



~Gardening with Bulbs ~

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The Bulb Garden

- *Cyrtanthus falcatus*, Culture & Propagation - Keith Fey, kwa-Zulu Natal, South Africa
- Doing Science with Ornamental Bulbs - Samantha Rose Hartogs, Mary Sue Ittner Grant Recipient
- Pollination of *Cyrtanthus falcatus* - Keith Fey

Cyrtanthus falcatus, Culture & Propagation

Author Keith Fey was born in Kenya and grew up in KwaZulu-Natal, South Africa. He was heavily involved in farming and developed commercial forestry nurseries among other plant-related endeavours, then began exploring across a number of African countries, including, more recently, the floral paradise in the foothills of the Drakensberg Mountains of South Africa. He has always been passionate about gardening and wilderness, and photographing and writing about wilderness areas has become his personal quest. He lives in the foothills of Bulwer Mountain a little way upstream from the Luhane Waterfall in the Drakensberg Range where he is surrounded by beautiful pristine alpine mountains, foothills, grasslands and mist belt forests. Hopefully, he will continue to share his thousands of photographs of wild magical places.

In the early 1960s, our family fished the uMzimkhulu river where once my father and brothers came upon this *New Flower!* subsequently identified at the herbarium of the Pietermaritzburg University Botany faculty as *Cyrtanthus falcatus*. At that

time, it was only the third known locality of this species and stirred considerable excitement in academia.

On a subsequent fishing trip in the 1960s, Mum collected a few bulbs from their precarious foothold high up on a rock face, which she cultivated in pots and troughs, and to

this day in 2018, these continue to reward us with a spectacular spring flowering. Mum very successfully propagated them by seed and they have multiplied and been subdivided several times during the past 50 odd years!

Recently I moved to Bulwer, and have now taken over the care of Mum's *Cyrtanthus* collection. As I write this, one pot of some twenty odd *C. falcatus* bulbs has

leaves a few centimetres long, and on 28 July 2018, this season's first bud was showing. The other two collections remained



A sunbird's view of a flower. © Keith Fey

Cyrtanthus falcatus cont'd

fully dormant. The second bulb sent up buds on 31 July 2018 with the third and fourth bulbs showing on 1 August.

Natural habitat

Last December whilst visiting the Ashtonvale Waterfalls for the first time, I photographed the foliage of what appeared to be large colonies of *Agapanthus* spp. on the surrounding cliffs. Later photo editing revealed a distinct growth form, with leaves up to 50 cm (21 inches) in length growing from bulbs.

Definitely not *Agapanthus*!

I returned the following morning equipped with a telephoto lens and tripod. After abseiling down the cliff I found to my delight that these were indeed *Cyrtanthus falcatus*.

They had finished flowering, and here and there, hidden deep within the summer foliage, almost dry seed heads contained the black papery seeds on shrivelled and curled up stalks.

Further exploration of these cliffs this past July revealed colonies of *Cyrtanthus falcatus* growing on north- and east-facing aspects. Surprisingly there are also colonies which grow in deep shade well within the summer high water spray of the waterfall; however the strongest clumps grow well out of reach of porcupines (African Crested porcupine) high up the cliffs.

The Luhane River cuts through a pronounced dolerite rock dyke forming the falls. The rock is very fractured; vertical and horizontal cracks separate significant blocks of stone and sheet fractures on the rock face leading to numerous crevices which, over time, fill with decomposing

rock, soil and organic leaf residue from above. These form ideal pockets for plants, shrubs, aloes, grasses and succulents. In turn wild animals, including rodents, red rock rabbit, dassies (rock dassies or Rock Hyrax, the closest living elephant relative in spite of its size) and civet deposit their dung containing seed and nutrients into the mix. With time these pockets become year-long gardens of Eden.

Fire plays a significant role. The very best

colonies appear to be seldom burnt, being protected in isolation high up on the exposed cliffs. Occasionally fire driven by hurricane-like August winds roars up the valley, igniting the dry grass all the way up the

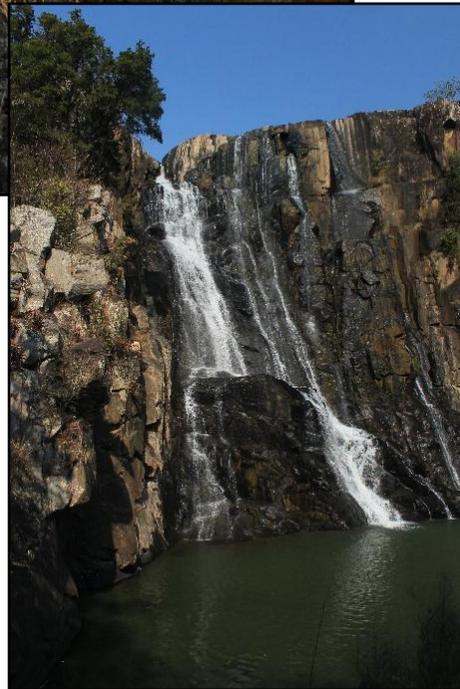
cliffs, after which dislodged clumps of bulbs can be found along the base of the cliff where they are quickly eaten by foraging wildlife, in particular porcupine.

In winter, the days are warm. Heated by the sun the rock face acts like a vast solar heat sink. Mid-morning temperatures on the rock surface reach 40° to 50° C (104° to 122° F), whilst the ambient average

day temperature of the air is in the low 20s C (high 60s F). By contrast at night, there is always a significant frost on the surrounding plateau, from which “waterfalls of cold air” pour down over the cliffs, reaching lows of -5° C (23° F). The bulbs however are protected by the thick layer of soil admix above them, and the ambient



Left: 8 a.m. sun showing long dry leaves of *C. falcatus* on cliffs above Luhane falls. ©Keith Fey



Ashtonvale Waterfalls on the Luhane river. ©Keith Fey

Cyrtanthus falcatus cont'd

rock temperature.

For months at a time during winter, infrequent cold fronts bring little rain and occasionally snow, and so the bulbs remain dormant until the change of



Heavy frost on the plateau with Bulwer Mountain backdrop in late July 2018. ©Keith Fey

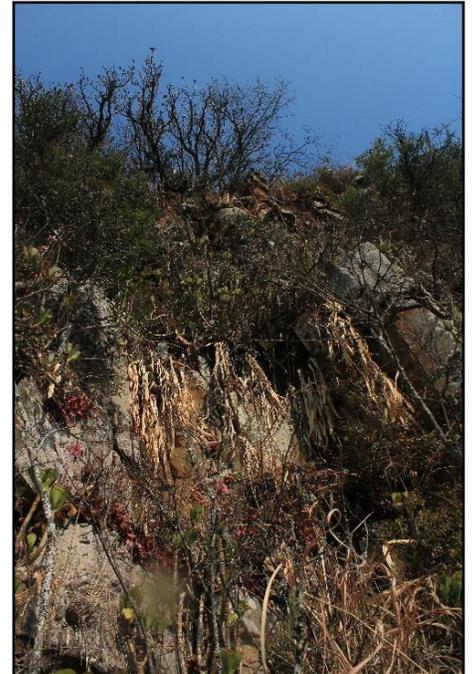
the seasons in late July. Spring heralds the onset of longer, warmer days, with increasing moisture in the form of light showers and mist.

During early spring, the peak flowering season, the cliff face collects rain and fog, channelling moisture downwards into the fissures and the accumulated peat-like sponge of humus above the bulbs. Close inspection reveals new feeder roots growing rapidly “Up” into this sponge like a humus reservoir, whilst larger anchor roots force themselves ever deeper into the horizontal and vertical cracks below and upwards into the very porous humus soil rock admix above them.

In high summer, thunderstorms become frequent. Rain water collecting on the slopes above the cliffs tumbles over edges onto these colonies. The storms are brief and sometimes heavy. Growing below their protected cover of humus, the bulbs in successful colonies are protected by an overhanging thatch of grass and herbage. The very largest of these colonies are additionally anchored by larger bushes, aloes, succulents and often trees such as Natal Bottle Brush, *Greyii sutherlandi*, which have established a permanent “roothold” deep into the cracks. I suspect that the very robust and healthy colonies are decades and perhaps centuries old? Over time, they grow and multiply by vegetative bulb splitting.

These often violent thunderstorms also add a significant annual wash of fresh topsoil and organic matter to the “rooftop” of the *Cyrtanthus falcatus* colonies. Average measured annual rainfall for this region is 877 mm (35 inches). However the additional moisture from the frequent summer mists must account for a further 3 to 5 mm (.1 to .2 inches) of moisture per day, so the real annual rainfall is closer to 1000 mm (39 inches) on the cliff face.

I have just returned from another trip to the falls today 31 July 2018, where I found the first two buds of this season!



Cyrtanthus falcatus growing on the cliffs. ©Keith Fey



First buds of the season. 31 July 2018 on the cliffs above Luhane falls. ©Keith Fey

Doing Science with Ornamental Bulbs - Samantha R. Hartogs

This study was done by Samantha R. Hartogs, BS Biology, and Verónica S. Di Stilio. Both are at the University of Washington, Department of Biology, Seattle, WA 98195-1800. Samantha was a 2017 recipient of the Mary Sue Ittner PBS Grant.

Walking through the forests in the eastern United States, you may notice a small understory plant with delicate white flowers. If you happen to stumble upon *Thalictrum thalictroides* (Rue Anemone, formerly *Anemonella thalictroides*), you might appreciate its beautiful appearance, but unless you dig deeper, you wouldn't know that it grows from a small bulb. *Thalictrum* (Meadow Rue) is a genus of approximately 200 herbaceous perennials from temperate regions worldwide, of which 22 species are found in the United States. They are known mainly for their beautiful clustered blossoms and are the treasure of many gardens.

Thalictrum grows well in moist habitats such as meadows, stream banks, and forest understories and flourishes here in the Pacific Northwest. Interestingly, these flowers lack petals, yet their sepals and stamens are often showy and colorful. The native *T. occidentale* thrives in gardens alongside a variety of non-native species that grow well here and are often maintained as ground cover. Some of the taller species are used as border plants for gardens because of their thin stalks with delicate flowers. One of the relatively unknown features of *Thalictrum* is that it has been utilized as a scientific research tool in developmental, evolutionary, and pollination studies. My lab at University of Washington, Department of Biology, has used *Thalictrum* to discover many previously unknown characteristics that have helped us deepen our understanding in each of these areas.

Being one of the few tuberous species and a spring ephemeral, *Thalictrum thalictroides* makes an excellent study system. There are several reasons tuberous plants are useful for experimentation. For one, tubers are established plants and are therefore fast-growing perennials that will flower each season. Reliability is important for experimentation that depends on fresh floral tissue. *Thalictrum thalictroides* is also easy to propagate from these tubers which has been



Fig. 1 *Thalictrum thalictroides*. Photo by Samantha Hartogs.

useful for generating a large collection of plants that will produce enough flowers for each experiment.

In the wild, there can be a lot of variation when it comes to the way flowers look. These variations are caused by mutations and discovering exactly what differs between the normal and abnormal flowers can lead to fascinating and unexpected discoveries. *Thalictrum thalictroides* has several cultivars that exhibit unique floral features. 'Double White' is one of the most striking examples of what happens when mutations cause extra (petaloid) sepals to develop, and similar mutants are found in the wild (Fig. 2 next page). Another prized cultivar with green sepals is 'Green Dragon' and is desired for its unique coloring. Studying the variation in the way these flowers look allows for a glimpse into the way different floral organs develop and uncovering the genes involved could lead to the cultivation of even more varieties.

I am most interested in pollination biology which focuses on the central questions of what makes a plant successful in getting pollinated and how did flowers get to be that way? Most flowering plants are pollinated by animals, but about 10% of species are pollinated by wind. These include important agricultural crops such as corn, wheat, and rice.

Continued on next page

Doing Science *cont'd*

Fig. 2 Above left and right: Normal *T. thalictroides* flower, double flower commercial cultivar 'Double White' with extra sepals and no reproductive organs. Photos by Verónica Di Stilio. Left: Double flower mutant found in the wild. Photo courtesy of Deanna Walters, Lexington, Kentucky.



There are some noticeable differences between flowers in each of these categories. For example, bird-pollinated flowers tend to be bright, colorful, and contain a lot of nectar, whereas moth-pollinated flowers tend to be white, sweet-smelling and open mainly at night. On the other side of the spectrum, wind-pollinated flowers tend to be less conspicuous and are often green and pendulous. Oak and willow trees are prime examples, with their flowers growing in pendulous catkins.

Thalictrum flowers are either insect (bee, fly) or wind-pollinated, and from studies in my lab it appears that insect-pollinated flowers are ancestral, while wind-pollinated species evolved later. We wanted to figure out what was responsible for making *T. thalictroides* flowers attractive to insects, and what differentiates them from their wind-pollinated relatives. Floral scent is known to be an important factor in a flower's ability to attract pollinators. So in one study, scent was extracted from flowers and tested on a bumblebee antenna. The scent extracted from *T. thalictroides* was able to stimulate the antenna, while scent from wind-pollinated species did not elicit a response. This suggests that the ability to at-

tract insects with floral scent was lost when species became wind-pollinated and no longer needed to attract pollinators (Wang et al, 2018).

Other physical features differ between wind- and insect-pollinated flowers, and can be summarized by saying that there are two different ways by which *Thalictrum* flowers can be showy and attract pollinators. The first is exemplified by *T. thalictroides*, with its large white or pink sepals

(Fig. 4a), and the second is exemplified by *T. aquilegifolium* with its colorful stamens (the male reproductive organs) that grow in bright clusters (Fig. 4b). Wind-pollinated species, such as *T. alpinum*, tend to have pendulous flowers with tiny green sepals and long stamens that extend far past the sepals (Fig. 4c).

Another interesting feature of many wind-pollinated species is that they are dioecious. Species such as *T. dioicum*, *T. dasycarpum*, and *T. occidentale* have male flowers on one plant and female flowers on a different plant, which forces them to cross-pollinate.

For my project, I set out to compare different species of *Thalictrum* to see if the physical appearance of flowers was linked to the way they are pollinated. I measured flowers from as many species as I had available fresh, so my data would be representative of the whole genus. I was limited by the live plant species I had access to, but I was able to acquire several more species thanks to the funds from the Mary Sue Ittner grant. To measure the differences in floral morphology, I used a flatbed scanner to scan flowers from 17 species. I then compared measurements of individual floral organs such as sepals, anthers and styles to build a data set that would allow me to

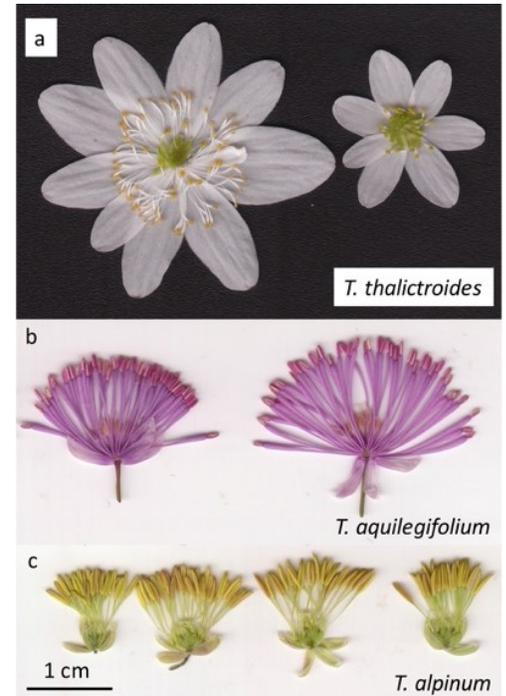


Fig. 4. Flatbed scans of *T. thalictroides* (a), *T. aquilegifolium* (b) and *T. alpinum* (c) above.

***Cyrtanthus falcatus* cont'd**

Cultivation and propagation of *Cyrtanthus falcatus*.

Growing from seed. Through trial and error my mother, Beth Fey, found the following practices give good results.

- Seed must be collected as soon as the capsules begin to turn yellow and show the first signs of splitting open, revealing the black papery seeds.
- Sow the seed in a very light free-draining acidic pH 6.5 growing medium. Half river sand (or dolerite fines from a quarry) with composted pine bark seedling mix.
- Sow in runs 2 to 4 mm (about 1/8 inch) deep and lightly sieve a covering of the medium over them.
- Water once and cover the seed tray or seed pan with clear cling wrap plastic. This should be supported several cm (1-2 inches) above the growing medium, creating a “greenhouse micro climate”
- Place the tray out of direct sunlight, in deep shade; under a table of ferns is ideal. No bottom heat is required here in South Africa, however a temperature range of 15° C (59° F) at night and 22° C (71° F) in daytime is ideal.
- Inspect for germination from about ten days onwards, and remove the plastic covering once 50% or more of the seed is showing new leaves poking up through the medium.
- Move the tray into about 50% shade, and fertilize at this early stage of development with a weak quarter strength NPK and trace element seedling fertilizer, weekly.
- **NEVER overwater** and make sure your seedling growing medium is very free draining.
- The tiny bulbs formed in their first year of growth will lose their leaves in winter. Grow these young bulbs in situ for their first year.

Growing year two

- Transplant out late the following winter into small 1 litre (6-8-inch) pots; plastic is fine.
- Plant several bulbs per pot ***leaving half the bulb above the growing medium.*** They thrive on companionship!
- Do not be concerned about root binding; this naturally mimics their conditions in nature.
- Place the pots in full dawn to midmorning sunshine, then shade after midday.

Growing from third year onwards

- The following winter ***lay the pots ON THEIR SIDES FACING THE WINTER SUNSHINE*** with morning sun, afternoon shade. Protect from temperatures below 10° C (50° F). Do not leave the pots exposed to extreme frost or snow.
- During winter dormancy, allow the pots to dry out very well. One water drenching per fortnight is ample.
- In late winter when temperatures rise, pot the entire clump of bulbs into a 2 to 5 litre container. Simply lift the entire clump without disturbing their root ball. Bulbs will be tiny at this time.
- When repotting, leave at least half the bulb above the growing medium.
- Repeat the winter dormancy regimen by lying the pots on their side.
- At the third repotting into a 5 to 10 litre container, the bulbs will be about the size of a pickling onion. This will be their final repotting prior to first flowering in their fourth or fifth year (It can take many more years of patient waiting depending on your local conditions.).
- In their final pot these bulbs will eventually reward you with a spectacular spring flowering, and multiply, rising up and out of the pot like a good loaf of home baked brown bread. They thrive by root binding and must be left in their pot until

Cyrtanthus falcatus cont'd

it cracks open, at which stage they can be repotted into an even larger container of 10 to 20 litres. Alternatively they can be subdivided.

- Wild mature colonies have 50 to a 100 bulbs!



Pots lying on their side for winter dormancy. August 1 2018.
©Keith Fey

Editor: American container sizes are included here to help you determine which ones to use based on Keith's article: A 2- to 5-liter pot would be approximately 1 gallon. A 5- to 10-litre container would be a 1- to 2-gallon pot or an 8- to 10-inch diameter pot. A 10- to 20-litre pot would be a 3- to 5-gallon container or approximately 12-16 inches in diameter. Just use your experience and best judgement and as long as the soil mix is free-draining, you should be fine.

Pollination of *Cyrtanthus falcatus* by solitary bees and wasps. Ashtonvale Waterfalls on the Luhane River, Bulwer, KwaZu-

*Keith Fey, in an effort to better understand *Cyrtanthus falcatus* pollination, went to great lengths to observe the pollination process.*

Literature cites that the pollination of *Cyrtanthus falcatus* is most probably by sunbirds, butterflies, and flies. However, whilst photographing the natural colony of *C. falcatus* during this 2018 flowering season I have yet to witness birds or butterflies visiting their prolific blossoms.

From first light until dusk I have been on the cliffs harboring *Cyrtanthus falcatus* interspersed with late flowering aloes *Aloe ferox*, *A. maculata* and *A. arborescens* as well as early flowering trees

Greyia sutherlandii, *Buddleja salviifolia*, and the very prolific succulent *Cotyledon orbiculata*. During this time I have observed Malachite, Lesser Double collared, and Black Sunbirds, Redwinged Starlings, Cape White-eye and Blackheaded Oriole flip and fly along the cliff face in foraging parties, drinking the copious nectar produced by the flowering trees, aloes and succulents. All these birds disregard the conspicuous *C. falcatus*.



The first bee was only 2 mm long. ©Keith Fey

There are many active wild hives of the African honey bee secreted in the deep cracks and holes of the cliff face. I have never witnessed these honey bees visiting *Cyrtanthus falcatus*. However, whilst photographing with a Canon DSLR equipped with a



Wasp collecting pollen. ©Keith Fey

200 mm telephoto lens this morning, I noticed very small insects hovering about the *C. falcatus* blossoms. With the aid of binoculars I witnessed different species of tiny black

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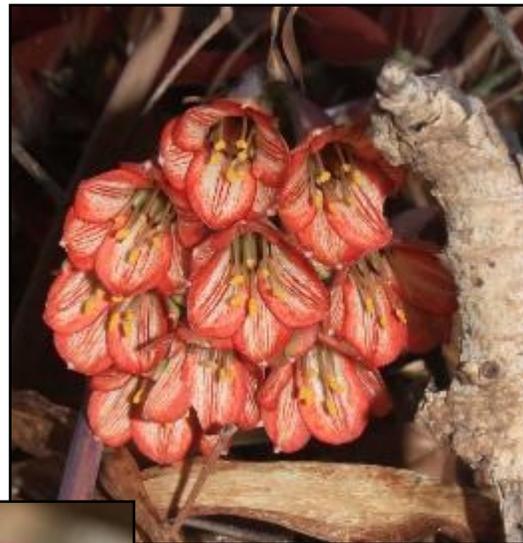
***Cyrtanthus falcatus* cont'd**

Bee collecting pollen. ©Keith Fey

wasp and bee first landing on the flower, then crawling out of sight into the blossom, then emerging shortly thereafter to quickly fly off, sometimes to visit another blossom, at others times almost instantly disappearing into the surrounding vegetation.

Climbing down the cliff, I was able to secure a safe perch underneath clumps of flowering *Cyrtanthus falcatus* with ripe pollen. Looking up into the blossoms, I focused my lens and set the flash, took a few test exposures and adjusted my shutter speed priority to 1/500 sec. then waited for the tiny black bees to arrive. I didn't have a long wait.

The wild African spring day spread out behind and below me. I could hear the foraging flocks of nectar-feeding birds moving about. A little Sparrow Hawk alighted briefly on a branch

Two examples of natural color variation in *Cyrtanthus falcatus*. ©Keith Fey

close by and noticing me, took off, mocked by Fork-tailed Drongos.

The bees arrived. Never more than two or three at a time, alighting on the top of "shepherds crook" of the *C. falcatus* resting before taking off to land on the outside of the tepals. After a brief moment, they would then crawl into the blossom, heading directly for a ripe pollen-

saturated anther. Clasp- ing the fila- ment behind the an- ther with its front legs, the bee or wasp rubbed

pollen onto its head between its eyes. Next it wove its way around, "rummaging" on top of the surround- ing anthers collecting pollen with its hind legs and all over its hairy abdo- men. Then having gathered its fill, it crawled directly to the stigma. At the very tip of the stigma it paused, rub- bing pollen grains all over stigma and for a short way down the style, then followed the style deep down and out of sight into the interior of the flower towards the ovary and possibly the nectar.

I witnessed this "pollen collection" several times with the aid of very close focusing binocu- lars.

Keith welcomes comments and correspondence from every- one as he feels privileged to live and work in this high floral kingdom. dubaifey@gmail.com



Board Minutes - July 29, 2018

Present: President Nhu Nguyen, Vice President John Wickham, Secretary Kathryn Andersen, Treasurer Arnold Trachtenberg, Directors Jane McGary and Albert Stella, Director and Co-editor Jennifer Hildebrand, Editor Robin Hansen.

President Nguyen called the meeting to order at 1:03 p.m. EDT.

Treasurer's Report: Trachtenberg reported a balance of \$39,595.94 in the UBS account. He sends Stella a list of members still owing for seeds and bulbs every quarter. He has some new images for bookmarks and for use in the *Bulb Garden*.

Minutes of April 22, 1018 Meeting: Trachtenberg moved to accept the corrected minutes. Second by Hildebrand. Motion carried.

Membership: McGary said that paid up membership stood at 326, about average for this time of year. She will work with Hansen and Nguyen to reformat membership list for publication. May add favorite plants, etc. to the Membership Directory. Trachtenberg will look to see how it was done before. Those who join after October 1 receive an extra quarter for their one year membership price. McGary will send out the word.

The Bulb Garden: Nguyen suggested placing the memorial issue online. All agreed to putting the issue online after sending it to the membership.

SX/BX: Stella reported that things are going well especially after receiving many oxalis donations. Nguyen keeps track of how many offerings are posted each year. Stella has not been overwhelmed with donations and would like to offer seeds as he receives them.

Hippeastrum Book: McGary has had some difficulty communicating with the authors, so she is still working on the book. She is also determining which photographs to be included. Graphics are in need of some work. No print on demand company has been found yet to publish the book. She will send Trachtenberg the PDF file and he will get a price.

The meeting was adjourned at 2:13 p.m. The next meeting was set for 1 p.m. EDT, October 28, 2018.

Treasurer's Report for First Quarter 2018

		<u>2nd Quarter</u>
Balance April 1 2018	\$	43,805.34
INCOME		
U.S. Members	\$	600.00
Overseas Members	\$	500.00
BX Receipts	\$	928.45
Investment results	\$	23.63
Total INCOME	\$	2,052.08
EXPENSES		
BX/SX Postage	\$	(1,324.20)
BX/SX Supplies	\$	(441.96)
BX Helper	\$	(62.80)
Board Conference call	\$	(87.36)
Accountant fees	\$	(500.00)
Treasurer's Supplies	\$	(265.00)
Publications	\$	(1,685.00)
Publication postage	\$	(647.97)
PayPal expense	\$	(188.36)
Bulb Garden editing	\$	(700.00)
Total EXPENSES	\$	(5,902.65)
Balance June. 30, 2018	\$	39,954.77

Respectfully submitted,

Kathryn S. Andersen,
PBS Secretary



Hello, Bulbophiles!!!

It's time to check your stash!...of bulbs and seeds, that is. We would not be able to maintain the Pacific Bulb Society without member support, which largely comes in the form of material donations. You will receive a credit to cover your shipping costs which will be applied to future BX/SX orders.

Your generosity is greatly appreciated! Thank you all.

*Albert Stella
BX/SX Director*

Doing Science *cont'd*

organize the species into groups based on similarities and differences. Once I organized the data, I found that most species that grouped together shared the same mode of pollination. Digging



Fig. 4 *cont'd*. 3D CT-scans of *T. rochebrunnianum* above (d) and *T. actaeifolium* on right (e). All photos in Fig. 4 courtesy of Dan Chitwood, Michigan State University.

deeper, I could see patterns among the groups showing longer styles and larger anthers correlated with species that are wind-pollinated! It seems that even though wind pollination evolved several times independently, each event led to a similar result, and this is known as “convergence”. I was excited to discover this because it brings up more questions I want to study regarding the genetic basis for these differences as well as further investigation into the intermediate forms and outliers that didn’t quite fit into strictly wind-pollinated or insect-pollinated groups; perhaps some opportunistic species are using both?

Flatbed scanning allowed me to conduct measurements on the computer and to analyze the numerical data to find which individual parts of the flower were important in the evolution of wind pollination, but I also wanted to assess flower shape more holistically, in its natural position on a plant. We experimented with the use of a CT scanner because it can take 3D pictures of an entire inflorescence. It worked remarkably well and even gave us a glimpse inside the

unopened flower buds! I am hoping in the future to use these scans to understand the shape of flowers and how the overall appearance is attractive to pollinators.

Studying flower morphology has given me a greater understanding and admiration for the amazing diversity we can observe in the natural world. Scientific research on plants promotes a greater understanding of why plants look and grow the way they do. There are so many ways to appreciate plants, from house plants to gardening to nature walks, and there is always more to learn about what makes them so special.



Works cited:

Galimba, K.D., Tolkin, T.R., Sullivan, A.M., Melzer, R., Theissen, G., and Di Stilio, V.S. (2012). Loss of deeply conserved C-class floral homeotic gene function and C- and E-class protein interaction in a double flowered ranunculid mutant. *Proc. Natl. Acad. Sci. USA* 109 (34), E2267-2275.

Wang T, M. Clifford, J. Martínez-Gómez, J. Johnson, J. Riffell and VS Di Stilio. (2018). Scent matters: differential contribution of scent to insect response in flowers with insect vs. wind pollination traits, *Ann. Bot.*



From the Editor

*From the Pacific Bulb Society Wiki regarding *Cyrtanthus* species --*

Bill Dijk stated in his comments on *Cyrtanthus* species that it is a large genus native to South Africa, and they are found growing in a wide variety of habitats, including damp bushy stream-edges, as epiphytes on other plants, and in near desert conditions such as described by Keith Fey. A few species will adapt to cultivation but other species require more specific rest periods and watering depending on origin. At the time Bill wrote (in late 2003), he commented that requirements can be very exact, and that this genus is rarely seen in cultivation; he considers it unlikely they will become popular.

That said, Keith Fey's article will help considerably in growing this genus of mostly larger bulbs, as long as control of conditions is maintained, i.e. fast-draining soil mixes, potting on into larger containers as needed, as well as timing of water, fertilizing, potting up and storing when dormant. Bill reminds us that more bulbs in pots are killed by over-watering than by anything else.

Most importantly, learning about the exact conditions where *Cyrtanthus* species grow, the climate, soil types, availability of nutrients, and so forth, will determine your success. Bill also cautions that seed may be short-lived and should be treated like fleshy amaryllids. For more detail, refer to the PBS Wiki.



SILVERHILL SEEDS

Contact information:

The R. Saunders Trust has been established and donations to it for publication of the species *Gladiolus* book the Saunders were nearly finished with will be accepted through Silverhill Seeds, but must be marked specifically for the book publication. Publication is not anticipated at least until 2019-20 since editing and layout have not begun. Please contact Ondine Schrick at www.silverhillseeds.co.za. Donations may be made to the R Saunders Trust to assist in publication of the *Gladiolus* book. by using PayPal or credit card, but please contact Ondine first for instructions before making a donation.



Its now time to renew for 2019!

We appreciate your support—we would hate to lose you!

Renewing is easy. You can renew **ONLINE** (\$20 U.S., \$25 international) via PayPal. Just use the button on our membership page, <http://www.pacificbulbsociety.org/membership.html>. and follow step-by-step directions.

You can also mail in your renewal. Please direct it to Arnold Trachtenberg, 140 Lakeview Avenue, Leonia NJ 07605

Whether renewing online or by mail, please contact Jane McGary (janemcgary@earthlink.net) if any of your contact information has changed. Please remember that you must be a member to order bulbs or seeds.

Thanks again for your continued support of the Pacific Bulb Society!

Arnold Trachtenberg
140 Lakeview Avenue
Leonia NJ 07605

www.pacificbulbsociety.org

Pacific Bulb Society, *The Bulb Garden*, Volume 16, No. 3



Cyrtanthes falcatus in full bloom. ©Keith Fey

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Propagation - Keith Fey

Doing Science with Ornamental

Bulbs - Samantha Hartogs

Pollination fo *Cyrtanthes falcatus* -

Keith Fey

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