

# The Bulb Garden



~Gardening with Bulbs ~

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## A Whirlwind Tour of Tanzanian Geophytes

### Cody Coyotee Howard

*Cody Howard received the Mary Sue Ittner Grant for Bulb Studies to collect *Ledebouria* species in Tanzania for his PhD dissertation. He is investigating the relationships among this group of plants and how the group has dispersed across the landscape in the past.*

I am sure many readers of *The Bulb Garden* are familiar with the diversity of bulbous plants that exist in the world. From understory *Asarum* (Aristolochiaceae) to arid adapted *Hexacyrtis* (Liliaceae), bulbous plants are found across the globe thanks to their unique ability to escape and survive unfavorable growing conditions. The more I learn of these fascinating species the stronger my desire to uncover their evolutionary history becomes. Interestingly, this yearning to know how they evolved into what we see today has afforded me the opportunity to travel to remote and wonderful places within Africa. To date, my travels have involved hunting for a group in the hyacinth family (*Ledebouria*) but I dare not ignore all of the other amazing geophytes I encounter along the way. Luckily, once you find one geophyte you are likely to find a whole slew of others since they commonly co-occur. The Pacific Bulb Society had previously funded some of my work on *Ledebouria* in the country of Namibia (*The Bulb Garden* Vol. 3, Issue 1), and I was fortunate enough to receive further funding from them for my recent work on the same group in Tanzania.

The country of Tanzania is located

in eastern Africa, and lies at an interesting intersection between northern and southern Africa. This area is most notable for the Great Rift Valley and as being the birthplace of humankind (This is still debated though.). The region also boasts a high degree of biodiversity and is considered a hotspot of such. This is due in part to the varied topography of the region, as well as the climatic oscillations that have occurred here in the past (i.e. it used to be more tropical than today). The repeated tropicalization of the region followed by subsequent drying is one reason why you can find both arid and tropic loving plants in the area today, including a number of interesting geophytes. During my time in Tanzania, I was lucky enough to come across a number of these fascinating geophytic taxa and I made sure to thoroughly document them for your enjoyment. So let us begin.



Tanzania in blue

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## A Whirlwind Tour of Tanzanian Geophytes (cont'd)

I started my journey in the area surrounding the famous volcano, Kilimanjaro. While I did not trek up the mountain, I did manage to enjoy its lower slopes by visiting Simba Farm, located at roughly 1400 meters (4600 feet) above sea level. The owners have a trail that allows visitors to walk through the forest and explore the area surrounding their section of the Simba River. Here, one will encounter dozens of ferns, orchids, large specimens of *Euphorbia* (I believe it is *E. candelabrum*.), and a few geophytes including *Scadoxus multiflorus*, *Sansevieria* species (sp.) and *Bowiea volubilis*.

After my brief visit to Simba Farm, I traveled around the north side of Kilimanjaro and ended up at Lake Chala, which is east of the mountain at the border with Kenya. The rains for the season were a bit late so the area was very dry but thanks to the resilience of some plants, I was able to find a number of succulent and bulbous specimens while hiking during



Above: *Ledebouria aff kirkii*; Right: *Scadoxus multiflorus*.

my visit. During the hot, windy hike I came across *Cyphostemma* sp., *Sansevieria* sp., and my first *Ledebouria* aff. *kirkii* of the trip. It would turn out to be the first of many exciting *Ledebouria* discoveries.

My travels in the country then turned into a whirlwind of an adventure. I met up with a colleague in Dar es Salaam, Tanzania who would be traveling with me in search of ferns. Before dealing with the process of obtaining our research permits, we made a trip to Bongoyo Island off the coast of Dar es Salaam. This island was covered in geophytes such as *Scadoxus multiflorus*, *Sansevieria* sp., and another *Ledebouria* aff. *kirkii*! During the following few days we obtained our research permits (after a bit

of a headache) and hurried across the central portions of the country to make collections for our research. We visited the Udzungwa Mountains National Park where we found huge specimens of *Scadoxus multiflorus*, as well as a couple different *Ledebouria* spp., and a large population of a tall *Amorphophallus* sp. We also had a chance to explore the pristine forests of Mazumbai in the Usambara Mountains. Unfortunately, the dry conditions made it difficult to stumble across any geophytes in the area. However, despite the fairly dry conditions in the north we still found a number of fascinating plant species, all the while seeing amazing landscapes. After our whirlwind tour of north-central Tanzania, I dropped off my colleague and picked up a friend to continue my journey. We then traveled south through Tanzania en route to Zambia. Along the way we made several stops to explore for geophytes, and the rainy conditions of the south made for some excellent discoveries.

The Iringa Rivervalley Campsite was our first of many unexpected finds. The property has a wonderful trail leading through it and one can easily find a number of geophytic taxa growing here. We happened upon hundreds of *Gloriosa superba*, several *Chlorophytum* sp., and a lovely prostrate, geophytic orchid called *Bonatea*. In addition to campsite strolls, when driving in Tanzania one can easily stop the car and do a bit of roadside botany. The best places I found that allowed for easy access to geophytes were



roadside construction sites. Southern Tanzania (at the time of my visit in February 2017) seems to be in the middle of a large overhaul of the roads, which is great for future visitors but made for horrible driving conditions during my time. What should have been a

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## Tropical Blue Water Lilies

### Johannes Urban

Johannes 'Uli' Urban, by profession a pediatrician, celebrates his second love – plants – by growing a plant hardly known by most of us. He retired at the end of the past year with plans to start a new garden amid the cork oaks of Portugal, a big change from Zone 7 northern Germany where he has lived, and promises that he will keep a diary of his adventures with lime-free soil in a new bulb garden.

Growing tropical blue waterlilies from tiny leaf tubers is very rewarding, easy and exciting. The leaf tubers are formed in autumn when the water gets cooler and the plant "feels" a certain stress. Sometimes leaf tubers will also form during summer, mostly unnoticed until the leaf on which the tuber has formed would decay and a small baby waterlily would float in the water. These young floating plants can be potted and grown on but this is not the story I would like to tell.

My blue waterlily is probably the hybrid 'Tina', but I am not certain about its identity. I could not find much in my books nor on the internet, but it belongs to the viviparous tropical group of tropical *Nymphaea* of the subgenus *Brachyceras*. I got it from a botanical garden under the name *Nymphaea x daubenyana* which



it is not. As I am not a botanist, I cannot identify it myself but after browsing through a lot of catalogs, I think it comes closest to *N. 'Tina'*.

During summer in warm water and very good light, plantlet formation can be induced by cutting a leaf off the plant, and weighing it down under shallow water with some pebbles. A young plant will quickly start from a latent leaf tuber. A leaf left on the plant will not do this; it needs to be severed from the plant.

Once the leaf tubers are about pea-size, some smaller, some bigger, they can be detached from the leaf. They sit on the surface of the leaf where the leaf stalk is attached below and are somewhat woolly and quite hard to the touch. These small tubers are very tough and can

be stored under very different conditions: moist in sand, or my preference, in sphagnum. I spray the saucer and the sphagnum with a systemic fungicide. They can also be planted in a loam substrate and kept in shallow cold water during winter. The picture of the overwintering plants was difficult to take with all the light reflections from the glass of the greenhouse and the water but you can see both an adult plant with a few pale green remaining leaves and beside that, in small pots tiny leaves of the plants that slowly sprout from the leaf tubers. The results from storing these tubers in barely moist sand were not as good but still possible. The saucer with the leaf tubers in sphagnum can be stored with or without light, cool but frost free. Length of storage does not seem to matter very much (within limits); mine have to wait from October



Left: *Nymphaea* possibly 'Tina'; Above: Leaf tubers; Below: Winter storage in unheated water.



until May to be started again into growth. Those I sent to the BX last year have been stored in sphagnum in the fridge in order to keep them really dormant

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## Book Review: The World of Crocuses by Robin Hansen

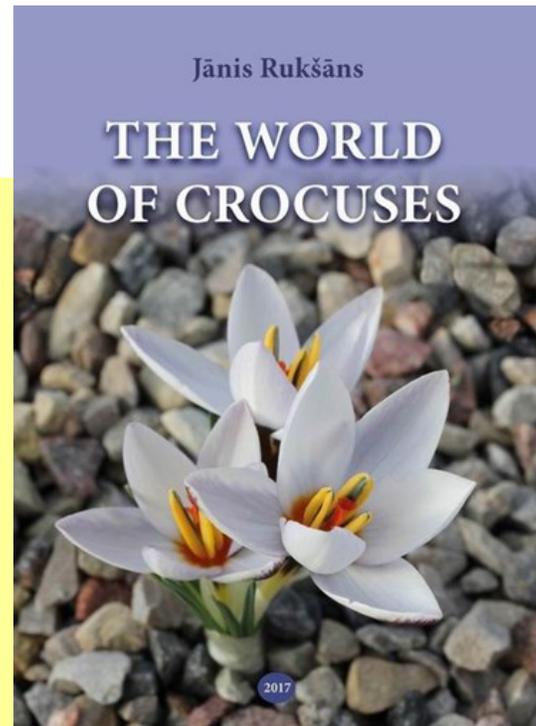
Janis Ruksans' latest book, a monograph on crocuses, has just been published under the imprint of the Latvian Academy of Sciences, and is now available from the Scottish Rock Garden Club and from several other sources (See list.). This generously detailed book with over 560 pages, 1700 photos, illustrations and distribution maps is not a rehash of his previous book on crocuses, but is a thorough treatment of the genus *Crocus*, listing all 235 known species, and celebrates Ruksans' incredible, bulb-obsessed 50 years of studying *Crocus* in the field and in his nursery and gardens. He expects it to be most useful to gardeners as well as amateur botanists, but it is the result of ongoing phylogenetic research up through 2016 and must be considered the definitive work of this genus.

Thanks to the author's perseverance, obsessions and willingness to endure incredible tests of endurance, political obstruction, and grueling travel conditions, we have a delightful and extraordinary reference that would simply be impossible as a resource on the internet, but as a book available at all times, it will considerably ease our way in growing and enjoying these delightful bulbs. He is well-known for his plant breeding, his lectures and his many articles on all manner of bulbs.

Janis has deconstructed and reconstructed the genus *Crocus* according to one comment I received, but isn't that what botanists do from time to time, especially now that DNA has entered the scene? And we are (usually) that much further ahead in our knowledge of a genus because a botanist was willing to spend years or a lifetime narrowly focused on one genus.

The old familiar argument between "lumpers" and "splitters" will instantly arise with this new book, and readers' comments forthcoming will be either as clear as Crater Lake on a sunny day or as muddy as the puddles in my driveway. So be it – if nothing else, we'll be entertained, educated, annoyed or seriously aggravated. Ultimately, though, we'll have a new and complete reference book.

When I received the book from Janis, I instantly stopped what I was doing and started reading, delighted to see a thorough monograph on a genus of which I've become ever more enamored. The author begins with the basics – cultivation, propagation and pests and diseases – and details some of the issues facing anyone who studies these particular plants, flung across thousands of miles and many habitats, often in rugged and barely accessible



terrain. Ruksans is primarily a commercial grower of some 50 years standing, and he clearly explains the basics and shows a deep knowledge of growing *Crocus* in the difficult climate where he lives and works. He divides *Crocus* into three groups based on their native growing conditions, and under each species he gives quite detailed information about habitat and distribution which is very helpful to us as we attempt to grow them in our gardens.

In the section on propagation, Ruksans comments that many *Crocus* are self-sterile, which is news to me, a neophyte with this genus; he recommends sources of seed since so many species are otherwise unavailable. He discusses pests and diseases in detail and illustrates clearly with photos the symptoms of viral infections, a necessary and often overlooked concern.

Then comes the section on classification and identification which will no doubt be an endless source of frustration, affirmation or just plain disgruntlement to the minority who insist on cut and dried determination of names. As an amateur grower (Some of you will no doubt be appalled at my willful ignorance.), I refuse to concern myself with these issues beyond a certain point. I just want to grow lots of different kinds of cool *Crocus*! And this book will help me do that.

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## A Whirlwind Tour of Tanzania (cont'd)

short 3 – 4 hour drive took roughly 8 hours one day. In order to ease the pain of the drive, we occasionally stopped at recently plowed sites to have a look around and we were rarely disappointed. You can imagine the road scraper acting almost as a large wildfire where it removes all of the aboveground vegetation but leaves behind the precious geophytes. They then quickly pop out of the ground with the first rains which makes it easy for

We then left the country of Tanzania and made our way into Zambia. After some time traversing the unseasonally wet Zambian countryside, we returned to Tanzania in order to drop off the rental vehicle. On our way north we decided to stop at Kitulo National Park, also known as Bustani ya Mungu (God's Garden), which is



Above: Road in the fog under construction between Babati and Dodoma; Top right: A traveling companion admiring *Gloriosa superba*; Bottom right: *Bonatea* sp. (Orchid family); Below: Large *Ledebouria* sp. outside Dodoma.



me to find them while driving 50 mph. It was at these highly disturbed sites where I found a number of gorgeous geophytes that included several *Ledebouria* spp., more *Gloriosa superba*, an interestingly furry *Hypoxis* (possibly *H. hemerocallidea*) and *Cyphostemma* sp.

touted as a botanical paradise and it did not disappoint. Situated on a high plateau, this area offers plant fanatics

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## A Whirlwind Tour of Tanzania (cont'd)



an opportunity to see several (up to 45) different terrestrial orchids, *Kniphofia*, and a lot of interesting grasses. If you are up for a visit you can also take a steep hike down to a gushing waterfall (The name escapes me.) and explore the wonderful ferns that grow all over the cliffs. The best time to visit the park is during the rainy season (February – April), which is when the flowers are in full bloom, but it is also when the roads and trails are the muddiest. Trust me, it makes the drive difficult in parts and getting stuck happens...it happened to me. Should you decide to visit this park, I recommend a high clearance vehicle, rubber boots and waterproof everything.

Despite the research permit headaches, difficult travel conditions, and sometimes incessant touts, my excursion across southern Africa was amazing. In the end, I made 80 collections of *Ledebouria* for my research and was able to observe many other geophytic species that I never thought I would get a chance to

see. Thanks to the Mary Sue Ittner Research Grant, I was able to see a part of the world that was completely new to me and offered a stark contrast to Namibia, the only other African country I had previously visited. Hopefully my adventures continue and I can see more of what Africa has to offer. Stay tuned.



Above left: Freshly cleared plots of land along the road make for wonderful geophyte spots.

Left: *Satyrium acutirostrum* (Orchid family) were very abundant and easy to spot due to their brightly colored inflorescences.

Above: *Hypoxis* aff. *hemerocallidea* in all its furry glory.

Ed.: Cody will be traveling again this summer and we can expect reports of his bulb adventures and studies in Southern Africa

## Tropical Blue Water Lilies (cont'd)

before posting.

Starting the tubers is fun. I pot them into small pots using the same heavy loam/clay as for the adult plants and put them into a big bucket or small aquarium which is heated to 20-25° C ( 70-77° F) using an ordinary electric aquarium heater. Unfortunately I never took a picture of this waterlily nursery. They are only submerged a few centimeters, maybe two inches deep and given the most light possible or extra artificial light. They explode into growth within hours and form leaves and roots. Before they are transferred into their summer pool they will be potted on once or twice; pots that are too large become too difficult to handle and are not neces-



Above: Tropical blue waterlily; Right: A pond friend enjoying a summer vacation.

sary. When they get their final pot I plant two or three young plants together or I use leaf tubers that have more than one sprout in order to get more flowers. When potting up into the final container I add some slow release fertilizer like Osmacote. The uptake of the released fertilizer by the greedy waterlily is so fast that the water does not get green. Once or twice during summer the slow release fertilizer is topped up by rolling the fertilizer into moist loam, letting it dry and inserting the hard loam into the soil of the pot. As you can see in the picture a mature plant with many flowers will form in one summer. Northern Germany's summers are not as hot as summers in the United States or Southern Europe, so all of you living there should get even better results.

Preparing mature tubers for overwintering will be necessary. Every plant will form a tuber of about the size of a small walnut. One would think that a big tuber will produce a big plant..... well, not necessarily. I have found mature tubers very difficult to keep alive out of water and have switched to overwintering the whole pot with the tubers in a big bucket in my frost free greenhouse. All the

leaves and buds and flowers have to be neatly cut off but the crown must not be damaged. I usually wait until the first frost has done the job on the leaves. So far during two consecutive winters, it has worked. The water in the bucket is not heated. So it could be guessed that in warmer frost free conditions the adult plant could be left in the pond and hopefully would restart in spring with the water warming up. Mature tubers stored in moist sphagnum or sand have ALWAYS succumbed to rotting into an unpleasant mush. Cleaning a mature tuber of leaves and roots causes so much damage that it opens the door wide for all sorts of fungi and bacteria, but without cleaning one would end up with a big messy clump of roots and leaves.

When the greenhouse warms up in spring the plant wakes up and starts to grow and will quickly want to out-grow its bucket prison. That is a tricky time, as there may be aphids and spider mites on the leaves that are up in the air. But by the end of May, during a warm spell, the plant is repotted, fertilized and plunged in the pond. I use a custom-made circular black plastic pool which stands on the sunniest corner of a terrace. Being black and standing above ground absorbs more heat than an ordinary pond in



the ground. I put a brick under the pot to avoid it standing in the markedly cooler water right at the bottom. Before moving the repotted waterlily into its summer holiday paradise the water must warm up for several days in order to avoid a shock. It is always amazing that frogs leap up into this pool which is 50 cm (20 inches) high and deep and 150 cm (60 inches) in diameter. The depth is okay but the diameter could be bigger.....

It is the fact that an aquatic plant can spend part of its life cycle out of the water and that fascinates me again and again. To me this is the climax of adaptation: a geo-

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## Book Review: The World of Crocuses (cont'd)

I will say that while I have a vague understanding of DNA, I am far more concerned with identifying living plants in the field, and so that affects my response to botanical monographs, as in “just tell me what the plant is...”. Nonetheless works such as *The World of Crocuses* are essential to our understanding of the plants we grow. If names change, so be it. We can always find the synonyms and ultimately know what we are growing.

There are issues of irregular editing for clarification and comprehension throughout the book, due in part to the fact that Ruksans is not a native English speaker. I didn't find the editing to interfere given that we receive such detailed descriptions of all known species accompanied by numerous clear photos and illustrations. Gardeners, after all, speak a universal language.

The keys are just before the listing of species begins, and included at the beginning of the keys is a list of important characteristics to assist in identification of individual species. Ruksans divides the keys into autumn and spring flowering bloomers with further subdivisions under each category, then follows the keys with one to three pages on each species which includes detailed descriptions followed by comments on field studies and personal observations. He also discusses locations, and clearly states whether he is familiar with a species.

Included with each species listing are location maps, multiple photos (often *in situ*) of flowers and corms (some on graph paper). The descriptions are standardized throughout, and while I would wish the paper the book were printed on paper allowing sharper images, that is a minor quibble. Illustrations throughout the book are clear, bold and well done, and I find the photos of plant parts quite useful.

*The World of Crocuses* concludes with a section on hybrids, a glossary, a list of *Crocus* species described or reclassified, a bibliography and a list of the main synonyms. There is no index which could prove frustrating when in search of synonyms not listed, but the book is well organized and the contents page covers the book well.

If you are “crocus-crazy”, this book is a necessity; even if you're not that severely addicted, you should consider buying it because you will use it over and over. Please thank his many generous supporters, many of whom are acknowledged, and consider financial support for future monographs. Without support of such individuals and plant societies we will be deprived of vital information we need to grow

the plants we love. Unfortunately, publishers, as Janis mentions, claim monographs don't sell, so it is left to plant lovers to step forward.

Ruksans has two other books in print and easily available, both published by Timber Press. His previous book on crocuses is Crocuses: A Complete Guide to the Genus. Buried Treasures, Finding and Growing the World's Choicest Bulbs is both a fascinating story of travels in remote regions of the world and a detailed description of the incredibly rich diversity of bulbs he has encountered.



A Janus Ruksans introduction - *Crocus huffelianus*  
'Carpathian Wonder'

### **The World of Crocuses**

by

**Janus Ruksans, PhD**

**Is now available:**

**Directly from the author by emailing**

**[Janis.bulb@hawk.lv](mailto:Janis.bulb@hawk.lv)**

**From the Alpine Garden Society at**

**[www.AlpineGardenSociety.net](http://www.AlpineGardenSociety.net)**

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**For Your Information - Things you need to know!**

**PBS List - David Pilling**

David Pilling who manages the PBS List and website, announced recently that the PBS List has been moved from host Ibiblio to PBS' own host. Some email providers have rejected members' posts from the new list as spam, so if you are still having problems or think you are missing email, please contact

[David@davidpilling.com](mailto:David@davidpilling.com)

Don't forget that you can follow posts to the list at our online archive: <http://www.pacificbulbsociety.org/list.php#Archive> and that posts must now be made to the new address [pbs@lists.pacificbulbsociety.net](mailto:pbs@lists.pacificbulbsociety.net).

**SX/BX Notes - Dell Sherk**

One of the most popular perquisites of being a dues-paying member of the Pacific Bulb Society is eligibility to participate in our two exchanges: the BX which offers bulbs, corms, etc. and short-lived seeds, and the SX which features seeds that have a longer shelf life.

There are two key requirements for these exchanges to operate. First, we must have generous donors who take the time to clean, label, and send their excess seeds and bulbs to the society. We would encourage more members to donate since their generosity is the lifeblood of the exchanges.

The second vital ingredient in making the SX and BX work is the generosity of volunteers who give hours of their skilled time to make the process work. For a few years now, we have had the kind services of two volunteers. Marilyn Pekasky verifies the nomenclature of each accession against authoritative sources, makes sure of the spelling, and suggests alternatives when there is confusion in the taxonomy. Karl Church divides and packs all of the seeds for the SX – many hundreds of packets for each round of the SX.

Many thanks to Marilyn and Karl! How good it would be if all members would donate seeds or bulbs and consider what they might volunteer to do to help PBS continue to be the best of bulb societies.

**Treasurer's Notes - Arnold Trachtenberg**

Arnold would like to remind all members to **include BX and SX numbers with both PayPal and check payments**. If you send your payment off without making a note of what it's for, please pop him a quick email to let

**Treasurer's Report for 2017**

<b>BALANCE 1/1/17</b>	<b>\$ 41,398.50</b>
<b>INCOME</b>	
<b>U.S. Members</b>	<b>\$ 1,200.00</b>
<b>Overseas Members</b>	<b>\$ 1,150.00</b>
<b>BX Receipts</b>	<b>\$ 1,537.60</b>
<b>Investment results</b>	<b>\$ 2,662.52</b>
<b>Total Income</b>	<b>\$ 6,550.12</b>
<b>EXPENSES</b>	
<b>BX/SX Postage</b>	<b>\$ (528.75)</b>
<b>BX/SX Supplies</b>	<b>\$ (292.50)</b>
<b>Board Conference Call</b>	<b>\$ (106.17)</b>
<b>Treasurer's Supplies</b>	<b>\$ (347.97)</b>
<b>Publications</b>	<b>\$ (1,415.00)</b>
<b>Publication Postage</b>	<b>\$ (672.00)</b>
<b>PayPal Expense</b>	<b>\$ (243.94)</b>
<b>Bulb Garden Editing</b>	<b>\$ (500.00)</b>
<b>Total Expenses</b>	<b>\$ (4,106.33)</b>
<b>Net Change in Account</b>	<b>\$ 2,443.79</b>
<b>BALANCE 3/31/17</b>	<b>\$ 43,842.29</b>

him know. Arnold's position as treasurer is voluntary and takes a lot of time. If we can save a bit of time for him by including Dell's invoices or other information with payment, it helps a great deal, or at least let him know after the fact as quickly as possible.

One other item - The book offer for Amaryllidaceae of Southern Africa by Graham Duncan expired on June 30. If you missed the group order deadline, do not despair. This book is available from Amazon and from Book.Depository.com. Keep in mind that Amazon has country websites such as Amazon UK and Amazon Germany, so if you don't find it on one website, check another one. According to several of our readers, the illustrations are exquisite, and John Grimshaw says "it is a truly superb book in every way."

Arnold's email address is: [Arnold140@verizon.net](mailto:Arnold140@verizon.net)



## Tropical Blue Waterlilies (cont'd)

phyte which can bridge the two extremes of a submerged life to a dry one. This is of course an adaptation to seasonal drought in its native African habitat where this species of blue waterlily comes from. There are Australian blue waterlilies that are also tuberous but are much more difficult to grow, and I have no personal experience with them. There are many more other plants and even fish adapted to the same habitat.



## Collecting & Preparing Seed

by Robin Hansen

As Dell Sherk, SX/BX coordinator reminds us, seed donations are always needed so that members can grow rare, unusual or just plain fascinating bulbs. For many of us, it's a lifelong disease. Wherever I am, I collect seed whether it's a plant I have or something new. I'm always hoping even with common seed that something new or unusual will come up one day. It has happened in the past – consider *Cotinus coggygria* var. *atropurpurea* or Purple Smoke Bush – which gave me twenty years ago a prostrate seedling of good purple and is still no more than a foot high but spreading much wider. Who knows what we'll discover when we sow our seeds?

June is nearly done and seed has been ripening day by day for weeks now. Following are some suggestions for learning when to harvest and how to store various types of seed. The one tedious rule that pays off most is to collect only ripe seed. This requires repeated trips to collect more seed as it ripens, but provides more viable seed. It's also Mother Nature's built-in safety net. If the first seeds to ripen are blown into a bog and rot, chances are good the next ripening seed will land where it will germinate and grow. Likewise the late ripening seeds are more likely to germinate after danger of frost and torrential rains or heavy snows cease.

Some seeds can be harvested when they appear to be not quite ripe; others must be harvested before the pods split and disperse, and still others can be collected when you get to them. *Thalictrum tuberosum* seed is still green in appearance when I harvest it. Other seed pods bear close watching so that they may be harvested just as the pods are getting ready to split and before they burst and spread or fall to the ground, such as *Camassia* spp., *Leucojum* (or *Acis*), *Aquilegia*, *Muscari*, *Romulea*, etc. Then you

have *Cyclamen*, *Asarum* and others whose seed pods contain a sweet sticky gel surrounding each individual seed that insects such as ants will harvest moments after your back is turned. You will turn around (or come back an hour later as I did once) and find the whole pod is gone.

Roses and other berries, for example, can be harvested when you get to them, provided a quadruped of some sort doesn't get to them first, or a mollusc such as the slugs and snails I've caught in the act. It did take me a while to discover who was at the *Cyclamen* seed as I was sure it wasn't ants. It turned out to be slugs as they leave characteristic tiny holes before they succeed in finishing the job, much as they do to my ripe strawberries.

But how do you tell if seeds are ripe? Let me give you some examples. I've been watching a *Calochortus* for about two weeks now. These seeds are in



*Acis nicaeensis* seed. Pod on left is still green. Pod on right is almost ready

a winged capsule that's quite distinctive and until today was decidedly pale green. We've had lovely warm temperatures the last three days and this morning the capsule was a light tan. When seed pods, in this case capsules, change from green to tan or brown or look dry and feel hard, they are ready and need to be watched closely or harvested then. Also observe the seed stalks or pedicels. Typically they will also be drying or nearly dry and tan or brown. You can gently squeeze pods or berries. If they are firm, then turn soft, you'll know they're almost ready. With *Thalictrum tuberosum*, for example, brush your fingers over the green-colored seeds to see if one or more will fall off into your hand; if the seeds come

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## Collecting & Preparing Seed (cont'd)

off, they can be harvested but I would plant them right away to get best results.

Most bulbs I'm familiar with have some sort of capsule, or pod as I refer to it or the seeds may be surrounded by pulp which softens when ripe such as *Arisaemas*. You'll note that I refer to seeds, pods, berries, etc. in general terms rather than using botanically correct terminology such as fruit, mostly in the interests of simplicity. Some seeds such as *Lysichiton americanum* are green and berry-like and are assembled in a spadix.

It's always wise to take just one pod first and open it to be sure the seeds are actually mature. If they are green or fading from green, they are unlikely to be ready. Sometimes the color of the pod of a particular species can be misleading; this is something you will mostly only learn from experience or from joining someone on a seed-hunting trip. Seed may seem dark and ripe, but I've had instances where using my fingernail to test the hardness shows that the seed is still a bit soft and not yet ripe. In fact, the fingernail test can be used on any seed large enough, or you can roll smaller seeds in your fingers to determine hardness.

You'll need small paper envelopes such as coin envelopes which I buy by the box of 500 in an office supply store, a few larger paper sacks and possibly a few small plastic containers without lids for the fleshy fruits you might collect. It's essential to label your envelopes with at least the name, date of collection, location of collection if needed, and a description using key words such as "Dwarf form, white flowers (when normally blue). I like to harvest in the afternoons on dry days when the humidity is usually at its lowest. I often use scissors or pruning shears to cut the seed heads off, while holding a small paper envelope below the pods I'm cutting. This prevents the accidental brushing or movement that can disperse seeds. If the fruits are wet, mushy or otherwise messy, I'll put them temporarily into a small plastic container without a lid (to avoid mold). If there are a lot of seeds up and down a stalk, I'll use small sacks I can set upright on the counter.

Do not, as I have repeatedly and regretfully done, put them into your pockets. The fruits can make an unholy mess if you don't remember them – this is the voice of experience speaking! Have you ever tried removing tiny black *Aquilegia* seeds from your breast pocket when they are caught in the seams and you were only able to find six seeds to begin with? Or stained clothing dark blue or black because you forgot the berries you put in your pocket?

Once harvested, seeds in paper envelopes should be left out on a counter for several days to reduce the mois-

ture in them. Fleshy fruits can be left in open containers to soften and become mushy, making it easier to remove the pulp. As an example, once rose seed has softened, I add water and break up the pulp with my fingers, rinsing and draining several times to get rid of as much pulp as possible. After the last draining, I dump the seed on a couple thicknesses of paper towel and let it dry for a few days until rubbing removes the last bits of dried pulp.

For seeds in hard dried capsules or pods, crush in a sieve or onto a sturdy paper plate. Then hold the plate horizontally with a slight tilt, gently blow away from yourself, removing the chaff and leaving the seeds. Scoop them into their envelopes. With few exceptions, store seed in paper envelopes. The envelopes can then be stored in a glass container in the fridge until needed. Don't store in the freezer. I can't think of a single time I've done that and ended up with seed that germinated, which is not to say it can't be done. It just doesn't work for me. If properly cleaned and stored, seed can last a number of years, and indeed, some seed germinates better if it is stored for some time.

Some seed is only viable if cleaned and stored immediately in moist or damp medium such as vermiculite, if you will not be sowing as soon as the seed is cleaned. In this case, you will want to use plastic wrap folded over several times and placed in plastic ziplock bags or the tiny ziplock bags jewelry comes in. Some examples of this would be *Trillium*, *Disporum*, *Lysichiton*, *Hepatica* and so on. Often information of which seed to treat in this manner is available in the Pacific Bulb Society archives or elsewhere on the internet. When in doubt, send a request to the PBS List. Someone on the list will know the answer.



*Cyclamen* seed. Note the seed pod in the center is opening.

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## Gardening with Bulbs



*Cyphostemma* sp. in Tanzania which came up when land was cleared. Photo by Cody Howard.

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