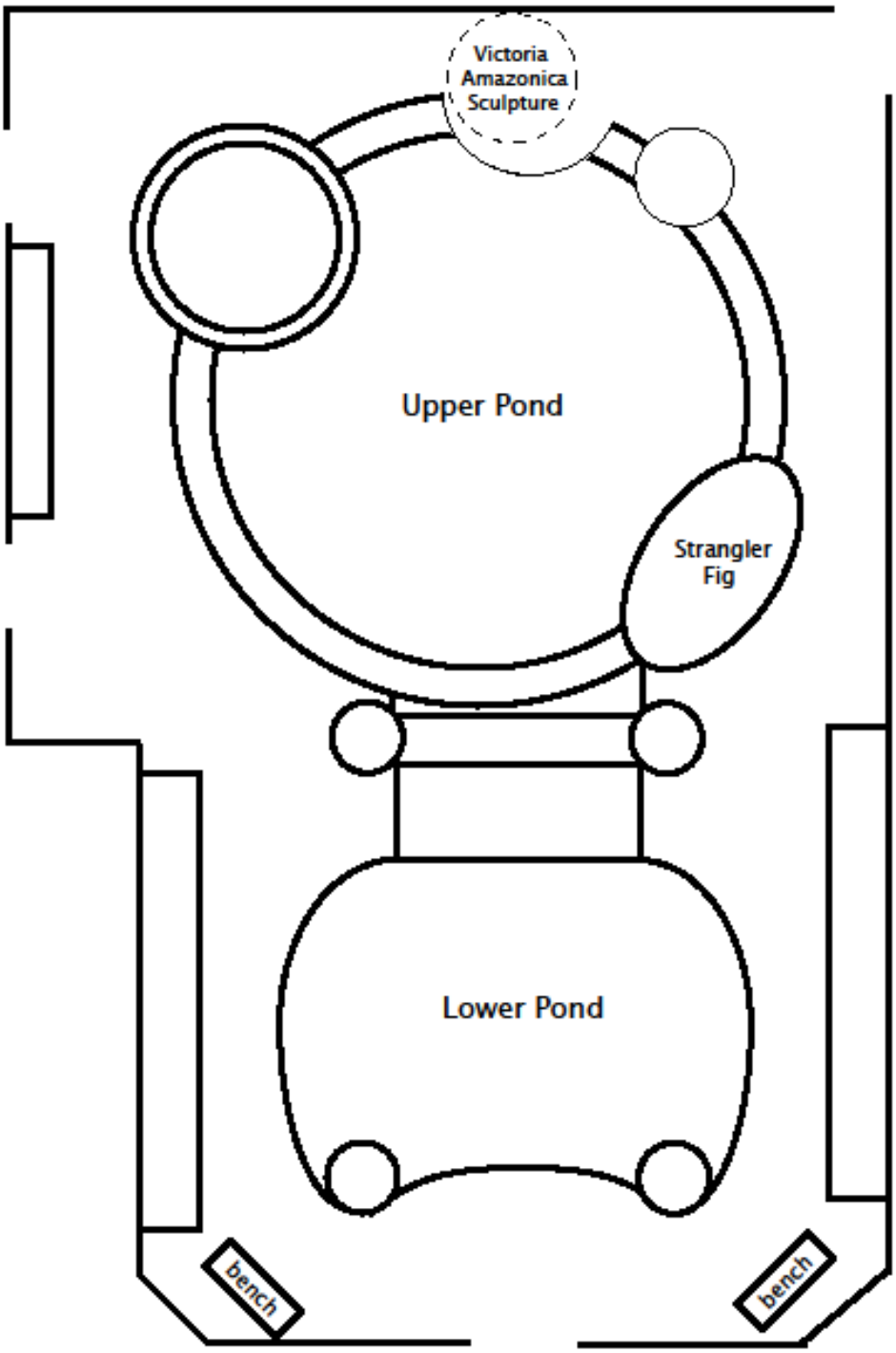
Aquatics Gallery



Aquatic Plants Gallery

The refreshing sound of splashing water excites the senses upon entering the Aquatic Gallery. Here are the Conservatory's beautiful cascading pools full of the striking plants that crowd the waterways of the tropics

Rivers in the Rainforest

From the Amazon to the Mekong, the tropics are home to some of the world's largest and most legendary rivers. All of the precipitation that makes rainforests so special also makes for some tremendous watersheds. Countless streams, creeks and tributaries feed into mighty rivers thousands and thousands of miles long.

Rivers in the tropical lowlands fork, meander in incredible twists and turns, and sometimes almost turn back on themselves. Since these rivers are in very flat areas without any significant slope and have a soft clay-like soil, there is not much to predetermine the course and the rivers snake lazily along as they wish, changing direction frequently and leaving large lakes and swamps where water once flowed.

The sheer volume of water keeps things pumping however. Mind-boggling amounts of water flow through the jungle, flooding vast areas of forest and carving great river cliffs sometimes 100 feet high. The Amazon is the most voluminous river on earth. One fifth of the world's river water flows from its mouth.

Most rainforest rivers, like the Amazon, are a muddy brown. With the vast amount of rain, sediment is constantly running off into waterways – a billion tons of it a year in fact. Torrential downpours can turn a dry creek bed into a raging river in a matter of hours, taking soil, plants, trees and even an occasional hut with it. Black water rivers are common in the tropics as well. Like deep, clear black tea, these rivers get their dark color from the quantity of dissolved vegetation they contain.

Aquatic plants grow in abundance in rainforest waterways, thriving on the sun that shines through these breaks in the forest canopy. Floating meadows are even a common site here. Great patches of floating plants can grow so densely that a whole community of small trees, shrubs, grasses, other plants and even animals can thrive aboard these living rafts. Some can reach up to a square mile in area.

The above was excerpted from Treasures of the Conservatory of Flowers by Nina Sazevich.

GEOGRAPHY / CLIMATE / COUNTRIES

This gallery features plants from the rivers, lakes, estuaries and bogs of the lowland tropics. Countries represented include: Borneo, Brazil, Ecuador, Costa Rica and India.

ARCHITECTURE / DESIGN / ARTWORK

- In this gallery the visitor will find a glass and metal Amazon water lily sculpture, a sculpted strangler fig laden with epiphytes, aerial root planters dripping with bromeliads, aroids and orchids in an ipé wood case.

- The suspended water lily sculpture allows visitors to see the bottom of a giant *Victoria amazonica* plant with its impressive structure. This species of water lily influenced Joseph Paxton's design of the entrance to the Crystal Palace built in London in 1851. The piece was created by glass/metal artist Steven Hirt. The large water lily pad is made of three layers of kiln-formed glass (green, white and magenta) and an elaborate network of cast bronze veins. The flowers are hand-blown glass supported with cast bronze stems. Each petal was individually made, then torch fused to form the flower.

- The bronze aerial root planters were created by local artist Eric Powell and rise up out of the pools to support bromeliads, aroids and vining plants. The bronze water lily ornamentations for the water jets are also Powell's pieces. Dave Tuthill crafted the elegant, iron-forged art metal railings with the water lily flower bud motif.

- The upper pool holds 9,000 gallons of water and the lower pool 4,500 gallons. The water is kept at 83 degrees.

- Master stone mason Edwin Hamilton built the stone veneer around the upper and mini pool walls. The veneer is constructed of colorful Mariposa slate, quarried from the Yosemite Valley region.

- The water in the upper pond is circulated through a coarse, in-line basket filter, a cartridge filter, biofilter, water heater, and UV chamber before being returned to the pool. The same process occurs in the lower pond without the cartridge filter. The water in both pools is seeded with beneficial bacteria and a liquid bacterial solution to combat algae.

Plant Families from the Aquatic Plants Gallery

The following pages detail some of the most popular plants found in our collection:

1. The Amazon Water Lily, *Victoria amazonica*
2. Taro, *Colocasia esculenta*
3. Pitcher Plants, *Nepenthes spp.*
4. Water Lilly, *Nymphaea*
5. Lotus, *Nelumbo*
6. Ant Plant, *Myrmecodia tuberosa*
7. Heliconia
8. Economic Plants

PLANT INFORMATION SHEET

Family: Nymphaeaceae

Botanical Name:
Victoria amazonica

Common Name(s):
Amazon Water Lily

Country of Origin: Brazil

Native Habitat: Warm, shallow waters lakes and rivers of Amazon basin, Guianas and Pantanal.

Galleries where found: Aquatics (living specimen is not always present, it is introduced to gallery in summer and fall)

This plant is noteworthy because...
It is the largest of all water lilies. COF is the first public greenhouse to display them to the public.

An interesting adaptation of this plant is…

- Large leaves that float with raised edges to "bump" against other plants so they will not be covered by other leaves or other plants, which would reduce the amount of sunlight they get.
- Small "v" shaped drain so no water remains on the leaf's surface.
- Spines under the leaves and along the leaf stalks keep manatees and fish from eating the leaves.
- The male part of the flower opens on a different day than the female part, ensuring it does not self-pollinate.

Is this plant or its native habitat endangered or threatened?
Not known to be threatened, but pollution or climate change could change its native habitat and this plant has very specific requirements for successful growth.

General Plant Description & Characteristics:
The flowers are white the first night and become pink the second night. Pollinated by beetles. The leaves are round, thick and buoyant, floating on top of the surface. Birds can walk on the leaf and feed for fish and other animals from the surface. The leaves can support up to 90 lbs if the load is evenly distributed over the entire leaf. While the support structure is very strong, the green pad is quite thin.

PLANT INFORMATION SHEET

Family: Araceae

Botanical Name:
Colocasia esculenta

Common Name(s):
Violet-stemmed Taro

Country of Origin: Tropical Asia but traveled throughout the Pacific. Reached Eqypt 200 years ago;

Native Habitat: moist or shady areas; often in water;

Galleries where found: Aquatics

This plant is noteworthy because... the corm (under ground stem) and root is eaten by many people in the tropics but must be cooked first to destroy its poison. The leaves are large and heart shaped. Because the plant is related to Anthuriums, it has the same type of inflorescence, but it is not as pronounced.

An interesting adaptation of this plant is…

- The leaves repel water.
- The stems have tubes which bring air down to the underwater roots.
- It has a compound inflorescence with lots of flowers on the spike. Usually the male flowers are on the top of the spike and female ones on the lower section. They mature at separate times to ensure cross fertilization.

Is this plant or its native habitat endangered or threatened? Monoculture planting technique, which means growing only one species, makes this plant more susceptible to diseases.

General Plant Description & Characteristics: A perennial herb with clusters of long heart or arrowhead shaped leaves that point earthward. Inflorescence is an open yellow-white calla lily like tube enclosing a spike covered by flowers.

PLANT INFORMATION SHEET

Family: Nepenthaceae

Botanical Name: *Nepenthes*

Common Name(s): Pitcher plant

Country of Origin: The greatest biodiversity is in Borneo and Sumatra, but also found in the area of Indonesia, Australia, Madagascar, Seychelles, Thailand, India, Malaysia, and Vietnam.

Native Habitat: Most grow in humid areas with high precipitation and moderate to high light levels. Found in lowland, highland and even alpine areas, there are some whose range is limited to a single mountainside.

This plant is noteworthy because...

- Leaf dimorphism: usually there are two differently sized and shaped pitchers on each plant; larger ones near base- sit on ground; smaller ones in upper part of plant and they can wrap around things with the loop in their tendril for extra support.
- At the Conservatory they trap cockroaches, ants, and gnats. We use fertilizer to augment their "diet".

An interesting adaptation of this plant is…

- Carnivory: a modified leaf to catch bugs for nutrients (self-fertilizing!).
- The slippery upper/outer lip of the cup to entrap insects.
- The lid covers the pitcher to keep rain from diluting digestive fluid.

Is this plant or its native habitat endangered or threatened? The limited distribution of some species makes them very vulnerable to extinction.

General Plant Description & Characteristics: Mostly liana (vines) forming plants. The plants are dioecious, with male and female flowers on separate plants. The flowers occur in racemes and point upward while the cups dangle downward. Flowers are smelly and are fly pollinated. Plant has to hope it will get pollinated before it eats its dinner!

PLANT INFORMATION SHEET

Family: Nymphaeaceae

Botanical Name: Nymphaea (various species)

Common Name(s): Water Lily

Country of Origin: Can be found throughout the northern hemisphere. Two species of the genus Victoria (giant water lily) can be found in South America.

Native Habitat: Waterways.

Galleries where found: Aquatics, not in winter

This plant is noteworthy because...

Water "lilies" are not related to true lilies in the lily family, nor are they related to the lotus (Nelumbo). The name Nymphaea comes from the Greek word for nymph, supernatural feminine beings associated with springs.

An interesting adaptation of this plant is…

The fruit of the genus Nymphaea sinks below the water level immediately after the flower closes.

General Plant Description & Characteristics:

The flower petals are much larger than the sepals. Leaves have a radial notch from the circumference to the petiole (leaf stem) in the center.

PLANT INFORMATION SHEET

Family: Nelumbonaceae

Botanical Name: Nelumbo (two living species, N. Nucifera and N. lutea; one extinct species N. aureavallis)

Common Name(s): Lotus, Sacred Lotus

Country of Origin: Asia, Northern Australia, and the Americas

Native Habitat: rivers and waterways

Galleries where found: Aquatics, summer only

This plant is noteworthy because...
When the flower of *N. nucifera* is fully developed, it has in its middle, a female reproductive part shaped like a flat-topped ice-cream cone or sink strainer. This structure contains 20 or so ovules (equivalent to the eggs of animals). More than 200 yellow, pollen-producing stamens (the male reproductive parts) surround the female reproductive structure and all of these are enclosed by about 20 petals.

Besides being symbolically important in Eastern religions, both Buddhism and Hinduism, the rhizome of the Lotus which stores food reserves for the plant is highly nutritious; lotus seeds are ground for flour or eaten as "nuts"; juice (latex) from the leaf stalks is used in the treatment of diarrhea; and some cultures use the large, water-repellant leaves as umbrellas.

An interesting adaptation of this plant is…

Like some other plants that depend on beetles for pollination, N. nucifera is a heat-generating plant. Heat generation comes from the female reproductive sturcture and the stamens.

General Plant Description & Characteristics:
Circular leaves (peltate) typically extend well above the water level. This is a contrast to the family of water lilies, Nymphaea, whose non-circular leaves float on the water.

PLANT INFORMATION SHEET

Family: Heliconiaceae

Botanical Name: Heliconia

Common Name(s): lobster-claws, wild plantains, false bird-of-paradis

Native Habitat: Tropical Americas, Pacific Islands west to Indonesia

Galleries where found: Lowland & Aquatic

This plant is noteworthy because...
They are an important food source for hummingbirds, some of which use the plant for nesting. The Honduran White Bat lives in tents it makes from heliconia leaves.

An interesting adaptation of this plant is…
Heliconia have special sticky threads that help in the adhesion of pollen to smooth structures such as the bill of a hummingbird.

Is this plant or its native habitat endangered or threatened? If so, what work is being done to preserve it and what can a CoF visitor do to help?

General Plant Description & Characteristics:
Heliconia are grown for their brilliant colorful flowering bracts. Breathtaking and unusual flowerheads (bracts) rise from clumps of banana like leaves, sometimes very large or slender. The colors in the genus range mostly from yellow, pink, orange to red. Inflorenceses may be erect, pendulous or spiraling with bracts in the shapes of bird's beaks, lobster claws, or fans.

Economic Plants in the Aquatics Gallery

Rice, *Oryza sativa,* Poaceae

- Southeast Asia
- Rice is extensively cultivated in warm climates where it forms the staple food of 50% of the world's population. Rice has fed more people over a longer period of time than any other crop. As far back as 2500 B.C. rice has been documented as a source of food.
- A tall-growing grass, rice can reach to six feet tall. In spite of the many different wild species of rice that have existed over the millennia, all the modern cultivated varieties are based on only two species: *Oryza glaberrima*, an annual red rice species originating in West Africa and *Oryza sativa*, the original of all Asian rice cultivars.
- There are two main groupings of *Oryza sativa* cultivars: swamp rice, the most important, requires flooding for two to three months during its growth—this is the rice we typically see in "rice paddies," and mountain, or upland rice, which requires less irrigation.

Taro, poi, *Colocasia esculenta,* Araceae

- Tropical Asia
- Taro has been cultivated for more than 6,000 years. From Malaysia to Egypt, and almost all tropical parts in between, taro is still an important source of food. The tubers are eaten baked, boiled or steamed, or cooked and mashed with water to make poi. High gluten content in the tuber is important to make quality poi. Poi is eaten fresh or allowed to ferment for a few days, often for longer, creating a sour taste considered pleasant.
- The species is thought to be a native of India and perhaps other parts of southern Asia and from there its cultivation has extended. It reached Egypt about 2,000 years ago and spread into the Pacific area in ancient times. However, it was in Hawaii that the cultivation of taro, called kalo, reached its most sophisticated level.
- In Ancient Hawaii, before 1778, about 300 varieties of taro were grown in Hawaii. In that time, earlier Hawaiians cultivated taro mixed with other species, such as *Erythrina* spp., banana, papaya, coconut, green peas, which ensure the maintenance of the health of taro species. The 20th century brought the monoculture technique, which made taro very much susceptible to diseases. Now, in the 21st century there are only seven to 12 varieties in the taro family. Ancient taro fields can be seen in the Hanalei Valley, Kaua'i, and the remains of others are found in remote areas, now uninhabited, such as Na Pali Coast of Kaua'i.

Pineapple*, Ananas comosus,* Bromeliaceae

- South and Central America
- The pineapple was first farmed in the high plateaus of central South America, where it was widely planted for its fiber and fruit. Pineapple was called “Anana,” which means “excellent fruit”. Highly regarded for its intense sweetness, it was a staple of South and Central American Indian feasts.
- The pineapple is poisonous until it ripens, severely irritating to the mouth and throat. This adaptation prevents the fruit from being consumed before the seeds are ready.
- In Europe during the 1600s, the pineapple was so valuable and prized that King Charles II of England posed for an official portrait receiving a pineapple as a gift. Wealthy Europeans rented pineapples by the hour to be displayed as centerpieces in their party buffet arrangements. The pleasure of actually consuming the pineapple, after it had been rented to dozens of parties, was the ultimate symbol of affluence.
- Today Hawaiian plantations produce almost a third of the world's crop.

Banana, *Musa sp*.

- All the above-ground parts of a banana plant grow from a structure usually called a "corm". They are often mistaken for trees, but what appears to be a trunk is actually a "false stem" or pseudostem.
- Each shoot flowers only once and then it dies. At the Conservatory, we cut down the shoot before it dies and allow the offshoot to mature and grow fruit.
- When a banana plant is mature, the corm stops producing new leaves and begins to form a flower spike or inflorescence. Dark red bracts peel away reveling rows of flowers. The top rows are the first to be exposed. They are female and grow into bananas. The bottom rows are male.
- Cavendish bananas (*Musa acomindata*) are the most common cultivar found in grocery stores. Cultivated bananas are parthenocarpic – the flesh of the fruit swells and ripens without it’s seeds being fertilized. Parthenocarpy literally means “virgin fruit”. Seedlessness is seen as a desirable trait in edible fruit with hard seeds such as watermelon, clementines, and grapefruit. Cavendish bananas are triploid, meaning it has three sets of chromosomes. Instead of having one set of chromosomes from each parent, it has two sets from one parent and one set from the other parent. Triploids seldom produce eggs or sperm that have a balanced set of chromosomes so successful seed set is very rare. Triploids cannot produce a functional seed, but they still develop good fruit through parthenocarpy.