upon looking for birds in salty coastal sites. It was lovely, but I secretly ached to explore freshwater sites for carnivorous plants—my big interest. What agony!

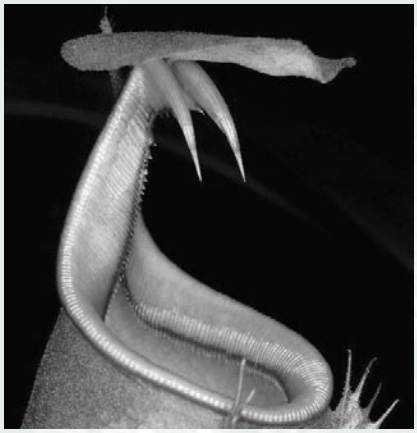
Still, I was a trooper. I consoled myself with the fact that we had budgeted a few days of our vacation to museum-hop in Washington, D.C. I looked forward to seeing the carnivorous plant collections at the United States Botanic Garden. There, I knew, bedazzlement awaited. After all, we're talking the nation's capitol! Surely the carnivorous plants there would be spectacular!

Imagine, if you can, the utter disappointment that resulted when we toured the displays. I counted only five carnivorous plants in the entire Garden, nearly all miserably grown in inadequate light, improper moisture, and inappropriate soils. My camera stayed in its bag the entire trip. O sadness! O despair! O wretchedness!

continued on page 2

IN THIS ISSUE

THE CONSERVATORY'S CARNIVORES (CONT. FROM PAGE 1)



Fanged pitcher plant (Nepenthes bicalcarata). Photo: Barry Rice

In hindsight, the cause of my unrealistic expectations was obvious: I have become spoiled by our own collections at the Botanical Conservatory. And perhaps you have, too, so let me tell you a surprising fact: the carnivorous plant collection at the Conservatory is, I believe, the largest and most diverse University collection in the entire USA. In fact, with the exception of a few private collections, nurseries, and the Atlanta Botanic Gardens, our collection at the Conservatory is the finest in the nation!

How did this come to be? Mostly it is due to the tolerance and cultivation by Conservatory staff of volunteer interest and enthusiasm. Tim Metcalf and Ernesto Sandoval have provided bench space and resources for entrepreneurial volunteers, and in the last decade the carnivorous plant collections have grown (some might say ballooned) into a fantastic ensemble.

By practically any standard, our Conservatory's collection excels. In sheer number of plants, in species diversity, and in global representation, the collection is astonishing. For example, we grow (or have grown) plants from every genus known to be carnivorous, except for one which is currently only grown in Bonn and its native Sierra Leone. What is most surprising about our collection is that, unlike most Universities that have their best plants either locked behind glass or hidden away in inaccessible propagation greenhouses, some of our finest plants can be seen and touched by any visitor. Yes, this is a theft risk—and sometimes we pay dearly with the loss of a prized specimen—but on the whole the satisfaction of providing such a good experience for the visitor is worth the occasional thievery.

In the limited space I have in *Lasthenia*, I cannot describe all the carnivorous plants in the Conservatory collections. So instead, let me describe a few that are of particular interest to me today. (The collection is so diverse, ask me for a list of interesting plants tomorrow, and it will probably be quite different!)

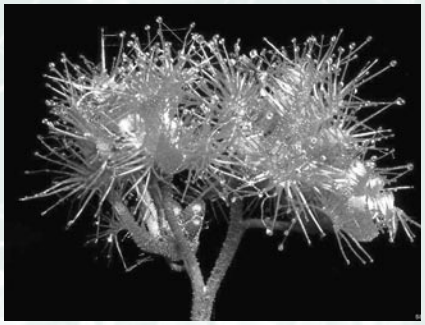
Fanged Pitcher Plant (*Nepenthes bicalcarata)*: This carnivorous plant uses a pitfall trap—any prey that fall into its pitcher drown in the basin of fluid, and are then broken down and digested by enzymes, bacteria, and carnivorous aquatic insect larvae. Two strangely fanglike thorns hanging over the pitcher mouth produce nectar to lure insects to sup in a place most treacherous. In the wild, colonies of an ant (*Camponotus schmitzi*) live inside the hollow tendrils that support each pitcher. Remarkably, these ants dive into the pitchers, swim, and haul out large prey items. The large dead insects often putrefy and damage the pitcher, so the actions of the ants may be beneficial. Meanwhile, the ants also patrol the plant to repel weevils that like to feed on *Nepenthes* leaves!

Utricularia humboldtii: This is a bladderwort, and is equipped with countless small aquatic bladders that suction in any prey that bump into them. Bladderworts feed on mosquito larvae, small crustaceans, and even fish fry. The flowers are spectacular, and at maturity release hundreds of seeds about 1 mm in diameter. The flat, papery seeds are transparent, and the tiny seedling is visible within like an unhatched bird. When wetted, the seeds hatch within a few hours, their many filamentary leaves looking like a tiny octopus emerging from a cage.

English Sundews (*Drosera anglica)*are festooned with myriad drops of adhesive mucus produced by the stalked glands on its leaves. It ranges throughout northern North America, Europe, and Asia; in California it is known only from a few sites. I am particularly fond of this species, and at one of my study sites near Mt. Lassen, its leaves are extremely elongated—in fact, longer than any other populations except one in the Thunder Bay area of Canada. Is this character genetic, or just a reflection of ideal growing conditions? In one population I studied in eastern Oregon, all the flowers had oddly mutated so that instead of producing petals, sepals, etc., they produced little plantlets complete with glandular tentacles!

Bug Plant (*Roridula dentata*): This sticky plant from South Africa may look like an oversized sundew, but it is profoundly different. The many droplets of glue that cover the plant are resinous, unlike the mucus drops on a sundew. Enzymes and nutrients cannot flow through resin, so this plant has long been thought not to be carnivorous. However, in the wild the plant provides a home for two species of assassin bugs (*Pameridea roridulae*, *P. marlothii*). These insects crawl about the plant, eluding capture because they have a thick layer of oil on their bodies. They feast upon the less fortunate prey captured by the *Roridula* plant. The feces from the assassin bugs adhere to the plant and nutrients from them are absorbed through special cracks in the waxy cuticle that coats *Roridula*. During lean times, when no prey are caught, the assassin bugs are sustained by sucking sap from *Roridula*.

Adrian Slack's Pitcher Plant (*Sarracenia* 'Adrian Slack'): This cultivar was named by me in 2000 and honors a great British horticulturist who was important in the annals of carnivorous plant growing. This plant is commonly considered one of the most spectacular hybrid *Sarracenia* in existence—certainly in full growth it is one of the most gaudily colored. Its green pitcher tube with red veins, crimson pitcher mouth, and white lid with green mottling and red venation are so striking



English Sundew (Drosera anglica) with abnormal glandular flowers. Photo: Barry Rice

Bug Plant (Roridula dentata)
Photo: Barry Rice

that when I first distributed photographs of it, horticulturists thought it was a computer-generated hoax! This is a spectacular plant!

Rainbow Plant (*Byblis* sp.): Brand new to our collection is a plant, possibly *Byblis filifolia*, but possibly a hybrid or new species. This sticky-trap plant from northwestern Australia has very strange characteristics, including flower stalks which bend downwards towards the ground after being pollinated, and odorless foliage which exudes a nasty fungal smell if jostled. Why does this plant do these things? Our specimens have only recently germinated and are only about 3 mm tall. At this age they are very susceptible to death by fungi; they must grow to at least 2 cm tall before they are past this delicate stage. So who knows if they will survive? I hope they do, though, because I want to observe this plant's strange new characteristics for myself!

I have introduced you to a half dozen of the oddities in the Conservatory collection, but we literally have hundreds of other carnivorous plant accessions, and each plant has its own story to tell. Stop by—ask about them, or come and find them yourself. We have them on display, and as I said before, in one of the finest displays in the land!

B. Rice

RECENT GIFTS

Botanical Conservatory Endowment
Genevieve Walden
In memory of Larry Mitich
Ellen Dean & Thomas Starbuck
In honor of Tim Metcalf
Maxine Schmalenberger

Herbarium Endowment
Estate of William F. McCoy
Julie Knorr
Brenda Grewell & Steve Kidner
Stephen Rae
Lynn & Robert Kimsey
Alan Whittemore
Craig Thomsen
Robert & Laurie Preston
Mandy Tu & Philip Rogers
Maxine L. Schmalenberger
Rebecca Wenk
Julin Maloof & Stacy Harmer
In memory of Grady L. Webster
Ellen Dean & Thomas Starbuck
In memory of William F. McCoy
Katherine Mawdsley
In memory of John M. Tucker
Elizabeth Bernhardt & Ted Swiecki
Elizabeth Corbin
Donald & Nancy Crosby.
Ellen Dean & Thomas Starbuck
Gerald Dickinson
Lewis Feldman
Gordon & Delia Harrington
Charlotte A. Kimball
Katherine Mawdsley
Robert & Roswita Norris
David & Caroline Pratt
Jean & Scott Shepard
Samuel Statler
Shirley & Kenneth Tucker
Genevieve Walden
Leonard & Marlene Warren
Katherine Keysor West

Jack Major Student Grant Fund
Mary Major
Ann Johnson

Society Student Grants Fund
E. Eric Grissell
Brenda Grewell & Steve Kidner
Maxine Schmalenberger
Gerald Dickinson
In memory of Jack Major
Stephen Rae

Conservatory Current Use Funds
Jean Gifford
Philip Hansten
Judy Jernstedt
Carole Ludlum

Herbarium Current Use Funds
Donald & Nancy Crosby
California Native Plant Society
Cole & Priscilla Hawkins

Gifts in Kind
Johanna Kwan & the Hewlett-Packard Giving Team
Greg and Debbie Crampton

Thank you for your support!

INDONESIA INVENTORY (CONT. FROM PAGE 1)

you all know; Lynn Kimsey, director of the Bohart Museum of Entomology and chair of the UCD Department of Entomology; Steve Heydon, Bohart Museum; David Rizzo, UCD Department of Plant Pathology; Douglas Kelt, UCD Department of Wildlife, Fish and Conservation Biology; Irene Engilis, Museum of Wildlife and Fish Biology; John Labavitch, UCD Department of Plant Sciences; Phil Ward, UCD Department of Entomology; and Selena Bartlett, director, Preclinical Development Group, Ernest Gallo Clinic and Research Center, UC San Francisco, who is working closely with Bjeldanes on the health screening activities. Numerous excellent scientists at the three Indonesian partner institutions are contributing to all aspects of the project as well, and Dan was delighted to have the opportunity to meet many of the participants during his recent visit to Indonesia (described elsewhere in this issue).

The project represents one of the largest multi-agency collaborations in US history to inventory biodiversity in Indonesia, a tropical island nation with a fascinating and complex biogeographic history. The region harbors tremendous biological diversity, but this diversity is being lost at an alarming rate as human populations and concomitant development grow and expand. Many species of ecological and economic significance are likely to go extinct before their systematics and biology are studied scientifically. In addition, organisms that produce substances with potential value to humans, such as sources of pharmaceuticals, are likely to be lost forever.

The island of Sulawesi, the focal region for the project, is the largest island within the biodiversity hotspot known as Wallacea, which includes Indonesia's central islands. Sulawesi is rich in biodiversity and high in species endemism in several taxonomic groups, but only a small portion of the diversity has been well documented and studied. Several recent efforts by scientists from LIPI in Indonesia and from research institutions in The Netherlands, the UK, Japan, and Denmark have helped begin to fill the enormous gaps in our knowledge of Sulawesi's flora and fauna, but much work remains to be done.

The project will focus on southeastern Sulawesi (the province of Sulawesi Tenggara), one of the least-studied areas on the island and one that encompasses a variety of substrates over a range of elevations. The study area is located on lands near the town of Kolaka on the western side of the southeastern peninsula of Sulawesi.

Southeastern Sulawesi has significant areas of intact forest with potential for designation as protected areas. Of primary interest is the biodiversity of the relatively poorly studied lowland tropical forest (below 1000 m altitude). This forest type is considered highly threatened due to logging and lack of enforcement of conservation laws in the limited protected areas. Three such sites will be surveyed. One upland forest site (above 1000 m altitude) will also be included in order to allow us to make comparisons of overall diversity in various taxonomic groups, diversity of organisms yielding natural products with potential applications in human health and bioenergy, and conservation status of forests at different elevations.

The first field trip to Sulawesi is planned for July, 2009. The project is a tremendously exciting opportunity, and the results will make significant contributions to a broad range of issues, including:

* development of knowledge about the patterns of biodiversity in southeast Asia;

* identification and isolation of natural products with potential value for treating globally important diseases and addressing human energy needs;

* development of effective biodiversity conservation strategies and proactive outreach and education programs to promote those strategies; and

* establishment of models for effective and equitable international collaborative partnerships, and ethical and sustainable international sharing of biogenetic resources.

D. Potter

SOCIETY PROFILES *Jim Doyle*

Jim Doyle in New Zealand with Ascarina lucida in the family Chloranthaceae

Jim Doyle, DBS President for 2008-09, says he has an "obsession with origins." This is supported by the upper division classes he teaches as Professor of Evolution and Ecology, with a joint appointment in Geology: Paleobotany and Systematics and Evolution of Angiosperms (flowering plants).

Jim's doctoral work at Harvard focused on early angiosperm pollen and evolution and led to research comparing early pollen and fossil leaf sequences to clarify the Potomac geologic sequence. He came to UC Davis in 1978.

His current research puts Jim in the middle of the hottest area of contemporary botany: using molecular and other data to clarify the evolutionary relationships of flowering plants. With his expertise in pollen, paleobotany and systematics, he works on the origin, early evolution and systematics of flowering plants, integrating molecular, morphological and fossil data. He describes his work as researching what the oldest plants say about evolution. Recent publications have dealt with living and fossil Chloranthaceae, the evolution of floral phyllotaxis (leaf arrangement) in the earliest flowering plants, and identifying a family formerly thought to be related to grasses as belonging near the base of the phylogenetic tree. He describes much of his current research as "data-mining," analyzing and synthesizing data developed by many researchers to derive new knowledge.

Much of Jim's work is done in the lab or at the computer—so when does he get to enjoy looking at plants? He's a "botanical tourist," he says, on sabbatical leaves. He has traveled to such places as New Zealand, Australia, and New Guinea, home of *Amborella*, currently thought to be the most primitive living flowering plant. He then gets to see the plant groups he studies on their home ground.

K. Mawdsley

STALKING WILD STONE FRUITS IN INDONESIA

I returned to Davis in late November after spending several weeks in Indonesia, where I traveled in connection with an NSF-funded project on the phylogeny, biogeography, and taxonomy of the genus *Prunus*. This project is being carried out in collaboration with Drs. Jun Wen (Smithsonian Institution) and Joey Shaw (University of Tennessee, Chattanooga).

Dr. Widjaja and two local assistants collecting leaves of Prunus in northwestern New Guinea. Martin is holding a jackfruit (Artcarpus heterophyllus) that he found growing on a tree near the Prunus.

Prunus is a large genus of about 200 species that is very familiar to residents of the temperate regions of the world due to its economic importance as a source of edible fruit crops (cherries, plums, peaches, apricots, almonds), ornamentals, and timber. Less well known is the fact that species of this group also occur in the tropics, with about 40 species native in Southeast Asia, one in sub-Saharan Africa, and about 20 in neotropical regions. A major objective of our project is to increase the sampling of tropical Asian and South American species, which have been poorly represented in previous phylogenetic studies of *Prunus*, including those conducted in each of our labs over the last 15 years.

In November, Jun, Dr. Elizabeth Widjaja (senior researcher at Herbarium Bogoriense in Indonesia), and I, with assistance from local guides, spent two weeks on New Guinea and a few days on Java searching for species of *Prunus* in lowland rain forests, highland cloud forests, mountaintop groves, and woods around bubbling, sulfur-smelling volcanic craters. I am happy to report that we were quite successful – we collected most of the species endemic to western New Guinea as well as several more widespread species. But I learned that tropical Asian *Prunus* are not so easy to find, which can be attributed to several factors.

First, tropical *Prunus* seem to prefer primary forests, and in many of the areas we visited from which we had records of collections from the 1960s through the early 1990s, the forests had been disturbed or replaced entirely by oil palm or cacao plantations. Second, even in primary forests, *Prunus* species are not typically dominant and the high species richness means that their frequency is quite low. Third, the steep slopes and slippery substrate on the Indonesian islands can make covering large areas (on foot or by vehicle) rather difficult. Finally, tropical *Prunus* superficially resemble many other tropical trees – species of *Ilex* (in the holly family)and *Symplocos* (sweetleaf family) are particularly troublesome – and lack any obvious characters that allow their easy identification from a distance.

Fortunately, on closer inspection, *Prunus* can almost always be readily recognized by two vegetative features. The first is the presence of one to several pairs of glands typically found near the base of the leaf lamina or at the top of the petiole. The second is the sometimes very strong "almond extract" odor produced by crushing a twig or scratching or cutting a tree's bark, the result of the cyanogenic glycosides found throughout the plant body in many Rosaceae, but especially prominent in *Prunus*.

Glands at the juncture of the blade and leaf stalk on the lower leaf surface of Prunus arborea, found in West Java.

Traditional village near Wamena, Papua Province, in the central highlands of New Guinea.

The difficulty of locating our target species made for some rather frustrating hours in the humid forests, but it also enhanced the sweetness of success when we did find them. On more than one occasion, the sight of a couple of small bright green circles on the back of a leaf or the whiff of hydrogen cyanide was the highly prized reward for a long day of searching. Of course, there were many other rewards associated with the trip, including the spectacular scenery,

Elizabeth Widjaja sniffing the cyanogenic glycosides of Prunus javanica, Manokwari, northwestern New Guinea.

the friendly and kind people, the delicious spicy food, the amazing cultural diversity, and the wonderful plants, among which some of the more striking were flowering individuals of species of *Pandanus, Rhododendron,* and *Schefflera*, various orchids, and members of Melastomataceae and Rubiaceae.

D. Potter
including photos

TALES OF BOTANIZING THE SAN RAFAEL WILDERNESS IN THE SIERRA MADRE MOUNTAINS, CALIFORNIA

G. Fred Hrusa, author of this article, is Senior Botanist at the CDFA Herbarium and Research Associate of the Center for Plant Diversity Herbarium.

Think about the Sierra Madre Mountains and images of Mexico, bandits, gold and Humphrey Bogart usually come to mind. It is less often that California's own Sierra Madre Mountains are thought about in a similar vein, and no, there are no bandits, gold or Bogart there, but the California version shares with its more famous namesake an unknown and wild condition, including its botanical

Shortlobe phacelia (Phacelia brachyloba) found on Salisbury Ridge, Sierra Madre. Photo: G.F. Hrusa

resources. That's right, Santa Barbara Co., that region of sun, nude beaches, and the upper classes, also has in its remote and inaccessible inland, a region of botanical mystery.

The Sierra Madre Mountains are the most northern range of the east-west trending Transverse Ranges. These ranges are unusual among the mountain ranges of the west coast of North America in that they face southward to the Pacific Ocean rather than westward. They are comprised of Tertiary sedimentary rocks, highly tilted and deformed. In several places large sandstone outcrops up to fifty feet high form spectacular visuals with wind-scoured caves, amphitheaters, and small waterfalls in the early season. The highest peaks of the Sierra Madre are about 1800 m (5500 ft.). The vegetation is dominated by chaparral, with silvic components that vary with elevation and exposure. Small stands of big-cone spruce (*Pseudotsuga macrocarpa*) and Coulter pine (*Pinus coulteri*) occur near the highest peaks, and some internal northwest and north-facing slopes of deep canyons support old-growth stands of these two conifers. Several of the eastern summits have stands of pinyon pine (*Pinus monophylla*), and the western summits have small patches of knobcone pine (*Pinus attenuata*). Close to the northwestern terminus of the Sierra Madre, near the Cuyama Canyon, and extending along the north base of the range for a dozen miles or so, occurs a blue oak (*Quercus douglasii*) woodland/savanna. Here blue oak is near its southern limit, and mixes with the southern California red shanks (*Adenostoma sparsiflora*), forming a distinctive woodland readily visible along the westernmost Sierra Madre Rd. In the northwestern part of the Sierra Madre, coastal sage occurs at elevations below chaparral.

Nested within the Sierra Madre Mountain Range is the northern half of the San Rafael Wilderness Area. The San Rafael was established as a primitive area by the Chief of the Forest Service on January 19, 1932 and then contained 79,900 acres. On March 21, 1968 the San Rafael became the first primitive area in the Nation reclassified as wilderness under the Wilderness Act of 1964. Sixty-three years and two expansions later, it contains 197,380 acres.

My first visits into the Sierra Madre came in the mid 1970s. At that time I noticed that the two most common sages occurring there, white sage (*Salvia apiana*) and purple sage (*Salvia leucophylla*), regularly formed hybrids. Later, as an undergraduate student at Cal Poly, San Luis Obispo, I used these populations to study the interspecific pollination syndrome among these two species and their hybrids. Hikes of more than 20 miles in and out of the study sites were commonplace, and the requirements of saving voucher

Lion Canyon, Sierra Madre. Photo: G.F. Hrusa

specimens helped develop methods of extracting fresh plant material from deep in the wilderness. Over the next ten years I explored numerous canyons of the Sierra Madre, setting the stage for later, more detailed, floristic exploration.

In 1996, I initiated a systematic botanical survey of the Sierra Madre Mountains. During subsequent years, I compiled the known and rumored plants of the area, producing a checklist of about 600 species. By 2006 the checklist had grown to more than 750 taxa, and plant collections numbered more than 1200, but little collecting had been done in the San Rafael Wilderness itself. In 2007, through the efforts of Forest botanist Lloyd Simpson and Bruce Emmens of the Santa Maria office of the USFS, I received permits to collect for five years inside the Wilderness Area; this work was intitiated in 2008.

One of the most interesting excursions I made in 2008 was my trip into the Sisquoc Canyon. Herbaceous diversity in these mountains is often concentrated in disturbed areas or burns, and the Zaca fire of 2007 opened up thousands of acres which had previously been inaccessibly dense chaparral. A heavy winter rainfall in 2007-8 brought out the fire-followers; it also washed away many of the currently used trails, either by slopewash overflow or floods, while at the same time sometimes revealing the remnants of old, abandoned trails. The riverbed here had flooded the winter before, and silt was deposited thickly within and above the riverbed. The annual flora was well-represented in the floodwash, and interesting species appeared quickly: California suncup (*Camissonia californica*); spoonsepal

spineflower (*Chorizanthe obovata* - one of several localized, and +/- narrowly endemic spineflowers in the area); and a presently unidentified *Clarkia*, like *Clarkia bottae* but with monomorphic stamens and cream colored pollen. Another unusual plant discovered in this area was a form of *Phacelia viscida* described early on by Nuttall as *Eutoca* (*Phacelia*) *albiflora*. This variant has pure-white, rotate corollas and is clearly distinct from typical *P. viscida*.

Mojave dwarf (Parishella californica). Photo: G.F. Hrusa

I made more than 200 collections in this spot, and have not yet studied most of them. This region is the most unused in the San Rafael Wilderness, and early next spring season I plan to revisit the area, particularly the canyons that open close to the Santa Maria Plain not more than a mile or so from the summer fog layer. I also intend to search specifically for more populations of *Phacelia albiflora* and the unidentified *Clarkia*. UC Davis Center for Plant Diversity alumna Genevieve Walden, now at San Francisco State, is currently sequencing the specimens of *Phacelia albiflora*, and its relationship to typical *P. viscida* should soon be known.

The 2008 season was a good one, yielding a total of 700 specimens and expanding the checklist to 831 species. A detailed analysis of the variation both within and among the recognized species will enable a first evaluation of the relationships and history of the individual taxa and the flora; eventually a detailed picture of the Sierra Madre flora, including its relationships and variation patterns, will emerge.

WINTER CHEER (TOXIC PLANTS!)

Don Crosby, author of "The Poisoned Weed: Plants Toxic to the Skin," is Past President of the Davis Botanical Society and a regular volunteer at the Center for Plant Diversity (along with his wife Nancy).

Chilly weather and rain are back—even snow if you live in the right place. It's winter again, and except for a few hardy species, your garden knows it. Indoors, though, it's like perennial spring: potted poinsettias still bloom, a holly wreath adorns the door, and there may even be a sprig of mistletoe left over.

For toxicologists, it's business as usual; the season has its own plethora of poisonous plants. I want to tell you about some of them—not to scare you, but to inform, intrigue, and help you to stay out of trouble. Although most people's outdoor activities are limited at this time of year, certain plants still pose a threat.

At the top of the list is **Winter Daphne** (*Daphne odora*). That evergreen shrub covered with clusters of small, sweet-smelling waxy flowers is one of the most poisonous things around; all parts of it are toxic to eat. Symptoms start with burning and blistering of the lips and mouth, followed by nausea, vomiting, seizures, and often death—the fatality rate in European children is 30%.

Hellebores are another garden plant blooming now. All species are toxic to a degree, but the **Christmas rose** (*Helleborus niger*), is especially so. Tasting even a small leaf of the showy ornamental can cause heart failure. Indeed, the dried and powdered leaves were used as an insecticide at one time.

This is also one of the most dangerous times of year for those sensitive to **Poison Oak**, (*Toxicodendron diversilobum*). While many people remember "leaves of three, let it be" in the summer, they ignore the bare sticks that are left once the leaves have dropped. These branches remain just as allergenic as ever, yet folks who would properly shun the plants in warm weather think nothing of wading into a thicket of bare limbs in winter. Be sure to apply barrier lotion to exposed skin if you're going into *Toxicodendron* country, and wash thoroughly afterward.

Conifers such as Douglas fir (*Pseudotsuga menzii*), white fir, (*Abies concolor*), noble fir, (*A. procera*), and balsam fir (*A. balsamea*), are familiar. However, their sap and resin contain allergens that cause "winter eczema," a skin disease especially in people who cut and handle Christmas trees. Incense cedar (*Calocedrus decurrens*), and western red cedar (*Thuja plicata*), are often used for Christmas wreaths, although red cedar is a major cause of occupational asthma wherever the wood and sawdust are produced. Incense cedar is used more for interior panels and flooring but also for pencils, and it produces allergy via its dust and shavings.

However, many toxic plants prefer to be indoors these days and may be given as gifts by the uninformed. The pretty, variegated **dumbcane** (*Dieffenbachia* spp.) is one of the most dangerous, especially for little kids. Its sap and leaves contain countless microscopic needles of calcium oxalate—sharp as glass—that penetrate the mouth and tongue of anyone who bites or sucks it. The result is a gross swelling that chokes off the breath and can make the victim "dumb," i.e., silent.

Many markets and florists sell pots of **ornamental pepper** (*Capsicum annuum*) at this time of year for its spectacularly colored fruit, which will burn and blister sensitive lips and tongues. The first time I tried one, it quickly raised a blister on my lip, so contact with even just one can injure a person.

Most of the **mistletoe** invading our trees is *Phoradendron macrophyllum*, although California claims over 20 other species. The whitish berries are the most toxic part, and eating even a few will lead to vomiting and diarrhea; swallowing more may cause heart failure. European mistletoe (*Viscum album*) was introduced into our state by Luther Burbank and fortunately is rare—it's deadly to eat, but still is sold locally as a holiday decoration.

Just how serious are these threats? California Poison Control Centers record over 10,000 plant-related calls each year—about 90% of them for kids less than five years old. In rank, the houseplant called philodendron (*P. scandens*) is No. 1, oleander No. 2, dumbcane third, poison oak fourth, ornamental pepper fifth and holly sixth. All but the pepper have caused deaths. So is everything toxic? Of course not; even some plants widely believed to be toxic are not. Poinsettias (*Euphorbia pulcherrima*) have a long-standing reputation for toxicity to skin, but available evidence says they're harmless. Likewise, firethorns (*Pyracantha* spp.) are avoided because the berries affect birds, but in fact, the birds are not poisoned—just drunk on alcohol from the fermented berries!

D. Crosby

DO YOU JUST WANT ELECTRONIC MAIL?

Thank you to all of you that have provided your email address to become part of our listserve. A number of you have requested that we send you only electronic versions of our calendar, fliers, and newsletter. We are in the process of changing our membership database, so that we can send paper mail just to those who want it. Those who just want electronic reminders will be sent a link to our electronic fliers and newsletter at the Center for Plant Diversity website (herbarium.ucdavis.edu). If you would like to be added to the listserve, please email our membership listserve coordinator, Kate Mawdsley, at wfm-kfm@pacbell.net.

LASTHENIA

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