The Friends of the
Edwin & Frances Hunter ARBORETUM
at PALOMAR COLLEGE

Issue #12 · April 10, 2018

NEWSLETTER

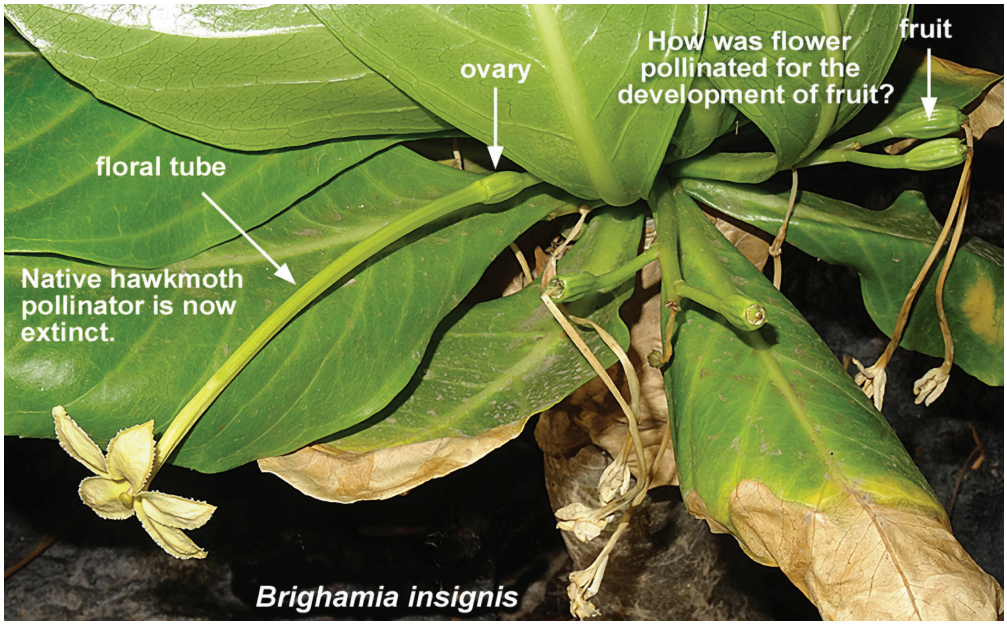
WHO POLLINATED THE RARE HAWAIIAN ALULA?

by W.P. Armstrong

Alula (Brighamia insignis) is a rare member of the lobelia family (Campanulaceae) endemic to steep sea cliffs on the island of Kauai. As of the year 2000, fewer than 100 of these remarkable plants grew in the wild. Alula can no longer produce seeds because its pollinator moth is now extinct. Luckily it responds well to hand pollination. Like the California condor, this unique species has been brought back from the brink of extinction through breeding programs at botanical gardens.

A remarkable phenomenon occurred in the Polynesian Garden at Palomar College. An alula plant produced fruit capsules with viable seed and it was not hand pollinated by horticulturist extraordinaire & Arboretum president Tony Rangel! Its pollination mechanism remains a mystery – could it be another local long-tongued hawkmoth or a hummingbird?

Hawaiian Alula plants growing on artificial lava rock in the Polynesian Garden.



This alula (Brighamia insignis) produced fruit capsules with viable seed and it was not hand pollinated. Its pollination is a mystery--could it be another local long-tongue hawkmoth or a possibly a hummingbird?

INSIDE THIS ISSUE

COMMITTEE MEMBERS

All plant photos by Wayne Armstrong ©

The leaves on this red maple (Acer rubrum) in the Palomar College Arboretum turned bright red without any frost in October-November 2017.

Alaska Cedar (Xanthocyparis nootkatensis) near Government Camp, Oregon.

THE TRUE CYPRESS: TREES THAT TRULY QUALIFY AS CYPRESS

by W.P. Armstrong

In 1966 I wrote a Master's Thesis entitled Ecological and Taxonomic Relationships of Cupressus in Southern California under the direction of Dr. R.J. Vogl, California State University, Los Angeles. Much of my thesis was published in chapter 9 of Terrestrial Vegetation of California, edited by M.J. Barbour and J. Major, University of California, Davis. California is a remarkable state, botanically speaking, because we have 10 species of cypress.

True cypress belong to the genus Cupressus in the cypress family (Cupressaceae), along with junipers (Juniperus), false cypress (Chamaecyparis), incense cedar (Calocedrus), arborvitae (Thuja), Alaska cedar (Xanthocyparis), and the Australian cypress pine (Callitris). All these genera represent separate branches (clades) in computer-generated phylogenetic trees. A number of genera formerly assigned to the taxodium family (Taxodiaceae) have been merged into the cypress family, including redwood (Sequoia), giant sequoia (Sequoiadendron), dawn redwood (Metasequoia), and bald cypress (Taxodium). The principle exception is the genus Sciadopitys (Japanase umbella pine), which was found to be completely unlike the Cupressaceae, and is now placed in the monotypic family Sciadopityaceae. Modern taxonomists consider DNA sequencing to be more reliable for the differentiation between families. All these changes drive old botanists like myself crazy!

The modern classification of true cypress (Cupressus) is especially fascinating if you enjoy plant taxonomy. In October 1999, a new cypress species was discovered in northern Vietnam. It was named Xanthocyparis vietnamensis. [The name Cupressus vietnamensis also appears in some garden references.] Surprisingly enough, its closest relative was found to be the Alaska cedar (formerly Chamaecyparis nootkatensis syn. Cupressus nootkatensis), separated by thousands of miles and on opposite sides of the Pacific Ocean. The two species were so similar that the authors combined them generically, and the Alaska cedar became Xanthocyparis nootkatensis. The Alaska cedar forms spontaneous, fertile hybrids with Cupressus species when these are grown together in botanical gardens. In fact the cultivated Leyland cypress (Cupressocyparis leylandii) is a hybrid between the Monterey cypress (Cupressus macrocarpa) and the Alaska cedar. Coastal populations of Monterey cypress are resistant to corneum canker; however, trees planted in the interior valleys are very susceptible to this fungal disease. It is interesting to note that the Leyland cypress has also acquired this fungal susceptibility from its cypress parent. Evidence from DNA and morphology indicates that the Alaska cedar and the Vietnam cypress are closely related to the New World species of Cupressus which are genetically distinct from the European and Asian Cupressus. So guess what?! The cypress of California and Mexico are now in a new genus Hesperocyparis.

The Jepson Flora of California (2nd Edition) lists 10 species of Hesperocyparis (formerly Cupressus), although some species have been reduced to varieties or subspecies by various authors. According to some botanists, disjunct species of cypress in California and Arizona have not been isolated long enough to warrant the status of a species. For example, species

with glaucous, glandular foliage have been named subspecies of the Arizona cypress (H. arizonica). California cypress occur in isolated groves from the mountains of San Diego County to the Modoc Plateau of northern California. They also occur in Arizona, Baja California, and mainland Mexico. In my opinion, they are fairly distinct when you see them in their natural habitats, but in a botanical garden like the Palomar College Arboretum they are difficult to identify. The key to species in the Jepson Manual uses leaf and seed cone characteristics, persistent vs. exfoliating bark, and shape of crown. If all these characters are not available, good luck in determining the exact species unless you have access to a DNA sequencing lab!

Phenotypic variability between different isolated groves of the same species may be due (in part) to genetic drift. These differences include slight variations in foliage and the general shape of seed cones. Differences attributed to genetic drift are analogous to racial differences in people, such as different blood type percentages and facial characteristics.

Millions of years ago, cypress woodlands containing one or more ancestral species once dominated vast areas of California. During the past 20 million years, as mountains were uplifted and the climate became increasingly more arid, most of these extensive cypress woodlands vanished from the landscape. In some areas, the cypress were probably unable to compete with more drought resistant, aggressive species, such as impenetrable chaparral shrubs and desert scrub. Although cypress are fire-adapted with serotinous seed cones that open after a fire, they are vulnerable if the fire interval occurs too frequently, before the trees are old enough to produce a sufficient cone crop. Chaparral shrubs quickly resprout after a fast-moving brush fire from well-established subterranean lignotubers. This may explain why some cypress groves occur in very rocky, sterile sites with poor soils where the chaparral shrubs can't compete as well.

The present-day world distribution of Old World cypress (Cupressus) includes Africa, Middle East and eastward along the Himalayas to China and North Vietnam. For thousands of years, Italian cypress (C. sempervirens) and mourning cypress (C. funebris) have been grown as ornamentals in the Mediterranean region and southern China. The beautiful, weeping Kashmir cypress (C. cashmeriana) has been cultivated around Buddhist Temples in Sikkim, Bhutan, Assam and nearby areas of Tibet and India. In Rome, the Church of Santa Sabina was built in the 5th century AD. The original door was made of Italian cypress with intricate carvings illustrating scenes from the Old and New Testaments. Whether or not cypress wood was used in the construction of Noah's Arc (Genesis 6:14) has been debated by biblical scholars for centuries. Italian cypress grew abundantly in the Middle East, and the seasoned timbers were very durable.

The cypress are a complex genus of cone-bearing trees that still challenge botanists. Based primarily on leaf characteristics, where they were purchased, and Grounds Supervisor Tony Rangel, I am reasonably certain about 5 species of New World Hesperocyparis in the Palomar College Arboretum: Tecate cypress (H. forbesii), smooth-bark Arizona cypress (C. glabra), Gowen cypress (H. goveniana), Monterey cypress (H. macrocarpa), and San Pedro Martir cypress (H. montana) of Baja California. We also have two Old World cypress: Italian cypress (Cupressus sempervirens) and weeping cypress (C. cashmeriana).

But of all the true cypress, my favorites are the California & Arizona native species in remote, isolated groves, appropriately called "arboreal islands."

THE FROST MYTH: RED MAPLE IN ARBORETUM!

by W.P. Armstrong

The leaves of deciduous trees fall from the branches during the autumn months, thus preparing the trees for their winter dormancy period. As days grow shorter a special layer of cells develops at the base of the petiole. This "abscission layer" is controlled by hormones and neatly separates the leaf from its stem, thus causing it to fall with the slightest breeze. The fall coloring of deciduous trees may involve yellow carotenoid pigments (terpenes) as well as flavonoids. In red maple (Acer rubrum) colorless flavonols are converted into red anthocyanin as the chlorophyll breaks down. Contrary to some references, bright red autumn leaves can develop without a frost. The trees are genetically programmed to drop their leaves in the fall, and red anthocyanins replace chlorophylls in the leaves.

The leaves on this red maple (Acer rubrum) in the Palomar College Arboretum turned bright red without any frost in October-November 2017.

SCHEDULE OF UPCOMING EVENTS 2018

FREE WORKSHOPS, LECTURES, AND OTHER EVENTS

Please Refer To The Online Calendar of Events: https://www2.palomar.edu/pages/arboretum/calendar-of-events

SPRING CLEANUP DAY

APRIL 21, 2018 *Saturday, 9:00 am – 3:00 pm*

Meet at the Patron's Pavilion in the Arboretum:
1140 W. Mission Road, San Marcos, CA 92069

Free parking in Parking Lot #5 for this event day and time only. Continental breakfast in the morning and lunch. Water will be provided throughout the day. Open to the public.

Please bring your own gloves, garden tools, hat, sunscreen & sunglasses. Wear comfortable and protective shoes. (no flip-flops). Please mark your tools and personal items with your name and phone number.

RSVP Tony Rangel if you would like to join this event:
arangel@palomar.edu or call (760) 744- 1150 x3122

Spring Cleanup Day in the Cactus & Succulent Garden.

CREATING FAUX ROCKS FOR YOUR GARDEN

JUNE 16, 2018 *Saturday, 10:00 am – 1:00 pm*

For More Information See Online Calendar Of Events

WALKING TOUR AT RANCHO BERNARDO CAMPUS

JULY 21, 2018 *Saturday, 10:00 am – 11:30 am*

For More Information See Online Calendar Of Events

Note to Faculty: You can receive Professional Development credit by taking our workshops, tours and lectures. Maximum of 2 hours of PD credit per semester. (PD Code #120).

Please sign-up with the Professional Development Office: http://www.palomar.edu/pd/ or call (760) 744-1150 x2250 for more information.

PAST EVENTS

BASIC TREE & SHRUB CARE
Saturday, March 3, 2018
10:00 am – 12:00 pm

TREE TRIMMING WORKSHOP
Saturday, March 3, 2018
10:00 am – 12:00 pm

For Future Dates, See Online Calendar Of Events

HELPFUL LINKS

The Morton Arboretum

American Public Gardens Association

Botanic Gardens Conservation International

www.arbnet.org