

Edwin and Frances Hunter Arboretum

Palomar College Received Generous Donation From The Hunter Family

The Palomar College Arboretum will be renamed the Edwin and Frances Hunter Arboretum after the cofounders of Hunter Industries in San Marcos. The Arboretum received an endowment of \$500,000 from the Hunter Family Fund and Hunter Industries, makers of high quality irrigation equipment and controllers.

The Hunter family came to San Marcos 35 years ago to open Hunter Industries, a global irrigation products company with 800 local employees. Ann Hunter-Welborn remembers the very moment when she decided to endow the Palomar College Arboretum in her late parent's name. While walking through the stately conifers and massive Moreton Bay and Mysore figs, she was impressed by their beauty and wanted to protect them.

In addition to Palomar College, the Hunter Family Fund has supported Center Artes at Cal State San Marcos, the San Marcos School District's Fortissimo Children's Orchestra program and North County Health Services, which operates two clinics for low-income patients in San Marcos.

The Hunter Family believes in the preservation of forests and greenbelts. "Palomar College is such a vital asset to our community, and having walked through the arboretum, it's clear this wonderful garden is important to students and is a value to the community. Green spaces are crucial to the future of our world." said Ann Hunter-Welborn. Improvements to the Arboretum are part of Palomar's Educational Master Plan, funded in part by Proposition M, approved by voters in November 2006. It will

"Green spaces are crucial to the future of our world."



include an irrigation system and wheelchair accessible trails throughout the Arboretum.



Figure 1: *Ficus pseudocarica* and *F. palmata* at test plots of UC Riverside in June 1985.



Ficus pseudocarica In Twin Oaks Valley The image (left) shows the distinctive profichi crop of syconia that mature in June. They are purple-black with a long, slender stalk (peduncle). Inside are male flowers loaded with pollen and ovaries of short-styled female flowers, each with a wingless male or winged female fig wasp. After mating, the polle-covered female wasps escape and fly to the receptive syconia of another caprifig or a female fig tree. In my yard they pollinate a "Verte- fig planted nearby, resulting in delicious figs that literally taste like candy!

A Caprifig Now Planted On Campus

This Is Pollinator For The Most Delicious Edible Figs

In the early 1980s I took a cutting from a wild fig growing along a roadside in Vista. It resembled a common fig (*Ficus carica*) except the fruits were purple and a little smaller than common figs. I compared it with fig trees grown in test plots at the University of Riverside and it appeared to be *Ficus pseudocarica*. During the 1940s through 1970s, fig authorities Drs. Ira J. Condit and William B. Storey conducted research on the taxonomy, pollination and genetics of cultivated figs. Over the years the taxonomic status of *F. pseudocarica* has been debated by botanists. *F. pseudocarica* is listed as a synonym of *F. palmata* (Punjab fig) in the [Kew List Of Plant Species \(2011\)](#).

According to Condit (1955), *Ficus pseudocarica* is native to Eritrea and Abyssinia, while *F. palmata* is indigenous to Pakistan, northern India and Afghanistan. He states that *F. pseudocarica* was introduced into Santa Barbara, California in 1902, and like *F. palmata*, was used for hybridizing with *F. carica*. In fact, the edible 'Brawley' caprifig cultivar is a hybrid between *F. carica* var. 'kadota' and a *F. pseudocarica* caprifig (Storey et al. 1977). *Ficus palmata* is commonly used in modern floras, with *F. pseudocarica* listed as a synonym. Alan Whittemore (2006) has studied herbarium collections of *F. palmata* (*F. pseudocarica*) from California and has concluded that they are misidentified and should be labeled *F. carica*. Recent DNA studies indicate that it is closely related to *F. palmata* or belongs to a *Ficus carica* species complex. I will continue to call it *F. pseudocarica* because it sure matches the tree I photographed at UC Riverside (Figure 1).

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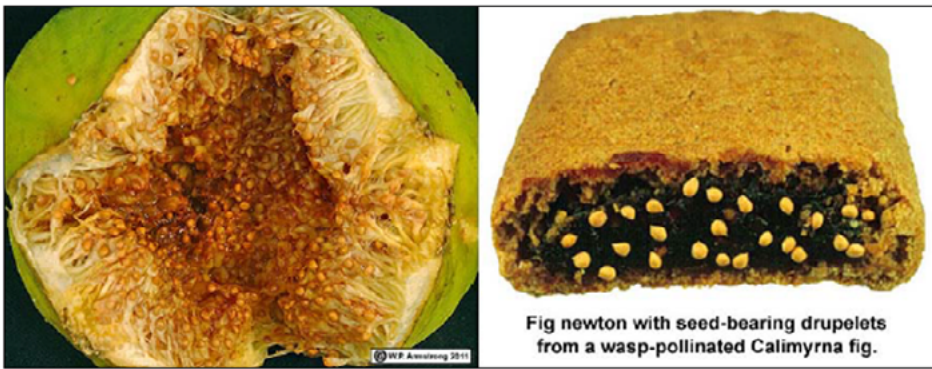


Figure 3: A wasp-pollinated Calimyrna fig containing numerous seed-bearing drupelets (minute ripened ovaries). In fact, the excessive pollination and seed production has caused the syconium to split open. The seed-bearing drupelets impart a superior nutty flavor to the fig newton (right).

According to Ira Condit's monograph on fig varieties (1955), the caprifig of this species has a distinctive profichi syconium that is purple-black in color with a long, slender stalk (peduncle). In his classic volume *The Fig* (1947), Condit describes the syconium as smaller than other varieties of *F. carica*. In *Ficus: The Exotic Species* (1969), Condit describes the twigs of *F. pseudocarica* as velvety pubescent and the twigs of *F. carica* as glabrous or only slightly puberulent when young. *F. pseudocarica* is listed as a synonym of *F. palmata* (Punjab fig) in the *Kew List Of Plant Species* (2011). It is listed as naturalized in California (under *F. palmata*) in the *Calflora Database* and *USDA Plant Database*. According to the revised *Jepson Manual* (2011), reports of *F. pseudocarica* and *F. palmata* are based on misidentified specimens of *F. carica* (A.T. Whittemore, 2006, *Sida* 22: 769-775).



Figure 2: Each June in California's hot San Joaquin Valley, paper bags containing wasp and pollen-bearing caprifigs are stapled to limbs in Calimyrna fig orchards. Only a few wasp-laden caprifig syconia are placed in the bags to prevent overpollination and split Calimyrna fruit. Inside the paper bag (right), small black wasps can be seen exiting the caprifigs.



The actual edible "fruit" of a fig tree is called a syconium--a hollow structure lined on the inside with hundreds of tiny unisexual flowers. A tiny female wasp (*Blastophaga psenes*) enters an opening on the syconium to pollinate the flowers. In *Ficus carica*, only the syconia of female trees are edible, and without pollination they typically do not ripen and fall from the branches. Male trees, called caprifigs, produce inedible syconia containing wasps and pollen-bearing male flowers. [Capri refers to goat and the syconia were apparently fed to livestock.] During the late 1800s, Calimyrna fig growers in California were puzzled why their trees would not set fruit. They discovered that the female trees needed the fig wasp and male caprifigs from the Old World.

Each June in California's hot Central Valley, bags of wasp-bearing caprifigs are placed in the Calimyrna orchards (Figure 2). This amazing pollination process is called caprifigation and the crunchy, seed-bearing syconia have a superior nutty flavor. Premium fig newtons are made from caprifiged figs and contain numerous seed-bearing nutlets (Figure 3).

My *Ficus pseudocarica* is a male tree bearing inedible syconia laden with pollen from male flowers and bearing hundreds of fig wasps. It produces three crops of syconia per year, including an overwintering crop when the tree is leafless which perpetuates the wasps during cold winter months. Tony Rangel planted cuttings from my tree in the African Garden near the Theatre Building. This is a good location since the *Ficus carica* species complex is native to colder climates of Turkey and the Middle East. The other 800+ species of *Ficus* are native to tropical continents and islands throughout the world.

There are hundreds of parthenocarpic varieties of the common fig (*Ficus carica*), including 'Mission' and 'Kadota' in which the seedless syconia ripen without pollination. According to fig connoisseurs, pollination produces a more delicious fig with a superior nutty flavor due to the seeds. The remains of parthenocarpic fig syconia in ancient settlements of the Jordon Valley indicate the people recognized natural parthenocarpic trees and propagated

Annual Crops of *Ficus carica* & *F. pseudocarica* syconia

Sex of Tree	Mature Crops Of Syconia Per Year		
Male Caprifig	Profichi (June) *	Mammoni (Fall)	Mamme (Winter)
Female Tree	1st or Breba (Summer)		2nd or Main (Late Summer-Fall)

* Only the caprifig profichi crop produces pollen, and this is used to pollinate the immature, receptive main crop in June by the action of winged female fig wasps. This main pollinated crop ripens in late summer-early fall. The mammoni crop is produced during the fall months followed by a mamme crop that remains on the leafless branches during the cold winter months. Wasps inside the mamme crop will enter the immature, receptive profichi crop in spring.

Friends of the Palomar College Arboretum Committee

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All plant photos by Wayne Armstrong ©

LINKS [More Information About Figs On Wayne's Word](#)
[Fig Species In The Palomar College Arboretum](#)
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Figure 4: The seeds of *Gigasiphon macrosiphon* resembles those of sea beans (*Mucuna*). The tough, indehiscent seed pod contains two seeds and they appear to be adapted for drifting in water.



Figure 5: A sea bean *Mucuna gigantea* ssp. *gigantea* collected on a West Maui beach on 22 November 2012. It truly resembles a miniature hamburger, especially when compared with an order of fries! I must confess that I greatly reduced the size of the plate and fries. The sea bean is only 22 mm in diameter (just under one inch).

them by cuttings more than 11,000 years ago. This may be one of the earliest forms of agriculture.

The fig and fig wasp pollination story is very complicated. It is exceedingly difficult to make a generalized explanation in front of an audience because there are so many exceptions depending on the fig species. During my career at Palomar College I have studied many

continued from *A Caprifig Now Planted On Campus*

subjects, from duckweeds, drift seeds and brodiaeas to ants; however, I must say that the coevolution of the 830 fig species and their symbiotic wasps is the most complicated and fascinating. So the next time you bite into a fig newton, think about the history of this tree and its symbiotic pollinator wasp, and how it affected our lives by providing food and itchy leaves for the first naked humans.

Fig References Cited In This Newsletter

1. Condit, I.J. 1955. "Fig Varieties: A Monograph." *Hilgardia*: 11: 323-538.
2. Storey, W.B., Enderud, J.E., Saleeb, W.F., and E.M. Nauer. 1977. *The Fig*. Jurupa Mountains Cultural Center, Riverside, California. [Available From: [California Rare Fruit Growers Market Place](#)]
3. Whittemore, A.T. 2006. "Notes On Southwestern Moraceae." *Sida, Contributions To Botany* 22: 769-775.

A Rare African Tree In The Campus Greenhouse

Gigasiphon macrosiphon: A Seed That Resembles *Mucuna*



Figure 6: Although the seeds of *Gigasiphon macrosiphon* resemble *Mucuna* species, the large blossoms are very different from the pea-shaped (papilionaceous) flowers of *Mucuna* (subfamily Papilionoideae = Faboideae). *Gigasiphon* actually belongs to a different subfamily, the Caesalpinioideae. It is more closely related to *Bauhinia* than *Mucuna*.

Horticulturist extraordinaire Tony Rangel recently germinated some seeds of *Gigasiphon macrosiphon*, a rare leguminous tree known only from moist, lowland and coastal forests of Kenya and Tanzania. According to [Encyclopedia Of Life](#) (EOL), destruction of East African coastal forests and the use of this tree for firewood, tools, charcoal and lumber has reduced its population to 33 known mature individuals in the wild. [The International Union For Conservation of Nature](#) (IUCN) assessed *G. macrosiphon* with "Red List Endangered Status" in 1997, and in a report in conjunction with the [Zoological Society of London](#) (ZSL) places this species on their list of 100 most endangered species in 2012. According to the Foster Botanical

Garden in Honolulu, Hawaii, this unusual tree may be extinct in the wild. The seeds are remarkably similar to those of tropical lianas in the genus *Mucuna*. These large woody vines are known as "seabeans" because the thick-walled, buoyant seeds are carried down streams into oceans where they float to shores of distant continents (Figure 4).

The large blossoms of *Gigasiphon* are very different from the pea-shaped (papilionaceous) flowers of *Mucuna* (Figure 6).

Gigasiphon actually belongs to a different subfamily, the Caesalpinioideae. It is more closely related to orchid trees (*Bauhinia*) than *Mucuna*.

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San Marcos, CA 92069-1487

Please make check payable to:

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

Volunteer

A Plea For Volunteers To Work In The Arboretum

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We Also Need Committee Members For Friends Of The Arboretum

On a recent road trip to Arizona, I visited the Boyce Thompson Arboretum, Tucson Botanical Garden and the Arizona-Sonora Desert Museum. One thing in common about these outstanding botanical gardens is their large, dedicated staff of volunteers. This

is true of other impressive arboretums throughout the continental U.S., Canada and the Hawaiian Islands. A handful of people is just not enough. As our Arboretum is improved with trail and irrigation systems, we also need volunteers to serve on the Friends of the Arboretum committee. Please visit the Arboretum home page for more information:

Palomar College Arboretum Web | www.palomar.edu/arboretum