



The Slipper Orchid Alliance Newsletter

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The Paphiopedilum Barbigerum-Complex, A New Puzzle for Growers and Taxonomists

Within the genus *Paphiopedilum* we have a few problematic groups that consist of closely related species, variable species with one or more varieties, or even some species that look quite alike but are not closely related phylogenetically; i.e., they aren't direct descendants of a common ancestor. In this latter group species with separated distributions might have evolved similar looks because they are exploiting similar pollinators. These species are not closely but generally related and share a couple of similar genes (e.g., color expression, leaf pattern, etc.) although they had different ancestors. Now, in response to the selection pressure of a shared pollinator group, e.g., a certain genus of hoverflies, the slipper orchids have developed rather look-alike flowers. An example would be the trio *Paphiopedilum sukhakulii* Schoser & Senghas 1965, *Paph. venustum* (Wallich ex Sims) Pfitzer 1888 and *Paph. wardii* Summerhayes 1932. Some even believe that *Paph. wardii* would be the natural hybrid of the former two. Already, the horticultural hybrid *Paph. Double Deception* (*sukhakulii* x *venustum*) proves that assumption wrong, because it looks rather different

SOA Membership

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from *Paph. wardii*. *Paph. sukhakulii* and *Paph. venustum* do not share a common distribution, and neither of the two grows in the same area as *Paph. wardii*. DNA analysis, a powerful tool these days, shows that the three species belong to the same section but are not closely related. *Paph. sukhakulii* and *Paph. venustum* are indeed sisters; i.e., they are direct descendants of the same ancestor. However, the sister species of *Paph. wardii* is *Paph. purpuratum* (Lindley) Stein 1892; i.e., it evolved from a different ancestor. Recently a new form of *Paph. wardii* was published that reminds us a lot of *Paph. purpuratum*: *Paph. wardii* forma *ying-xiang* F.Y. Liu & Z.F. Zhao 2007.

If we look at groups of closely related species we inevitably come to section *Cochlopetalum*, the species around *Paph. victoria-regina* (Sander) M.W. Wood 1976 (also known by its synonym *Paph. chamberlainianum* (Sander) Stein 1892). Wood (1976) has regarded part of them as varieties, others as mere synonyms of *Paph. victoria-regina*. This view is not followed by most specialists because there are obviously clearly separated populations in the wild without gradual transition of characters. Therefore, it makes sense to uphold species rank for the different groups. Such treatment is also granted to the pairs *Paph. parishii* (Reichenbach f.) Stein 1892 / *Paph. dianthum* Tang & Wang 1940, *Paph. haynaldianum* (Reichenbach f.) Stein 1892 / *Paph. lowii* (Lindley) Stein 1892, *Paph. bullenianum* (Reichenbach f.) Pfitzer 1894 / *Paph. appletonianum* (Gower) Rolfe 1896 (with a lot of forms in between that often are treated as species on their own), or *Paph. barbatum* (Lindley) Pfitzer 1888 / *Paph. callosum* (Reichenbach f.) Stein 1892 (also with many forms in between that are sometimes also treated as species).

An example of variation within a species is *Paph. villosum* (Lindley) Stein 1892. The species concept is comprised of the type variety *Paph. villosum* var. *villosum*, by *Paph. villosum* var. *boxallii* (Reichenbach f.) Pfitzer 1903 and by *Paph. villosum* var. *annamense* Rolfe 1907. The type variety, var. *villosum*, has a dorsal sepal

with a maroon to brownish-violet reticulated center, a relatively wide greenish zone and a more or less narrow white margin. In var. *boxallii* the central brown coloration is often very dark to blackish, the reticulation overlaid or replaced by dots, and the entire flower darker. In var. *annamense* the dorsal sepal has a more or less violet center that goes directly over into a rather broad white margin. As there is a constant transition of these floral characters between the populations, and only separated clones in cultivation seem to indicate separate species, the treatment of these forms as varieties makes good sense. More so, as the pubescens of the ovaries and stems is likewise rather fluid between the groups, with long white hairs to short red ones, thus not providing a reliable tool for identification of truly separated groups.

While the examples presented above are long known and often discussed, a new taxonomic problem group has just recently appeared on the scene. When in the 1980s the first living *Paph. barbigerum* Tang & Wang 1940 entered cultivation in the West, it was usually compared to *Paph. insigne* (Wallich ex Lindley) Pfitzer 1888. The new



Paphiopedilum insigne (left) and Paph. barbigerum var. barbigerum (right)

species, however, differs considerably from the long known *Paph. insigne*. Not only in size but also in flower shape and coloration, *Paph. barbigerum* differs nearly as much from it as it does, for example, from *Paph. villosum*. Most prominent is the lack of dark spotting in the dorsal sepal of *Paph. barbigerum*, as well as its more constricted base. On the other hand, both species share rather similar petals with slightly undulated margins. Meanwhile, a lot of different forms of *Paph. barbigerum* from southern China, northern Vietnam and even northeastern Thailand are known. As usual in the orchid world, most of these new forms were and by many still are regarded as new species; some, like *Paph. coccineum* Perner & Herrmann 2000 and *Paph. vejvarutianum* Gruss & L. Roellke 2003, were published as new species, and *Paph. x aspersum*

Averyanov 2002 as a natural hybrid of *Paph. barbigerum* with some unknown parent because of its dark spots in the dorsal sepal (still different enough from *Paph. insigne*, despite the spotting).



Paph. barbigerum var. barbigerum at Hengduan Mts. Biotechnology with a spontaneous seedling of Paph. barbigerum var. coccineum (front right) which flowered 3-4 years after seed was falling into the pot.

During the last several years I assembled a lot of different forms of *Paph. barbigerum* which are used as breeding stock in the nursery of Hengduan Mountains Biotechnology in Chengdu, Sichuan province, China. Based on the observations I could make with this material, I fully agree with Leonid Averyanov that *Paph. coccineum* is a variety of *Paph. barbigerum*. First Leonid had republished *Paph. coccineum* as *Paph. barbigerum* var. *lockianum* Averyanov 2002, but he has now put the variety *lockianum* into synonymy with *Paph. barbigerum* var. *coccineum* (Perner & Herrmann) Cavestro 2001. He also now regards his *Paph. x aspersum* as a variety of *Paph. barbigerum* (Averyanov et al., 2007) with spots in the dorsal sepal and a flower coloration close to var. *coccineum*, and I fully agree with that. The formal publication as a variety of *Paph. barbigerum* hasn't been made by him yet but is pending. *Paph. vejvarutianum* was described by Olaf Gruss and Lutz Roellke based on plants from northeast Thailand, which are also known as *Paph. 'kraititii'*, a trade name of no scientific significance. He



Paph. barbigerum var. aspersum (left) and Paph. barbigerum var. coccineum (right)

compares the overall shape and size of the plant with Paph. gratrixianum (Masters) Rolfe 1905 and the flower with Paph. barbigerum. From the latter he separated it by the intense reddish markings on the floral bract, which according to Gruss would be comparable to Paph. charlesworthii (Rolfe) Pfitzer 1894, and the more intense flower color. All these characters - the larger size, the more or less intensely marked bract and the intense reddish flower color - are typical of Paph. barbigerum var. coccineum. In fact, Paph. vejvarutianum does not differ in any feature from Paph. barbigerum var. coccineum, including the staminode that lies well within the range of Paph. barbigerum and its varieties.

Why is lumping all these different slipper orchids into Paph. barbigerum justified? Because there is in fact a continuous transition from small forms with brownish-yellowish flowers (the typical Paph.



Paph. barbigerum var. coccineum, large clone with tall flower stems

barbigerum var. barbigerum) to small ones with more yellowish flowers (also var. barbigerum) and those with reddish flowers and narrower petals (Paph. barbigerum var. coccineum) to medium-sized flowers which can be yellowish (var. barbigerum) or reddish (var. coccineum) and rather tall plants with large leaves and red flowers (again, var. coccineum). Then there are medium-sized plants which have much in common with Paph. barbigerum var. coccineum, but with the



Paph. barbigerum var. barbigerum, yellow form.

main difference of dark brown spots in the dorsal sepal (var. aspersum). This group, which is still under the umbrella of one species, might in the more or less distant future become separated into distinct species, when intermediate forms are extinct, the distinguishing characters are more strongly pronounced and separate adaptations to different pollinators and more or less different environments have taken place. But today they are densely linked and too close for any specific separations. There is, however, one group that seems to have drifted away far enough to form a rather unique group, published by the Austrians Franz Fuchs and Herbert Reisinger as Paph. herrmannii Fuchs & Reisinger 1995. I find it odd that Phillip Cribb (Cribb, 1998) as well as Leonid Averyanov (Averyanov et al., 2003) regard this species as a natural hybrid between Paph. barbigerum and Paph. hirsutissimum var. esquirolei (Schlechter) Karasawa & Saito 1982. With the latter it shares no common features. The only shared character would be the strongly undulated petals, but these are a mere intensification of what is already clearly present in Paph. barbigerum. The pouch, the sepals, the staminode and the coloration are free of any Paph. hirsutissimum influence! And the often mentioned high variability of Paph. herrmannii is something I have never seen documented in any photos nor living plants I had before me. I even dare to state the opposite: compared with many other species, including Paph. hirsutissimum, Paph. herrmannii is a relatively uniform species with low variability. It is, however, so close to Paph. barbigerum var. coccineum, that, besides several less obvious differences, the coloration and undulated margins of the dorsal sepal are the easiest clues



Various forms and species compared. Front row from left to right: *Paph. gratixianum*, *Paph. barbigerum* var. *aspersum*, *Paph. barbigerum* var. *coccineum*, *Paph. barbigerum* var. *barbigerum*. In the background clones of *Paph. barbigerum* var. *coccineum*.

to tell apart *Paph. herrmannii* from *Paph. barbigerum* var. *coccineum*. And yet, in two of his recent books Guido Braem has published a photo of *Paph. barbigerum* var. *coccineum* as *Paph. herrmannii* (Braem et al., 1999; Braem & Chiron, 2003).

Rather distinct from *Paph. barbigerum*, though frequently mentioned as being very close, is *Paph. helenae* Averyanov 1996 (a synonym is *Paph. delicatum* J.Y. Zhang et Z.J. Liu 2001). This beautiful little miniature slipper orchid is easily told apart from *Paph. barbigerum* and its varieties by the narrow plain petals, always semi-pendulous, and the dorsal sepal with its characteristic bright yellow to orange coloration topped with a narrow white margin and usually a little brownish staining at the



Paph. barbigerum var. *barbigerum* (left) and *Paph. helenae* (right).

base. Another species, which unlike *Paph. helenae*, has had not much attention so far is *Paph. areeanum* Gruss 2001, initially published by Olaf Gruss as being the natural hybrid between

Paph. barbigerum and *Paph. villosum*; later Singchi Chen and Zhong-Jian Liu published the synonym *Paph. rhizomatosum* S.C. Chen & Z.J. Liu 2002. It is not a hybrid, not only because in its western Yunnan habitat *Paph. barbigerum* does not occur but also because it forms pure populations of its own with a set of characters not common in *Paph. villosum* nor *Paph. barbigerum* (or other closely related species). The flower stem is always rather tall like in *Paph. insigne* (but even more so) and carries a medium-sized flower with slender segments. The leaves are pretty much of the size and appearance of *Paph. villosum*. The most interesting character is the often enormously elongated rhizome which looks like it belongs to a *Vanda*, not a *Paphiopedilum*. I have plants with the stems (rhizome seems

an inappropriate term for an upright green stem above ground) between 30-40 cm (1 foot and more) long and had to plant them in narrow deep pots for Chinese cymbidiums. After 2 or 3 years the buried stems have rotten away, and now the plants have a normal appearance (including healthy new roots) with the normal short rhizomes one expects from a regular *Paphiopedilum*. The collector of the specimens and discoverer of the species, Mu-Hua Zhao {after whom *Paph. chaoi* Hua 1999 was named, a synonym of *Paph. henryanum* var. *christae* (Braem) Braem 1999} told me that the plants were climbing on steep limestone slopes in shady places over rocks and in trees, a habit like in *Vandas* and similar orchids. As already mentioned, in pot culture this habit gets lost, but even in stronger light the flower stems remain very tall. Nevertheless, I have mounted one specimen with a pad of sphagnum moss on a hardwood branch. It has grown reasonably well for about three years but has not flowered yet, while the potted specimens flower regularly each autumn.

In conclusion, following are the species and varieties in the close affinity of *Paph. barbigerum*:

Paph. barbigerum var. *barbigerum*
Paph. barbigerum var. *coccineum* (synonyms *Paph. barbigerum* var. *lockianum*, *Paph. vejvarutianum*)
Paph. barbigerum var. *aspersum*
Paph. herrmannii
Paph. areeanum (syn. *Paph. rhizomatosum*)

Seedlings of all varieties of *Paph. barbigerum* from Chinese plant material, as well as of *Paph. helenae* (which occurs in northeast Vietnam as well as in southwest Guangxi, China) and *Paph. areeanum*, were produced in

the laboratory of Hengduan Mts. Biotechnology. In cooperation with the Chinese CITES authorities these laboratory propagated plants will be distributed internationally in the coming years.

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10th International Slipper Orchid Symposium

Altamonte Springs, Florida was the site for the 10th International Slipper Symposium on November 3rd and 4th. Vendors and participants from as far away as California, Massachusetts, New York (Bob Phillips) Chicago (Ken Brewer), and Marcia Romeck from Eugene, Oregon attended as well as many other Lady Slipper enthusiasts.

Jamie Lawson and the Orchid Study Group organized the symposium with the assistance of Frank Smith and Tina Coen of Krull-Smith. The venue was the Holiday Inn and seven vendors were in attendance: Katherine & HP Norton, and daughter Carol Campbell from Orchidview; Earl and Phyllis Bailey from ORCHIDbabies, LLC; Sam Tsui from Orchid Inn; Norito Hasegawa from Paphantics, Ltd; June Hill from Raingreen Tropicals; Fred Clarke

from Sunset Valley Orchids; and Robert Quene' from Orchids Limited.

The first speaker was Fred Clarke of San Diego, CA. Fred Clarke is a professionally trained horticulturalist and has grown orchids for over 30 years. Fred now owns and manages Sunset Valley Orchids in San Diego, CA. He maintains his interest in the newest and best for breeding interesting crosses focusing his breeding efforts on *Cattleyas*, *Paphiopedilums*, Australian *Dendrobiums*, *Bulbophyllums*, and *Catasetenae*. He's perhaps best known for developing *Fredclarkeara After Dark*, the blackest orchid ever seen.

Mr. Clarke's topic was "Trends in Multifloral *Paphiopedilums* section *Coryopedilum*" during which he reviewed the influential species, primary and advanced hybrids. In January Fred will be speaking at the World Orchid Congress in Miami.

Dr. Robert Quene' of *Orchids Limited* in Plymouth, Minnesota was the second to speak. Dr. Quene', born in Kenya but raised in the Netherlands, received a Ph.D. in plant breeding at the University of Minnesota. Since 1999 he has directed all the laboratory work and most of the hybridizing at *Orchids Limited* where he has specialized in *Phragmipedium*, *Paphiopedilum* and *Phalaenopsis* breeding. Dr. Quene' spoke on *New Developments in Paphiopedilum and Phragmipedium Breeding at Orchids Limited*.

Norito Hasegawa owns *Paphantics, unLimited* in Santa Ana, California. *Paphantics* has specialized in *Paphiopedilums* since 1975 and Norito has been growing and collecting orchids for over 35 years. He's been involved in growing and hybridizing commercially and also is a hobbyist and author. His partner was Harold Koopowitz for over 20 years, and he co-authored the book "*Novelty Slipper Orchids*" with Harold Koopowitz.

Dr. Hasegawa's topic was "Paph Species and Their Influence on Modern Hybrids." Norito is very interested in and committed to orchid conservation; and he believes that since there is so much hybridizing, we cannot lose sight of the future of breeding patterns. He stressed that we need to keep the gene pool pure as much as possible. All breeders should think carefully about what they can do, as it is so important to maintain the species. There are 60 odd species of Paphs, and we must remember, "Extinction is forever, and Conservation is forever as well."

Frank Smith, the final speaker of the day, began growing orchids when he was 15 and it has been his continuing passion. About 32 years ago, he and Jim Krull formed a partnership and Krull-Smith Orchids was born. Frank became an AOS judge and was one of the youngest to ever be in training. His topic was "A New Standard for Awarding Paphs."

Saturday November 3rd boasted outstanding culinary delights too: a delicious lunch was followed by a Champagne Barbeque Supper at the Pavillion at Krull-Smith in Apopka on Saturday evening. Bill Thoms kept the bidders chuckling and enjoying spending money on beautiful orchids while he tried to get bids higher and higher for the Symposium expenses. All monies raised support the Symposium! The next day, a breakfast back at the Pavillion at Krull-Smith initiated a marvelous morning in the greenhouses of Frank Smith.

The International Slipper Orchid Symposium is sponsored by the Slipper Orchid Study Group of Florida, and Jamie Lawson is its moderator. Originally Paul and Mary Phillips of Ratcliffe Orchids began the symposium, and they requested help from the Study Group. When the Phillips left the country in 2006, Frank Smith of Krull-Smith offered to help. With his help and that of Tina Coen, Frank's assistant, the Symposium was moved from Kissimmee to the Altamonte Springs Holiday Inn. The traditional open house was kept alive when Frank Smith graciously offered to host it at his nursery.

Plans for the 11th International Slipper Orchid Symposium are already underway, and Jamie Lawson and Frank Smith are promising to make it better and better. You are cordially invited to reserve the first weekend in November, 2008. Make plans now to attend.

Phyllis Bailey
Scribe
ORCHIDbabies, LLC

Upcoming Events

52nd Paph Guild Meeting

Saturday and Sunday, January 12 and 13, 2008
The Inn at Morro Bay, Morro Bay, CA
Tentative list of speakers includes: Olaf Gruss, Terry Root, Fred Clarke, Jerry Fischer, Sandra Song and Charles Weckerle-Thrun
Contact Patti James for more information. Phone: (805) 528-5086, email: flowergirlpj@charter.net

SOA Meeting at WOC

The SOA will have a meeting at the World Orchid Congress in the Sheraton Miami Mart Hotel and Convention Center on Thursday, January 24, 4:30 p.m. in the Banyon Room (please check the posted daily events to confirm the room). This meeting is open to anyone interested in the lady-slipper orchids. The American Orchid Society will meet in the same location prior to the opening of the WOC and will not hold a separate spring meeting.

2008 Paph Forum

Saturday, February 16, 2008
National Arboretum, Washington, DC
The 28th annual NCOS Paph Forum will feature internationally-renowned speakers, plants for sale, a show table featuring hundreds of slippers in bloom, ribbons and trophies for outstanding show plants and a silent auction. Speakers will include Leonid Averanov from the Russian Academy of Science and Dennis D' Alessandro of Gypsy Glen Orchids in PA. Other speakers to be announced later. Please visit the NCOS website for further details and registration information. <http://www.ncos.us/ncos>

Pink Phragmipediums in Columbia

In May of 2007, I had the opportunity to visit Cálí, Colombia, and to give some lectures to the Asociacion Vallecaucana De Orquideología. It was a wonderful experience to meet so many generous and dedicated orchid people and to get the opportunity to visit areas around the city that until very recently were considered unsafe due to the ongoing war between the government and various guerrilla factions.

One area in particular caught my attention. It is the habitat for a very interesting population of Phragmipediums. What appears to be two closely related, yet distinct species, were found growing together, and luckily we saw both in flower. According to local orchid collectors, this is the only known locality in Colombia for these species. One of them is the enigmatic and much debated *Phragmipedium fischeri* Braem & H.Mohr. The original description, published in Leaflet. Schlechter Inst. 3: 30 (1996), was based on a plant in cultivation with a malformed flower, different from the very similar *Phragmipedium schlimii* (Linden ex Rehb.f.) Rolfe. Some of the differences, however, appear to have been occasional anomalies in the flower morphology and do not seem to be consistent with the species. There are other features though, that clearly distinguish it, particularly the

shape and position of the shield of the staminode. In *Phragmipedium schlimii* the diamond shaped shield is placed more or less above the orifice of the lip, while *Phragmipedium fischeri* has a more irregularly shaped shield placed slightly deeper into the lip. The latter species is by no means a recent discovery. It has been known among orchid collectors, importers and growers for more than a century. It is illustrated and referred to as *Cypripedium schlimii* var. *albiflorum* in Veitch's *Manual of Orchidaceous Plants 2 (Cypripedium)*: 67 (1889), where it is mentioned that it comes from the western Cordillera in Colombia, is considered "exceedingly rare," and was introduced into horticulture via Linden's nurseries in 1873.

According to present day local collectors, large numbers of plants were exported a few years ago, and as recently as in the spring of 2007 an estimated 1000 plants left the country. A picture of *Phragmipedium fischeri* can be seen in *Orchid Digest*, Nov.-Dec.: 232 (1978), labeled "*Phragmipedium* sp. nov." It is the same picture (mirror reversed) that was published in *Orchid Digest* Jan.-Feb.: 6 (1970), then identified as "*Phragmipedium schlimii*," but mentioned as coming from southern Colombia and being different from the northern form of the species. Regardless of what appears to have been a malformed flower of the holotype of *Phragmipedium fischeri*, it appears to be a distinct species, and it is a mystery why it was not described until 1996.

What is more obscure, however, is the second species from the Cálí area, which is our most recent member of the genus: *Phragmipedium andreetae* P.J.Cribb & Pupulin. The species was described in *Lankesteriana* 6(1): 1-4 (2006), and is based on a collection from an undisclosed locality in the northwestern part of Ecuador, which is the same locality where the type of *Phragmipedium fischeri* was found, according to an Ecuadorian plant collector. It is interesting that these rare species grow together in both places.

When seen next to each other *Phragmipedium andreetae* and *Phragmipedium fischeri* appear very distinct, both in plant and flower shapes, but there are also some definite similarities, such as the shape and color of the staminode and the lip. The entrance, or orifice, of the lip differs, however, with *Phragmipedium andreetae* having a much narrower opening (at least in the few flowers examined by me), suggesting a smaller pollinator. Very little is known, however, about the natural variability of both these species, and more field studies are needed in order to better understand how, and if, they are able to maintain a valid and distinct taxonomic profile. According to people who visited the Colombian site in the past, the road cuts used to be literally covered by plants that displayed flowers with a high degree of color variation. Whether they also varied in shape is uncertain since they

were all considered to be *Phragmipedium schlimii* at the time. In May of 2007, only scattered seedlings could be observed along the road cuts, and since then, a broadening of the road probably has ensured that most of these have disappeared as well. The good news is that this seemingly destructive construction project will also provide a fresh new habitat for future *Phragmipedium* seedlings to germinate. This happened successfully in the past and will most likely happen again, since many species of *Phragmipedium* seem to thrive in man-made roadside habitats. If plant collectors leave the area alone for a decade, I am quite confident that we once again will see a healthy roadside population of pink Lady-Slipper orchids.

The key to the cultivation of these orchids may be found by observing the natural habitat. All species mentioned in this article, and also *Phragmipedium besseae* and *Phragmipedium kovachii*, grow in, at least seasonally, extremely wet areas, where cool water is constantly seeping down the vertical cliff sides where the orchids thrive. I have observed healthy looking plants of *Phragmipedium besseae* flowering freely with generous amounts of water showering both plants and flowers. Seedlings are often found in large numbers below the cliffs where they grow in gravel, organic muck or occasionally as epiphytes on mossy roots and branches of trees. At the 2006 Slipper Symposium in Kissimmee, Florida, I purchased an unbloomed seedling of *Phragmipedium fischeri* from Jason Fischer. Upon my return to Sarasota I replanted it in a clay pot, using an airy mixture of coarse perlite, charcoal and limestone gravel, with very little further organic material in the medium. I then placed the clay-pot inside a larger and sphagnum filled plastic pot to ensure a lot of air movement around the roots, but also to maintain a high humidity at all times. The potted plant moved around for a while until it found a permanent place on the mist-bench in our "cool-house" (which really is our "not-so-very-hot-house"). Once exposed to constant mist and sopping humidity, it began growing very well and flowered in August of 2007. It was the tiniest *Phragmipedium* flower I have ever seen, to be compared only with *Mexipedium xerophyticum* in size, but there was no doubt about the similarity to the wild plants of *Phragmipedium fischeri* in the Cálí area. A voucher specimen has been accessioned in the Orchid Identification Center database, and a DNA sequencing has been done (with the patient support of Norris Williams and Mark Whitten), at the University of Florida in Gainesville. The preliminary results are intriguing and will be presented at a later date.

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Some Thoughts About Paph. sanderianum

By John Doherty

Paph. sanderianum is one of the icons in the slipper world, forever changing the face and dynamic of Paph breeding since its re-discovery in Sarawak in 1978. Perhaps unbelievably to some, we are approaching the 30-year mark of its tangible impact on modern horticulture. To this day, however, sanderianum remains a beguiling and elusive species, with flowering specimens rarely, if ever, seen at shows or judging centers. Some of the reasons for this are discussed below. This article will first provide a brief background on the species itself, with an additional focus on its impact in breeding endeavours to date.

Habitat

First discovered in 1885 in Borneo, sanderianum was subsequently rediscovered in Sarawak in 1978. It grows on vertical northeast or east-facing limestone cliffs, and apparently spends most of the day in deep shade. It is reported to receive diffuse sun in early morning; however, other observers have reported much brighter conditions. In all likelihood, like many orchids, it can be found across a spectrum of light intensities. Flowering in the wild occurs between March and June, with annual mean temperatures of 85 F during the day and 65 F at night. Elevations vary from 50-500 m, annual rainfall is considered heavy, and relative humidity is constant at 80-85%.

Roots are in direct contact with the limestone substrate, as well as leaf litter and mosses. Medium is clearly calcareous, with a pH of 7.3-7.5.

There are apparently two colour forms of the species: the highland form, which has darker colored flowers, shorter petals, and somewhat stiff, upright leaves. In contrast, the lowland form tends to have lighter colored, more tan flowers, and apparently much longer petals (~3 feet). Leaves are longer and floppier. I personally have not seen these in the field, so cannot comment on *in situ* morphological variants. In cultivation, I have seen plants that fit both descriptions. After growing this species for more than 15 years, my current sentiment is that flower color, and particularly petal length, are significantly impacted by environmental conditions. As many growers will tell you, any orchid's behaviour can indeed change dramatically when exposed to varying conditions, including light levels, fertilizer, humidity and temperature. I have seen this in flowering our 'Rapunzel' clone of

sanderianum many different times, with petal length varying from 30-40 cm on its maiden bloom, to a maximum of 110 cm on another, with all sorts of different sizes in between. Colour as well is environmentally influenced to a degree, with higher light levels usually resulting in lighter colored flowers. The deepest, darkest colored rothschildianums often come from the deepest, darkest parts of the greenhouse.

How big is big?

Equally surprising and disappointing is the number of AOS awards that have been given to this species: 14 to date. The petal length varies from 58-95 cm on record, with anywhere from 2-5 flowers.

Paph. rothschildianum and its own history in cultivation serve as a great basis for comparison. Relatively speaking, we are much earlier in the process of "horticultural introduction" with sanderianum than rothschildianum. When they first came out, roths were exorbitantly expensive and difficult to grow. Flower quality was often mediocre, with little significant difference from wild strains. Subsequent breeding and selection, with inadvertent selection pressures favouring greenhouse cultivation practices, have ultimately led to much easier to grow, higher quality, breathtaking flowers. Many sib crosses available today could be considered "fast growing" – seemingly impossible just 20 years ago. Sanderianum is currently at these early stages; plants in cultivation are relatively slow at best. As with any species new to horticulture, the process of flasking and deflasking begins to favour the faster growing seedlings, to a point where a measurable and observable overall improvement in vigour is achieved within but a few generations. The good news is, therefore, ten years from now sanderianum will be much easier to grow than it is today! We can, however, expect, as we have seen with rothschildianum, that the market price for a large blooming size sanderianum will remain relatively high. This will eventually become a direct function of time invested in its propagation, and much less so for the novelty/rarity currently associated with many of the highest price tags.

How do we grow sanderianum?

We get asked this question a lot! Generally, we grow the plants in bright Paph/bright Phal conditions; we try to get the leaves to a light green/yellow coloration, where they may sometimes look almost whitish. Mix is our typical Paph mix of fine/medium fir bark, with ~10% charcoal, ~5% sponge rock, and a sprinkle of chopped sphagnum. We also top dress twice a year with oyster shell. Watering is relatively frequent, as I have found this species does not like to dry out; however, yes, you can indeed rot the roots from overwatering. Once the roots are compromised, it is



Paph. sanderianum flowers

very slow to come back and sulks for months or years, taking its time to regain its momentum (if at all). UNLIKE most other Paphs, repotting does not seem to particularly stimulate new growth, so we try to repot only every 18 months or so.

Blooming is on a mature growth, with a second growth at least 2/3 mature. We have some clones that bloom in the fall or spring, while I am convinced that others are triggered to bloom by hot summer nights.

As we water with RO water, we use a balanced 20-20-20 fertilizer with a micromineral blend added, to a conductivity of 0.4-0.5. In our location (Windsor, Ontario, across the river from Detroit), our greenhouse is regularly 90 F and 95% humidity from June to Sept. Under these bright, hot, steamy conditions, sanderianum grows more in those 4 months than it does for the remaining eight.

Sanderianum as a parent....

The AOS awards system has been in place for many years and represents the best objective measure of the quality of any given orchid hybrid. As many will agree, there are plenty of high quality orchids worthy of recognition that are not captured by the awards system, for a multitude of reasons. For the purposes of this discussion, however, there is no greater nor valuable resource of award data in a single location that serves our purpose. Many excellent



**Paph. Screaming Eagle 'Zephyrus Burgundy Curls'
AM, CCM/AOS**

crosses receive no awards, and vice versa, with many mediocre crosses perhaps receiving more than their fair share. Having said that, I acknowledge that this data is certainly not comprehensive nor definitive, yet is only discussed as a general point of reference.

To illustrate this point, look at Paph. Dragontale (supardii x sanderianum). This is a fabulous cross. Its award record does not indicate this however, as it has received only 3 AOS awards. This should not be interpreted as a reflection of its merit. Rather, this is a reflection of its rarity in cultivation. If we were ever able to measure the percentage of plants flowered of any given cross versus the number of those flowerings that actually received awards, Dragontale would certainly be near the top of the list. Unfortunately this metric is practically incalculable, so we will now use the AOS awards database as a valuable, although slightly imperfect, alternative. So let's roll the numbers.....

Did you know???

- There are about 85 different registered hybrids with sanderianum as a pod or pollen parent.
- The top ten awarded sanderianum hybrids

account for 88% of all sanderianum hybrid awards!

These are listed below: (Number is current awards as of this article.)

- x rothschildianum = Prince Edward of York, 47
- x St. Swithin = Angel Hair, 22
- x philippinense = Michael Koopowitz, 21
- x stonei = Sander's Pride, 19
- x adductum = Paul Parks, 19
- x kolopakingii = Kolosand, 16
- x Berenice = Screaming Eagle, 11
- x glaucophyllum = Landmark, 7
- x primulinum = Oberhausen's Diamant, 5
- x haynaldianum = Angelina Kruger, 4

This tells us a number of things about the way this species has performed thus far in North American breeding programs:

- Eight of the top ten are primary hybrids, suggesting that fertility issues may present themselves in attempts to breed with more complex hybrids.
- Alternatively, those crosses made with hybrids (as opposed to species) may just be lacklustre!
- Eight of the top ten are bred to multiflorals. As initially suspected, the dramatic petal length of sanderianum is only maintained, to varying degrees, by other multiflorals; petal length is muted or completely dominated by short petalled species, i.e. brachys, parvis, Maudiaes.



Paph. William Ambler x sanderianum

F2 Hybrids: Generation Dismal!

Perhaps not surprisingly to some, sanderianum has proven to be a poor grandparent. Of the 85 or so hybrids made with sanderianum, only 13 of those have been used as subsequent parents.

From those 13 sanderianum crosses that were used as parents, there were about 55 different crosses made. Of those 55 crosses with sanderianum as a grandparent, only **THREE** have been awarded. Phrased differently, **only 5% of all hybrids with sanderianum as a grandparent have been awarded!**

The vast majority (>90%) of "second generation" sanderianum awards have gone to Shin-Yi's Pride (Michael Koopowitz x rothschildianum). This leads us to the question, why has sanderianum been such a poor grandparent?

Part of the answer is simply time - these next generation hybrids have simply not been around long enough, and aren't grown by enough people to make a measurable impact on the award system. Early flowerings of things like Shin-Yi Sanders (Michael Koopowitz x sanderianum) and Shin-Yi Dragon (Prince Edward of York x Berenice) show tremendous promise. The former looks like a superior Michael Koopowitz with petals as long as you'd expect, with the latter looking very much like Screaming Eagle, yet attractively presented on upright inflorescences, thanks be to the greater influence of rothschildianum.

Next Steps

There is hope! Looking carefully at the second generation sanderianum crosses, we see only three have been crossed back to sanderianum:

- Shin-Yi Prince (Prince Edward of York x sanderianum)
- Shin-Yi Sanders (Michael Koopowitz x sanderianum)
- Shin-Yi Sand Lady (Booth's Sand Lady x sanderianum)

Given this again represents about 5% of all second generation crosses, the net effect has been an overall dilution of the impact of sanderianum on subsequent generations. It seems at this point that in order to maximize the impact of this formidable parent, it must be reintroduced to breeding lines to impart its trademark characteristics.

At time of writing, crosses like Michael Koopowitz x

Prince Edward of York had not yet been registered. In my own opinion, this direction holds the greatest promise for the future of next generation, long petalled hybrids that are both colourful, easy to grow, and presented on upright, arched inflorescences.

Line Breeding Primaries

An alternate approach exists for creating improved primaries such as Michael Koopowitz or Prince Edward of York (PEOY), that being subsequent sibblings from selected clones. Perhaps counter-intuitively, PEOY x PEOY can yield potentially better progeny than simply remaking rothschildianum x sanderianum. The reason is that during the process of pollen/ovule formation (meiosis), the gametes (egg/sperm) of a hybrid have the potential to favour one parent or another. This means that SOME of the pollen from PEOY will behave more like sanderianum (and SOME too would behave more like rothschildianum). Conceivably, pollen behaving more like sanderianum, uniting with an ovule that favours sanderianum as well, would result in progeny that remains PEOY, yet is significantly *more than 50%* sanderianum.

Compared to a remake of a primary, it is simply not possible to expect progeny to be ever more than 50% sanderianum.

Future Directions and Goals

I shall not try and speak for all Paph breeders out there, so the following goals represent ones that I personally value and strive for in a sanderianum hybrid:

- Readily flowering from a single growth
- 3-5 flowers per spike
- long, arching spike held at 45 degrees to maximize petal presentation (upright vertical spikes don't show off petals well and can look messy)
- minimum petal length 50 cm
- great colour

Untapped potential exists in a number of species as yet untested: gigantifolium (colour, floriferousness), intaniae (spike habit), stonei or philippinense album (albinisitic Sander's Pride or Michael Koopowitz, wow!), and even adductum var. anitum (a black Paul Parks!?!).

I have recently flowered Julius x Michael Koopowitz and was so impressed with the results that I named it after my wife (Nicole Doherty). Spikes were upright with the rich Julius colour, and petals on first bloom seedlings a modest length of 25 cm. An encouraging result, yet clearly indicative of the need for additional breeding

efforts with 'Nicole Doherty' – rights as a breeder over which I hope to maintain exclusivity!

BIO INFO:

John Doherty loves colourful, long petalled multiflorals and wishes he could flower parvis more easily. He lives in Windsor, Canada, across from Detroit, with his wife Nicole and two daughters Jordyn and Madelyn. He is also a judge, is fascinated by Madagascan terrestrials such as Cynorkis, would love to see a picture of sangii x sanderianum, and has 3 blue panther chameleons as greenhouse pets. nic@zephyrusorchids.com



Paph. sanderianum 'Rapunzel' AM/AOS

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