

Victoria 'Adventure' — The New Kid

by Kit Knotts
photos by Ben & Kit Knotts

There's a new kid on the Victoria block, the spanking new hybrid 'Adventure.' It is the reciprocal of 'Longwood Hybrid,' and has long been considered an "impossible" cross. But it does exist! And it is blooming! And it is different!

The giant water lily *Victoria* has captured the imagination of the world from the very first glimpse of it in its wild South American home in 1801. Named for Queen Victoria, it was nearly 50 years later that it was first brought to bloom in "captivity" in England, inspiring a wave of enthusiasm for its size and the beauty of its flowers.

There are two species in the magnificent genus *Victoria*. *V. amazonica*, once called *V. regia*, grows in quiet pools and inlets of the mighty Amazon River. *V. cruziana*, also called *V. trickeri*, inhabits cooler climates of Argentina, Bolivia, and Paraguay.

Amazonica, from its tropical home, tends to have

larger, redder pads with rather low rims. *Cruziana* is greener, has higher rims, and is more tolerant of cooler temperatures than its equatorial cousin. All *Victoria* are night blooming, scenting the afternoon and evening air with their pineapple fragrance in anticipation of the first night flower, huge and white. The second night *cruziana* is delicately flushed pink. *Amazonica* becomes cotton candy pink to ruby red depending on the individual plant.

In 1961 Longwood Gardens' Patrick Nutt successfully made the first, and until now, only cross of the two species with *cruziana* as pod parent and *amazonica* as pollen parent. The resulting *V.*'Longwood Hybrid' possesses the best attributes of both parents — large pads with nice rims and a reddish edge and the tolerance of cooler temperatures of *cruziana*. In general, the pads are larger than either parent and it tends to bloom earlier, making it the ideal display plant for botanic gardens around the world.

An expedition to the Amazon in the spring of 1998 led to greater availability of *amazonica* seeds, allow-



Victoria 'Adventure' (*V. amazonica* x *V. cruziana*) first night flower still open the next morning.



Victoria 'Longwood Hybrid' (*V. cruziana* x *V. amazonica*, Patrick Nutt) first night flower the next morning.

ing more of us to grow parent plants for making 'Longwood Hybrid' and to experiment with other possible crosses. (See *Pond & Garden*, Issue #3 for Rich Sacher's tale of this quest.)

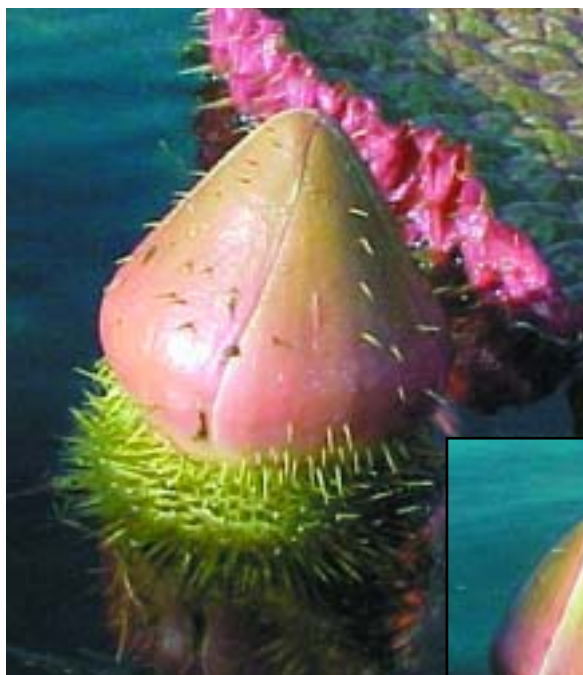
The reciprocal cross to 'Longwood Hybrid,' *amazonica* as pod parent and *cruziana* as pollen parent, was successfully made in 1998 in three different locations, here in Cocoa Beach, Florida, by my husband Ben and me, in Greenwood Village, Colorado, by the *Victoria* Conservancy's Trey and Nancy Styler, and in St. Louis at the Missouri Botanical Garden by Joe Summers.

How did two hobbyist water lily growers in Central Florida become so hooked on *Victoria* that we wanted to try crossing them? That's easy when you have a friend like Rich Sacher of American Aquatic Gardens, New Orleans, Louisiana. Rich knew that our single *Victoria* each year produced lots and lots of seeds with no help from us and urged us to try growing the

two species to cross. The project mushroomed when we decided to build a special pond, "Reflection," on the ocean side of the garden especially for five *Victoria*.

Rich, a master at starting babies, jump-started our season by sending us a *cruziana* grown from seeds from Longwood Gardens, an *amazonica* from seeds collected in the wild, and 'threw in' a 'Longwood Hybrid.' Stan Skinger provided wild *amazonica* seeds (as well as inestimable support) from which we grew two more plants. Walter Pagels sent us sprouted seeds from his long-selved *cruziana*, adding two more plants to the mix.

Through sheer ignorance of how others hybridized, we developed new, quick, highly effective techniques for crossing the *Victoria*. Ignoring conventional wisdom, we tried every cross we could think of and at varying times. Over our very long growing season, we produced more than 18,000 seeds from 200 flowers



Bud of V. 'Adventure'



Bud of V. 'Longwood Hybrid'

on the seven plants, which included the seeds for the new hybrid.

When we sent all of our surplus seeds to the Conservancy, we asked for the right to name the new hybrid if it proved out



Petals: V. 'Adventure', top; V. 'Longwood Hybrid', bottom

and were urged to go ahead and name it based on having produced the seeds. We have called this incredible journey through construction, propagation, basic botany, anatomy and floral 'surgery,' helped by a worldwide E-mail net-

work of friends through every step, our 'Adventure.' It seemed the right name for the new hybrid. When we discovered that the Stylers and Joe Summers had also made the cross successfully, we asked if they would join us in the naming, and they agreed.

Our seeds proved viable, as did the Stylers' and the Summers', the first one sprouting spontaneously in a jar on our kitchen counter. Even as seedlings, they appeared a little different from the species and the 'Longwood Hybrid.' As floating leaves developed, they could be identified by color.

'Adventure' here in Cocoa Beach is growing directly beside 'Longwood Hybrid,' both with the same parent plants, just reversed. 'Adventure' has 25% larger pads than 'Longwood Hybrid' with somewhat lower rims relative to pad size. The 'Adventure' pads have a more olive cast to the green upper surface and a deeper maroon rim. This plant and others reported achieved mature size and bloomed sooner from germination.



Sepals: V. 'Adventure', left; V. 'Longwood Hybrid', right



Victoria 'Adventure' second night flower at 7 p.m.

Where 'Longwood Hybrid' buds are rather squat and rounded, 'Adventure' buds are more slender and pointed, darker, and have more thorns. These are clues to what the forthcoming flowers will look like. And did we watch them closely when we first saw them! Of course, it rained on the first flower.

'Adventure's' flower is larger than 'Longwood Hybrid's' by about an inch because of narrow, tapering petals as compared to 'Longwood's' wider, rounded petals. In the flowers sacrificed to the cutting board, 'Adventure' had more, though thinner, petals. The second night flowers of 'Adventure' take their color from the particular *amazonica* parent, pale to dark pink, whereas 'Longwood Hybrid' is medium pink.

We hope 'Adventure' will enjoy just a measure of the renown of Pat Nutt's famed 'Longwood Hybrid.' His pioneering has led us

to this adventure, and his hybrid has mothered two more: 'Discovery' and 'Challenger.' Until now such crosses having been considered *really* impossible because of uneven chromosome numbers. They, too, are alive and growing. In the *Victoria* world, never say never!

Kit Knott has three loves in her life: husband Ben, of course, her Lippizaners, and hers and Ben's many water gardens and the aquatic life therein. P & G is grateful for Kit's sharing part of that love and its fruit V. 'Adventure' with all of us. Congratulations Ben and Kit, Nancy and Trey, and Joe! Well done!



One large seed pod collected during the Amazon River trip in 1998 contained over 1,000 seeds. After cleaning the seeds, they were stored in water. Photo by Rich Sacher

The Chicken or the Egg?

In retracing our steps through the “adventure” that led to the creation of *Victoria* ‘Adventure,’ where do we begin? With starting seeds or making seeds? In real time, we made the seeds first, bumbling our way to discoveries that explode many myths and previously held beliefs about *Victoria*. The “we’ll try anything” attitude we developed in the summer of 1998 led us to try new methods of starting seeds and growing seedlings that have proved to be far more successful than previously accepted methods. And now our crosses have produced live, blooming, verifiable plants.

We are not scientists, just enthusiastic explorers fortunate enough to live in a climate that makes almost year-round experimentation possible. We have carefully documented every step and have kept detailed records of results, available to anyone. We have encouraged the direct participation of other *Victoria* enthusiasts who can attest to our verac-

ity, but we make no claims beyond our own experience.

Where do ideas come from? In this case they have come from the synergy of a large group of people, many who may not even realize how much they have helped us. We are not saying they agree with us, support us, or, in some cases, even believe us, but we want to say thank you to all of them, most especially Rich Sacher, Stan Skinger, and Nancy Styler.

Others who have been part of the synergy are Guillermo Angulo, Paula Biles, Dr. Monroe Birdsey, Nancy Coile, Gary Davis, Bill Frase, AJ Hicks, Jack Honeycutt, Tim Jennings, Andre Leu, Pat Nutt, Walter Pagels, Yosef Porat, Rob Robinson, Dirk Rosenburg, Betsy Sakata, Dr. Ed Schneider, Joe Summers, Jim Thiele, Cyndie Thomas, and Butch Weaver.



V. ‘Adventure’, foreground; V. ‘Longwood Hybrid’, rear

The Secret to Starting *Victoria* Seeds — Open the Door!

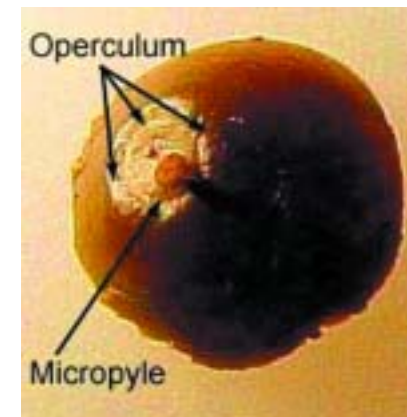
Growing *Victoria* begins with starting babies from seed, and those seeds are historically difficult to get going. It makes sense that Mother Nature would find ways to protect an aquatic seed from predators, pathogens, and rot in an ever-changing and sometimes harsh environment. But those same protections make it difficult for those of us who want to cultivate it in the pampered luxury of our gardens! We who strive to grow *Victoria* have all experienced the anxious waiting for a single seed in 10 or 20 to make its beautiful white nub in water or to display a tiny filiform leaf emerging from the soil, as we exclaim with great joy at that single event.

Nancy Styler has developed a method of germinating *Victoria* seeds in water which is very successful for her. Germinating in water rather than in soil offers the benefits of saving space and being able to watch the seeds develop into seedlings. We adopted that method for our own germination this past year. In short, we placed seeds in small perforated plastic bags with tags and a marble for weight in a five-gallon aquarium. The aquari-

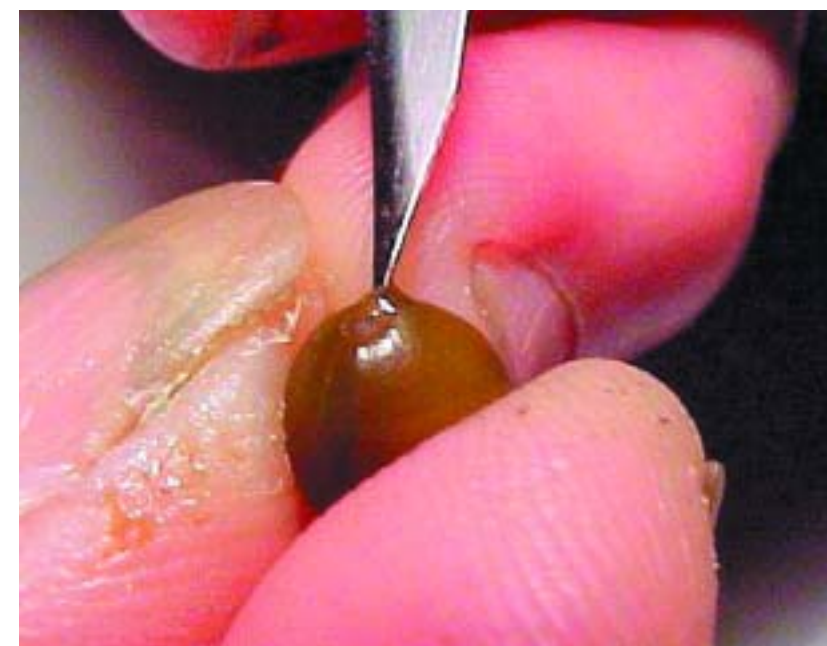
um was in a sunny window but had a submersible heater to maintain the water at 85 degrees at night, as well as an airstone for circulation and oxygenation. Our initial germination rate was an abysmal 6%, even after many weeks “cooking.”

If you look carefully at the pea-sized seed, it is eggshaped and smooth. At the small end of the egg is the point where the seed was attached to the pod. As the seed coating matures and hardens, this spot makes itself into a little trapdoor. The embryo is directly beneath it with the rest of the seed containing food for the future sprout.

If you carefully remove the “door,” really called the operculum, with the tip of a scalpel or an exacto knife, chances of germination are greatly improved, usually in 3-7 days. For brevity, we call this “nicking.” Carefully



Labeled picture of the trapdoor.



Opening the trapdoor.



Seedling aquarium from above.

sanding away the door also improves sprouting.

The subject of scarifying *Victoria* seeds has been bounced around for many years with most growers finding it unsuccessful. Scarifying, or various methods of penetrating the seed coating, is random in placement. The method we are discussing here is very specific, penetrating the seed coating at the operculum and at the operculum only.

In our experiments here, we saw germination of seeds with the operculum removed in 1-20 days with the most at 4-5 days. We think that those nicked at or near the time they go into 85 degree water germinate at a higher rate than those nicked after they have "cooked" for a period of time. For those that didn't sprout within a few weeks, we repeated the operation or simply ran the tip of the scalpel around the opening again with a resulting flurry of new sprouts within days.

Though a low but considerably improved rate of germination (from previous methods) of the seeds collected in the Amazon in 1998

affected our overall percentages, we have been very pleased with the results. Of 338 seeds started, 20 (6%) germinated without nicking, a somewhat misleading number as we nicked later batches at the outset. 230 (68%) made initial nubs. Of the 250 seeds sprouted (overall 74%), 182 went on to make at least filiform leaves (54%). The remainder either did not develop beyond nubs or made what appeared to

be a pair of tiny leaves and nothing more. *Amazonica* yielded the fewest filiforms at 33% and *cruziana* the most at 85%.

These methods were highly successful for us. Not only does the high rate of germination allow us to start fewer seeds, but the speed of sprouting allows us to plan our timetable of growth and installation with far greater accuracy than with previous methods.



Seedling aquarium from above.

Growing Those Babies On

Now we have those beautiful nubs protruding through the "open door." We remove them from the bags to their own little cup with a tag in a second aquarium set up just like the first one. We use a second aquarium because we don't want the seeds affected by the fertilizer we give the seedlings when we plant them.

The first leaf, the filiform, looks like a thin blade of grass. The next two leaves, produced 3-14 days from germination, are called hastate leaves and are shaped like arrowheads. By that point, roots are developing. The first floating leaves, produced at 17-29 days, are pointed and lobed. Subsequent leaves become rounder and more characteristic of the adult

plant.

We have experimented with different times and depths of planting the seedlings. We found that a higher rate of seeds with nubs did not develop when planted at that stage (before filiform and hastate growth) than those left in water to acquire further growth. The best time for planting seems to be at first hastate stage. We also found that seeds with either nubs or filiforms, planted 1/2" to 1" in the soil, developed much slower than those planted nearer the surface of the soil.

We use "yard dirt," our just-better-than-beach sand, washed to remove excess salt, for the seedlings. Since there is really no nutrient in the soil, we add fertilizer right away. Those with good soil or clay probably wouldn't have to do this. We plant initially in two-ounce

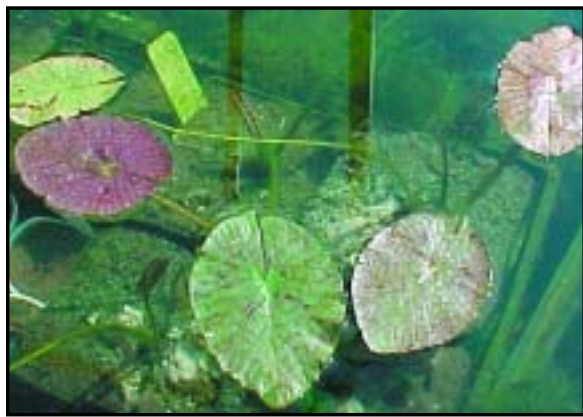


Seedling with one floating leaf, seed still attached.

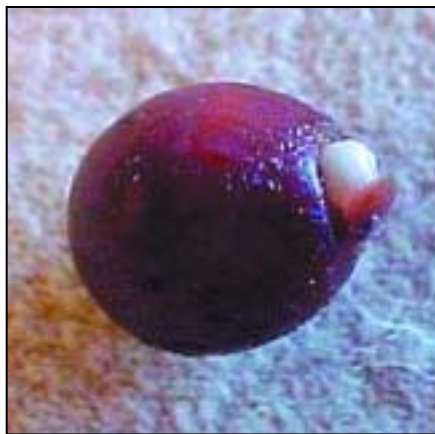
plastic cups. We leave these in the aquarium until the second floating leaf develops. Then they go into a small, heated, seedling pond outside in full sun, and we fertilize them again.

A note here about the aquarium water — we do use a dechlorinator and do adjust pH to nearly neutral. We found water changes unnecessary once we began to add Cycle, a product made up of multiple beneficial bacteria. Algae and high nitrite levels subsided and the seedlings thrived.

Once outside, light, warm water and regular fertilizer soon necessitate boosting the seedlings to larger pots. We use 4" square



Seedling with floating leaves, *Victoria* "Challenger" (*V.* 'Longwood Hybrid' x *V. cruziana*)



Seedling, Day 1



Seedling, Day 3



Seedling, Day 5

plastic pots heavily lined with newspaper so that the root ball isn't disturbed in the next move. We have found seedlings that develop the fastest are generally the strongest.

About the time these youngsters have 8" leaves, they really take off, growing very rapidly until they are ready to bloom. Then pad size seems to stabilize and sometimes shrink. The

Floral Anatomy Lesson

In late August 1998, we were able to persuade Stan Skinger to spend a week with us. He brought along all the material available on *Victoria* sent to him largely by Walter Pagels. One of our goals for the week was to dissect, photograph, and identify the flower parts in a way understandable to us non-botanists. We settled on "The Floral Anatomy of *Victoria* Schomb.(Nymphaeaceae)" by E.L. Schneider as our primary reference.

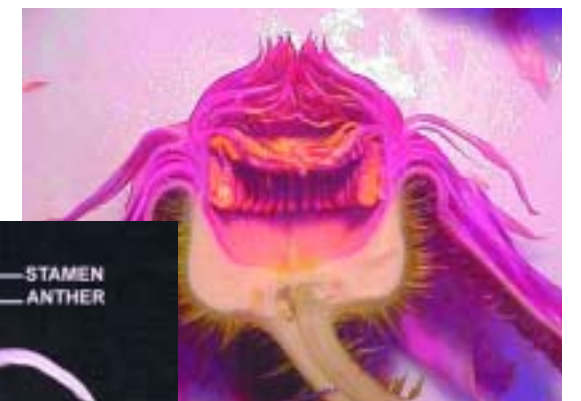
Halving a *cruziana* and an *amazonica* flower side by side revealed stunning differences in the shapes and colors of the interiors. A few nights later we cut open a 'Longwood Hybrid' which showed characteristics of both parents with *cruziana* traits the much stronger. We were finally able to label a photo with all the parts important to us.



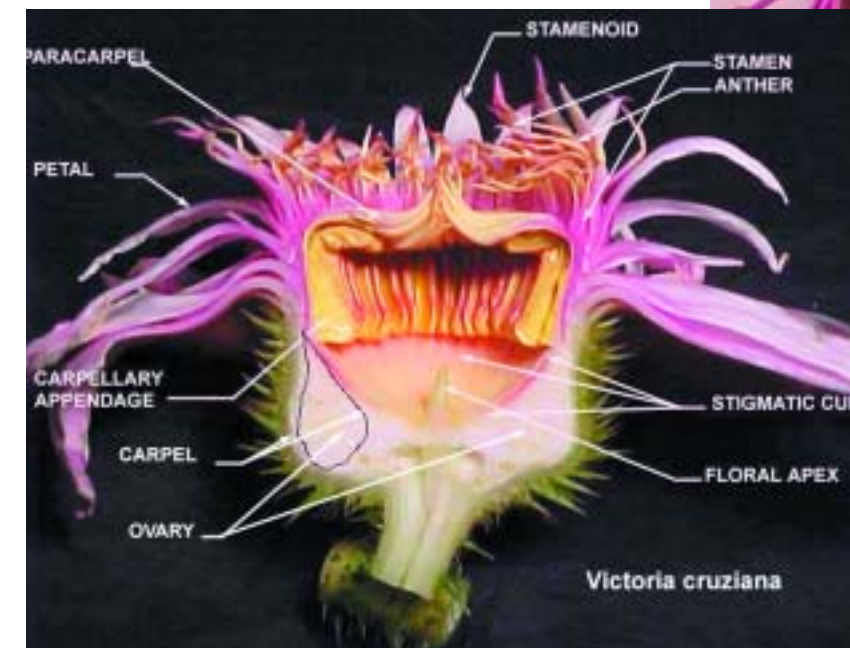
Halved *cruziana*



Halved *amazonica*



Halved 'Longwood Hybrid'



Victoria floral anatomy based on Schneider's study

Go By the Book? Rewrite It!

Since the goal of our “adventure” was to make seeds, as beginners at pollinating *Victoria* (or anything else for that matter!), we read what we could find on the subject, which was precious little! Knowing we would have plenty of flowers to work with, we allowed the early ‘Longwood Hybrid’ and one *cruziana* to self-pollinate with no help from us, as we had done in previous years. When the largest *amazonica* began to bloom, we began to hand-pollinate.

Our first attempt to emasculate the “mom” flower was “by the book” — waiting for the first night *cruziana* flower to open at near dark, removing stamenoids and stamens one by one, accidentally dunking the flower in the water trying to push through the paracarpels, and drying it before we brought the *amazonica* pollen. After waiting until 10 p.m. for the second night *amazonica* flower to open fully to collect the pollen, we gently introduced the pollen (as instructed), struggled to close and wrap the flowers in cheesecloth, couldn’t get the rubber bands to stay on, and were exhausted. In spite of everything, the *amazonica* x self yielded 183 seeds and the *cruziana* x *amazonica* yielded 172. But there had to be a better, easier, earlier way!

Because we were at this point very unsure about how written, often conflicting, references to the flower parts related to variously labeled drawings and to the real thing, we decided the only safe way to emasculate was to remove *everything* and to do so before the first night flower opened. This actually proved to be quite easy! Here’s how to do it:



At about 6 p.m., we begin with the first night flower chosen for pollination, in this case *cruziana*. Having peeled back the sepals, we make a vertical cut from the base of the petals on one side, up and over the top to the base of the petals on the other side. We then remove half of the petals.



This exposes the stiff stamenoids.



We then make a horizontal cut at the upper tips of the carpellary appendages, their location felt by putting a finger through the center of the stamenoids. We remove the wedge.



That allows easy access to remove the rest of the stamenoids, stamens, paracarpels, and upper tips of the carpellary appendages.



The stigma is neatly exposed for immediate pollination as a first night flower, or “balled” and covered to prevent accidental pollination, for second night pollination.

Another happy accident led us to discover that, even though the stamenoids of the second night “dad” flower are still clamped down tight at 6 p.m., the pollen is already shedding from the anthers within and is fully viable! No more tripping through the Victoria thorns in the dark! All pollinations can be accomplished in daylight hours. And here’s how....



1 A second night *amazonica* will provide the pollen. By 6 p.m. the petals are open, but we must peel or cut away the stamenoids, popping them off close to their base in order to access the anthers beneath that are dehiscing pollen.



2 We clip away about 70% of the anthers, for the “mom” *cruziana* and other pollen recipients or storage, which exposes the paracarpels.



4 We clip the remaining anthers and paracarpels into the stigma to self pollinate this flower, rub vigorously, “ball” and cover the flower with cheesecloth and tag.



5 Returning to the emasculated pod parent, we put the anthers from the pollen parent in the stigmatic cup and rub it in.



(left) We ball the flower, easy with half of it removed!

(right) We secure it with cheesecloth and rubber bands. Tag it, and we’re done.

In a day or two we remove the cheesecloth, allowing the flower parts to rot away naturally. When we approach rupture time, we place a perforated plastic bag around the pod.



Encouraged to make every possible cross, whether it had met with success in the past or not, we let the availability of flowers determine what we tried. They all produced seeds, and now plants. Though the “rule book” said that, even in self-pollinating, second night pollen should be stored for the next first night flower, we never did it. Knowing how well our previous Victorias had selfed on their own, we elected simply to cut the anthers into the cup on the second night. These second night selfs produced far more seeds than crosses to first night flowers, so we decided to try some crosses to second night flowers, emasculating the recipient the first night. These second night to second night crosses consistently produced far more seeds than the conventional second night to first night crosses.

Having read that the flowers sometimes contained nectar (and having gotten water in them a few times by accident), we made some of the early pollinations swirling a little pond water in the stigma with the pollen, still wanting to be gentle with the stigmatic surface. This proved to be a mistake, yielding only partial pods. We actually did have nectar in one flower, left it there for the pollination and compared it to before-and-after flowers; the result was poor. Rain did not seem to affect seed set, as long as the stigma was kept dry during pollination and the flower was well “balled” and wrapped afterward.

We wanted to know if insects had any part in the seed set of flowers that we allowed to self with no help, and we often needed to protect flowers from accidental pollination by others while allowing them to open and to be enjoyed. Gauze picnic umbrellas (kept from sinking by attaching fishing floats to the corners) proved to be our answer. We found no evidence of insect participation in the pollination process.

We don’t know for sure if, in self pollination

with no help from us, the pollen simply falls into the stigma as the anthers dehisce, if it is pushed there by the closing of stamenoids and petals, or if, as reported in one somewhat obscure reference, the flower gives itself a “perceptible jerk” before it closes. Though beetles seem to play a role in self and cross pollination of flowers in the Amazon, Walter Pagels and Butch Weaver report finding no beetles at all in or around *cruziana* flowers on their recent expedition to Argentina.

But the beetle participation in the Amazon brought about another leap in rule breaking. Those trapped beetles tear up the inside of the flower, so why are we gently using camel hair brushes to spread pollen onto the stigmatic surface? Vigorous rubbing of the pollen into the stigma again improved seed set.

We tried storing some pollen, wrapped in tracing paper inside a ziplock bag, placed in the door of the refrigerator. Storage of 4 days produced 108 seeds and storage of 5 days produced 203, both pods on the same plant. We attempted 6 days, but the flower dunked itself between emasculation and pollination, wetting the stigma, and did not set. Techniques are being brainstormed for experiments this year in extending storage time beyond five days.

Pod “behavior” was consistent plant to plant. Those successfully pollinated soon developed a “crook” in the stem holding the pod upright as they sank gradually to the bottom. The pods then rotated downward, the stems lengthening gradually through pod development. As they neared maturity, they rose to the surface for the last several days and then the stems sank abruptly to the bottom, floating the seeds right into our ziplock vegetable bags. (Perforated plastic bags are available in gallon size; we poke little holes in smaller ziplocks for lily seed collection. Either works fine.) A remarkable exception to this occurred when Tropical Storm

Mitch passed just to the south of us. *Amazonica* #2 raised all of its pods to the surface, some even out of the water. After a few days they all returned to their expected positions.

During the main part of the season, buds that reached the surface opened that very night. We could be sure they were going to open if the thorns at the base of the sepals were out of the water and if there was slight pineapple fragrance at the tip of the bud as early as 3 p.m. Some buds that were half submerged early in the evening “pushed” up to open. In the winter, buds were at the surface 3 days before they opened, pushing up during the day and sinking back a little at night.

In the main part of the season when the water was 80 to 90F, seed pods matured in an average 38 days. The earliest natural rupture from which we obtained mature though pale seeds was at 24 days. We designed several experiments, cutting pods off plants and floating them, to try to determine how much earlier than “ideal” (since the maturation time for those more northerly was far longer than ours) we could obtain seeds that seemed viable. Others can determine their “ideal” by keeping track of days to rupture under optimum conditions for them. “Ideal” minus 12 days was the earliest for full-sized seeds. We noted no additional development of the seeds after the pods were cut off, though others’ experience is different.

As the water cooled off and day length shortened (we are guessing that both factors are involved), maturation time increased. Pods collected in December from *amazonica* ruptured at 49 to 53 days, while pods collected in January 1999 took 61 days.

Once collected and counted, we leave the seeds and tag in a bucket of water outside to allow the arils, the little flotation device the plant has devised to disperse the seeds, to begin decomposing. The seeds are soft at this point



The aril of a freshly collected seed is almost like thin, flexible Styrofoam.

and need a little “cooking” (the water in the buckets gets pretty hot sitting in the sun!) to begin the hardening process. We then clean them by rubbing them around in a wire strainer, rinsing, and rubbing some more.

They graduate to jars of tapwater on the kitchen counter which we change every few days. When the water stays clear, the seeds are ready for storage. We store in the same jars of water, but storage at what temperature is really up in the air! The rate of germination of mature *amazonica* seeds recently collected is nearly 100%, but that rate drops dramatically when they are stored at lower than 75F. The longer the storage, the greater the drop. Many more experiments are needed to confirm this and to make a recommendation as to the “right temp.”

The consensus of opinion is still that the hybrids and *cruziana* do well stored at 55F though we can attest that isn’t low enough for some crazy *cruzianas*. While doing a routine check of seeds in our 55F storage refrigerator, we found 21 of 86 seeds in a particular *cruziana* batch not just sprouted but trying to grow out of their lidded jar. The filiform leaves were more



Seed pod collected just as one side started to rupture, the rest looking remarkably like a grapefruit!

than 4” long, roots had formed, and several were developing hastate leaves.

More Odds & Ends

We were asked if we noticed that the plants grew in any sort of pattern or direction as they made their way upward. They do! Both pads and buds grow in a rotating triangle. Some grow clockwise, and some grow counter-clockwise, with no consistency in direction by species or hemisphere of origin. We equated it with being left- or right-handed.

We were undaunted by the idea that *Victoria* is said to prefer neutral to acid water (pH) since those we had grown in the interior of the garden had done so well. The five plants grown in “Reflection,” the pond directly on the ocean

front did not attain the size we might have expected (fortunately for the space available!), perhaps because of the pH. Occasional pH checks ran 8 in the morning and 9 in the afternoon. During a period of drought this spring,



A nearly ripe seed pod, sectioned

the pH became immeasurably high, as did the salt level, but the plants kept right on growing. Seedlings, however, did not like it at all and required adjustment to lower their water’s pH



Seed pods still on the plants



Euryale ferox, a *Victoria* relative, remains elusive to hybrid efforts.

and salt levels.

The *amazonica* do not thrive in our worst summer heat, doing better in cooler weather. They attained their maximum pad and bloom size in October and November. This causes us to rethink the “conventional wisdom” about cold tolerance.

We grow Victorias in concrete ponds, some of which have an added sand “bottom” and built-in deeper holes for the plants. We also grow them in pots, 10” to 10-gallon. We fertilize weekly year round with PondTabbs poked as near the crowns as we can get without impalement, though there is always at least one expletive per plant.

The Other “New Kids”

In addition to the new ‘Adventure’ hybrid, we produced seeds from ‘Longwood Hybrid’ x *amazonica*, calling it ‘Discovery.’ Joe Summers also made the cross successfully and joined with us in the naming. ‘Discovery’ is being grown out in quite a few locations this year. Ours looks just like you would expect — 3/4 *amazonica*.

We were the only ones to try ‘Longwood Hybrid’ x *cruziana* and produce seeds. We have named it ‘Challenger.’ Only three plants made it through the baby stage. One is growing here, one at Denver Botanic Garden under Nancy Styler’s watchful eye, and the third is with Joe Summers at or near Missouri Botanical Garden. Ours looks just like 3/4 *cruziana*.

We had the unique opportunity to grow both the *cruziana* long-selfed at Longwood Gardens

and *cruziana* long-selfed by Walter Pagels (after obtaining it from Trickers). We crossed them in that order to produce the new *cruziana* variety ‘Super K.’ We sent *cruziana* ‘Pagels’ pollen to the Styler’s *cruziana* ‘Longwood’ so they were able to produce it also. Crossed the other way, we call it variety ‘Super S.’ These crosses are germinating and growing extremely well, displaying the outcross vigor we hoped they would.

In three attempts under less than ideal conditions, we were unable to produce seeds from ‘Longwood Hybrid’ x *Euryale ferox* but will make many more attempts this year, just to obtain more information about “possible” or “impossible.” We did collect a large number of seeds from *Euryale ferox*.

We thought we would have a breather after summarizing the 1998 records on the seven plants, 200 flowers, and 18,000 seeds. With two plants continuing on, seeds sprouting spontaneously on the kitchen counter, the 1999 crop to plan and start, there has been no breather. What we think we “know” today is out the window tomorrow. We’re even more addicted than ever, because with *Victoria* the only thing to expect is the completely unexpected!

Victoria an Annual?

The conventional wisdom is that *Victoria* is an annual that must be regrown from seed every year. Our ‘amazing-overwintered-bloomed-at-Christmas’ *amazonica* from 1998 is alive and well and blooming in Cocoa Beach. We are not alone! Several others report bringing *Victoria* through the winter.

We were able to overwinter the plant by adding soil and fertilizer around the crown regularly. When it slowed down and began to look unhealthy in early spring, we dug it up, cut away the lower part of the huge pineapple-like rhizome that was rotting under the crown and



A dug-up ‘Longwood Hybrid’ shows the shape and form of the *Victoria* rhizome.

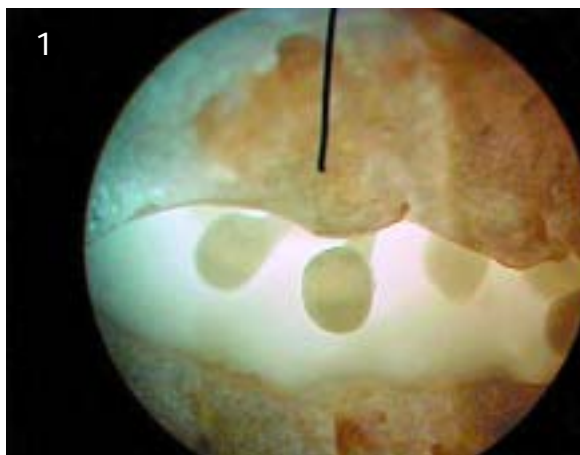
replanted it.

The tricks seem to be removing rotten portions, eliminating the cavity that forms under the crown from the decay, and taking good care of the new roots that form at the base of each leaf stem by keeping them in soil and well fed. We should mention that the lowest water temperature we recorded was 58F, and we were frost-free.

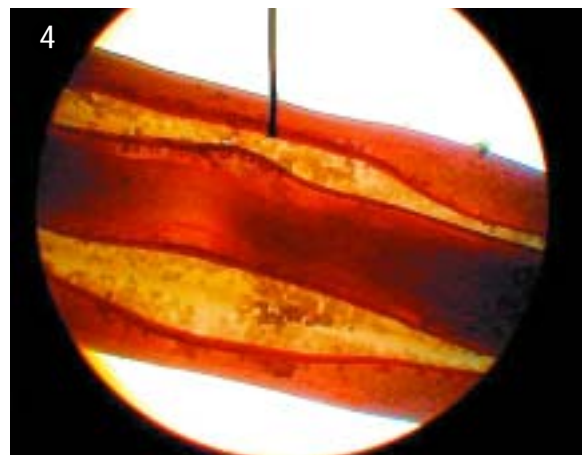
Want to Grow Victoria?

Where *Victoria* was once only in the province of the greatest botanic gardens, today anyone can grow it! Seeds are available from the IWGS’ *Victoria* Conservancy, c/o Nancy Styler, 6583 East Ida Avenue, Greenwood Village, CO 80111.

Think you need a huge pond? You don’t! Think you need a huge pot? You don’t! Think you need full sun? Wrong again! We are growing another ‘Adventure’ and ‘Longwood Hybrid’ together to see just how little they can make do with. Each is in a 10-inch pot, limited to three pads, side by side in a pond that gets only three hours of sun. The combined spread is 9 x 12 feet. The three-foot pads are luxuriant and the flowers are big and beautiful!



Ovules, future seeds, through the microscope



An anther with pollen dehiscing



Pollen through the microscope, the four-celled or tetrad composition unique to *Victoria* and *Euryale*



A pollen grain germinating on a slide. Note the corkscrew-shaped pollen tubes

See for Yourself!

'Adventure' and 'Longwood Hybrid' are being grown side by side in several locations around the country. Go see them!

Ben & Kit Knotts, Cocoa Beach, Florida
 Butch Weaver, Boulder, Colorado
 Denver Botanic Garden, Denver, Colorado
 Dirk Resenberg, Olney, Illinois
 Missouri Botanical Garden, St. Louis, Missouri
 Trey & Nancy Styler, Greenwood Village, Colorado
 Waimea Gardens, Waimea Bay, Hawaii
 Waterford Gardens, Saddle River, New Jersey
 Hudson Gardens, Littleton, CO

Scoping It Out

We discovered quite by chance that we could take pictures through the microscope by placing the lens of our digital camera to the eyepiece of the microscope. This has allowed us to study many things on the computer screen rather than go blind staring through the 'scope' or lose things that are changing. We also can send the pictures via E-mail, usually with the accompanying cry of "Help! What are we seeing?"

True Blue Film

Photographing water lilies, especially the blue ones, has been an impossible dream when it comes to color accuracy. When the American Orchid Society's *Orchids* featured an article comparing color slide films for color accuracy, we decided to try their 'winner.' It is Kodak Ektachrome Professional Neutral (EPN) and we think it's great!

The photos with "The New Kids" and on the cover are shot with EPN. We've also shot lots of blue lilies with EPN, comparing directly with digital and other films. The results are excellent — no filters, no tricks — just true blue.



N. 'Azure Dawn', shot with the new EPN film. The famous "ditch lily" found growing in a Florida roadside ditch by Kit and Ben Knotts. After extensive research, the plant was named by the Knotts and Rich Sacher. (See *Pond & Garden*, Number 3 issue)

Bluebloods Go High Tech

Starting with the 1998 expedition to the Amazon, DNA samples have been collected on as many *Victoria* as possible, both those from which pods were collected in the wild and those used for breeding in cultivation. DNA mapping is being conducted by Dr. Don Les. This not only allows us to confirm our new hybrids with

state of the art science, but it will let us track our blueblooded offspring for generations to come.



N. 'Azure Dawn' shot with other film as it was shown in the "Ditch to Debutante" article.



N. 'Director George T. Moore' offers the richest violet color in a tropical water lily. Hybridized and introduced by the Missouri Botanical Garden's George H. Pring in 1941 by crossing *N.* 'Judge Hitchcock' with *N. colorata*.



N. 'Midnight' bears unique anthers that develop as small petals with a ruffled, fringe effect in the center of the richly colored bloom. Hybridized and introduced by George H. Pring in 1941 by crossing *N. colorata* with *N. capensis* var. *zanzibariensis*.



N. 'Star of Siam' was discovered by Betsy Sakata at the famous weekend open-air market in Bangkok, Thailand, and given to Rich Sacher and Bill Daily in February of 1997 to bring back to the U.S. With bright blue flowers and richly marked leaves, the plant's second day flower displays a multi-pointed white star in the center of the flower as the white, broad stamens begin to fold down. Hard to find and slow to propagate, it is offered at Rich and Bill's New Orleans nursery, American Aquatic Gardens.

A Promise of Paradise....

*The Garden of Ben & Kit Knotts
by Rich Sacher*



All around Ben and Kit's home is a 1 1/2 acre garden into which a myriad of ponds have been lovingly placed, like so many jewels in a tropical tapestry. I am amazed that such a garden exists just 150 feet from the sand dunes of the Atlantic Ocean, where large, rolling waves spill onto the glistening white beach.

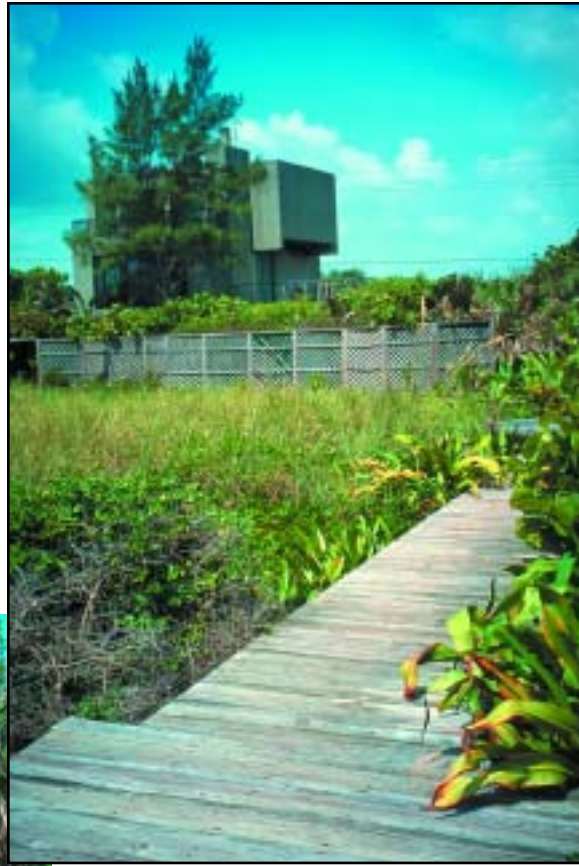
All through the gardens are stone paths, boardwalks, large and small gazebos, arbors, and sitting areas — all built by Ben and Kit themselves. Kit says that most of the garden's design is a result of Ben's musings, "Wouldn't it look nice if..." The garden is now about eleven years old and evolves according to the dictates of its topography and microclimates. It includes native plants that have arrived courtesy of the winter winds or visiting birds. Although the



native soil is mostly beach sand, regular fertilizing and constant attention from Ben and Kit have produced a tropical paradise where every square inch is either lush with tropical plants or is a pond sporting a wide variety of aquatic plants.



Ben and Kitt join their dog, Smuggler, in a lilly pool where Smuggler wisely walks 'around' the lilies!



A view of the Knotts' home from the beach.



The boardwalk leads through the garden and out to the beach.

As I consider the improbable existence of this garden, so close to an often stormy ocean, bounded by a river and a thin strip of land, with soil not much more than sand, I realize that all gardens are, by definition, a temporary creation of man. Perhaps gardeners in particular have a subconscious collective memory of a garden lost, long ago, a garden where we belonged in the beginning, and a paradise we strive to recreate in our own life times...a living symbol of what once was, and a promise of what will be once again. 🌿



'Queen of the Night' cactus grows completely up the trunks of palm trees in the garden.



The 'General Pershing' pool features only that special tropical waterlily hybridized by George Pring in 1920.