A REVISED CHECKLIST OF THE GENUS PAPHIOPEDILUM

HAROLD KOOPOWITZ

SINCE THE ORIGINAL annotated checklist was published in the *Orchid Digest* (Koopowitz 1995), two important revisions of the genus have appeared. Phillip Cribb (1998) has revised his earlier 1987 work, and Guido Braem with the help of Charles and Margaret Baker has expanded on his original 1988 monograph (Braem, Baker & Baker 1998, 1999). At the same time numbers of new species have been described which are not included in those works. In the intervening years, I have also had the opportunity of examining additional material of several species for which I earlier had inadequate samples. This now requires amending some of my earlier concepts. There are, however, several species that still remain obscure, and, in the absence of good specimens and adequate population samples, must remain poorly defined.

The late Professor Ted Schelpe said that taxonomy was easy as long as one had only a single specimen with which to work. Delineating species demands an adequate knowledge of the natural variation within and between populations. While we have information on variation available from wild-collected and cultivated plants, we usually do not know how the variation relates to population structure. Population structure is dynamic, and many plants are members of either rapidly evolving species

Charles Rowden

Paph. acmodontum 'Amethyst' B/CSA

Left to right: Richard Clark, Jean Pierre LePabic, Trudi Marsh

Paphiopedilum adductum 'Wayne' HCC/AOS

P. adductum var. *anitum*

Paphiopedilum appletonianum

Left to right: Courtesy of CSA Files, Paphanatics, unLtd., T. Marsh

Paphiopedilum argus 'Red Helmet' AD/CSA

Paphiopedilum armeniacum

Paphiopedilum barbatum

or active hybridization zones. Many of the forms currently described may be incipient species, not yet isolated or separated from their ancestral stock. Other plants may represent unsuccessful, though natural, experiments on their way out. Species are described on a single specimen, but is it a new, single form representative of a real species or merely an aberration, a rare mutation from an otherwise different population and not a real species at all? This problem is compounded by politics. Normally, scientists are reluctant to describe new species on the basis of a single specimen but would rather wait until additional population information is available. Paphiopedilums, however, are so charismatic, and there is such intense competition to give new species names that one cannot afford to wait to have suspicions confirmed or denied. Recently, three different descriptions were published in the race to be first to name *P. vietnamense*. The publications were separated only by days, and the slightest delay lost the race for two of the descriptions.

Another problem involves consistency of interpretation, not only between taxonomists but also within a single worker's treatment. This is the question whether to lump or to split. For example, *Paphiopedilum barbatum, P. callosum,* and *P. lawrenceanum* are all very similar morphologically and merely vary with regards to the position and placement of the petals and pattern of warts on the petals. One might want to regard all three as either subspecies or varieties of a single species. However, each concept can easily be identified although the basic similarities are also quite evident. Both Cribb (1998) and Braem et al. (1998, 1999) draw species boundaries around each of those three and treat them as separate species. In a similar vein, the various species—*P. victoria-regina, P. victoria-marie, P. primulinum,* etc.—could also be considered either subspecies or varieties of one very variable species. This was suggested by Wood (1976) but was never really accepted by other workers. If the component members of the *P. callosum* alliance and the *P. victoria-marie* alliance are considered to be different species, then logic demands that many other slipper-orchid taxa must be treated similarly. In Cribb's second edition (1998), he reinstates several taxa back to species level; thus *P. dianthum* is separated from *P. parishii, P. wilhelminiae* was removed from *P. glanduliferum,* and *P. fowliei* and *P. hennisianum* are separated. But Cribb is reluctant to recognize *P. lowii , P. lynniae,* and *P. richardianum* as distinct although the differences between those three concepts are on a par with those between *P. parishii* and *P. dianthum*. Braem et al. (1998, 1999), on the other hand, deals with this problem by grouping very similar species into "complexes" although he retains most of the species' names, even where he doubts that they really define clear species. But his complexes are not equivalent to each other; e.g., his *P. villosum* complex very clearly contains plants and species that very closely resemble *P. villosum* and also the closely related *P. gratrixianum* and *P. boxallii*. This is clearly a natural grouping of taxa that share a recent common ancestry and makes sense. But then Braem produces a *P. insigne* complex with a disparate group of species of which *P. exul* must possess a much closer relationship to *P. insigne* than any of the other species in that complex. He also includes *P. tranlienianum, P barbigerum,* and *P. helenae* into that complex. These must be much more distantly related to *P. insigne* than *P. exul,* while *P. henryanum,* which clearly also belongs in this group, is put into a totally separate alliance with *P. herrmannii*.

Since the publication of my earlier checklist (Koopowitz 1995), I have had the opportunity of examining many more specimens, including several which at that time had only recently been described and were not available. Based on this and also in an effort to be consistent about where boundaries are drawn between species and varieties, I have also restored several varieties back to the species level.

The genus *Paphiopedilum* stretches across tropical Asia, down through the various islands of Malaysia to New Guinea and across to the Solomon Islands in the east. Species are widely scattered across this region, but we often find discrete populations on islands hundreds of miles from their relatives. The Southeast Asian archipelagoes are recent with insulation (creation of islands) having only occurred since the peak of the last ice age some 10,000 years ago when the ice caps started to melt and sea levels rose. Some of the islands may have been separated from adjacent landmasses for less than 6,000 years. This is scarcely enough time for speciation to have occurred. Even those islands that existed at the peak of the last ice age have had their surface areas drastically reduced as sea levels rose when the ice caps melted. In addition, one might expect a number of species on these "new" islands to be facing imminent but natural extinction because of the species' relaxation effect (reduction in number of species an area can support) that occurs when species are isolated on an island or confined to a smaller area. On top of this, rampant deforestation and land conversion have destroyed many of the natural ecosystems of Southeast Asia. Many sites are so perturbed that one might expect man-induced extinctions to affect the natural slipper-orchid populations as well. When new populations are discovered, they may only be remnants of what previously existed, and our knowledge of the natural variation that once was found in that species is compromised. Concomitant with this are a species at ever-faster rates. It is no wonder that the situation is often confusing. A plethora of species names, some good and others not, abound to make the situation seem arcane.

The genus *Paphiopedilum* is honored with more scrutiny and competition from taxonomists than is normally visited upon other orchids. It is regularly revised, and rather surprisingly there has been a growing concordance among the taxonomists that is reflected in this list as well as the recent monographs of Cribb (1998) and Braem et al. (1998, 1999). There are still certain sticking points, some of which are due to the innate variation with groups such as the *P. appletonianum-P. bullenianum* alliance and the *P. praestans* complex that are simply difficult to deal with, and there are also a few instances where taxonomists have allowed personal preferences to overrule their common sense. But for the most part a reasonable consensus is emerging.

The names of *Paphiopedilum* species have several functions. The most important is that they allow one to communicate with others about a particular plant so that all parties can precisely identify the actual plant under discussion. These names also reflect groups of individual plants which have a common evolutionary origin and which continue to have the possibility of interbreeding and producing fertile offspring in the field. In order to be sure one is talking about the same plant, one needs to be able to compare the plant under discussion with a standard. That standard is usually the type specimen, and unfortunately it is usually a single individual flower, often with no indication of the variation that may occur within the species. To make matters even more difficult, the type specimens are not always accessible or available, and one may have to rely on type descriptions and diagnoses which can be poorly written or very ambiguous, in some cases even inaccurate when the authority has poor powers of observation.

In part, many of the problems in the genus are probably due to active speciation that is currently going on in many of the alliances. We are seeing speciation in action, and the usual boundaries between species have still to be formulated. There has long been a problem in *Paphiopedilum* taxonomy of consistency in the terminology used. The definitions of some of the terms have changed over the last hundred years. In particular, the term "variety" has altered from one denoting unusual or distinctive individuals (clones) to its present and common usage of a subset of a species, which are geographically defined populations of plants that share similar characteristics and are different from other populations of the same species. Usually such a population has the potential of evolving into a new species. Since varieties may be at different stages of this evolutionary process, it becomes a matter of interpretation when a variety has become distinct enough to be considered a separate entity. In this sense, there is no clear difference between the usage of variety and subspecies. In their earlier works on *Paphiopedilum*, Braem or Cribb used the category variety to denote different things. In the earlier monograph Braem confused the term and used it for both individual clones as well as distinct populations; in his more recent treatment Braem now conforms to the accepted usage of variety to denote different populations. The term *forma* is now used to mean distinct individual clones such as albinos that one wants to delineate from the rest of the population.

Most systematists strive for a way of grouping species that reflect their evolutionary history: this is the function of subgenera and sections. However, it is difficult to peer into the past with much certainty. There have been a series of techniques that have purported to have been useful for reconstructing evolutionary relationships. Originally it was comparative floral morphology, and then chromosomal analysis became popular. Currently, molecular techniques comparing the structure of DNA in the plants' genes are being touted. All of these approaches are problematic and none can claim certainty. One should bear this in mind as one listens to the experts espousing their interpretations. Current molecular techniques have been used to construct a *Paphiopedilum* phylogeny (Cox et al. 1997), which has been most useful in confirming the organization of the genus at the subgeneric level. Perhaps one of the main surprises from this is the close affinity of the old *Cochlopetalum* Section with subgenus *Paphiopedilum* rather than with the other multifloral species.

What follows is a list of *Paphiopedilum* species names and some of their most common synonyms. This work is not exhaustive and the synonymy is not complete, but it contains most of the names still used by growers and those that are common in the trade. Some of these species are very distinct and there is little argument or controversy about their identity, but others are so variable that it is difficult to resolve their nature without lumping the taxa into overly large and unwieldy groups.

Checklist of the Species

Species and varietal names printed in bold are those names which I consider to be acceptable. Paragraphs that are set apart discuss names that have been in the literature or have become well known even though they may refer to concepts that are ill-defined. Some names are to my way of thinking either synonyms or illegitimate for a number of reasons. To a large extent this checklist reflects my own views and biases and does not always agree with those of other taxonomists. In this work I recognize eighty-two "good" species and sixteen distinct varieties. Much of the new increase is due to the findings of new species rather than the rearrangement of old ones. Without a doubt there are other new species still to be described.

Paphiopedilum acmodontum Schoser *ex* M. W. Wood

This is a clearly defined species with a tooth at the midrim of the pouch and stubby petals, painted pink. There is no controversy as to its taxonomic status.

Paphiopedilum adductum Asher

Syn.: *P. elliotianum, sensu* Fowlie, Orchid Digest 44:70; 1980 *non Cypripedium elliotianum* O'Brien

There appears to be a general consensus that *P. adductum* is the accepted name for this taxon.

Paphiopedilum adductum var. **anitum** (Golamco) Koop. **comb. nov.**

Syn.: *P. anitum* Golamco, Waling-Waling Review 9:9-14; 1998

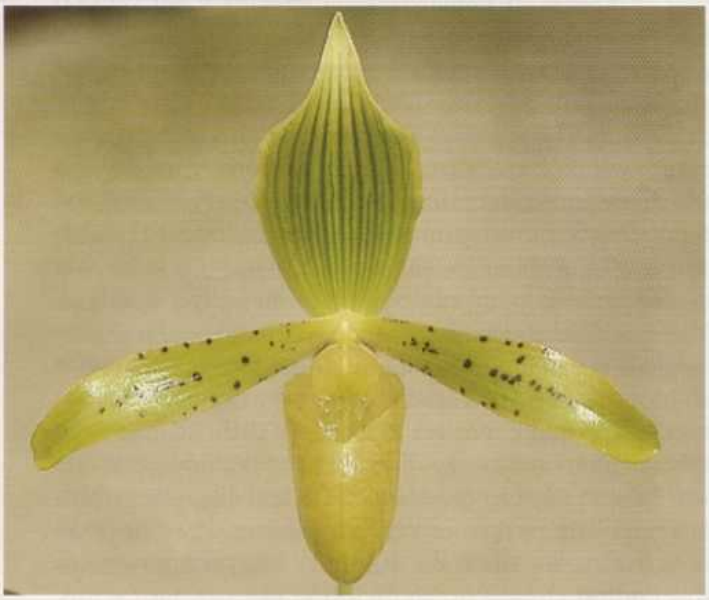
Recently described, this appears to be merely a slightly larger and more darkly colored form of *P. adductum*. My examination of the staminode in *P. adductum* does not reveal the distinctive differences that Golamco described. The differences in width of the lobes and the cleft between them can easily be accommodated within the concept of *P. adductum*.

Paphiopedilum appletonianum (Gower) Rolfe

Syn.: *P. bullenianum* (Reichb.*f.*) var. *appletonianum* (Gower) Rolfe
P. cerveranum Braem

Paphanatics, unLimited

Paphiopedilum bellatulum



Paphiopedilum braemii

Left to right: Charles Rowden, Trudi Marsh, Paphanatics, unLimited

Paphiopedilum bellatulum 'Orbicular' B/CSA

Paphiopedilum barbigerum

Paphiopedilum ciliolare

Trudi Marsh

Paphiopedilum bullenianum

Paphiopedilum bullenianum var. *celebesense*

Paphiopedilum callosum var. *potentianum*

Paphiopedilum dayanum

Left: O. Gruss, right: Paphanatics, unLimited

Paphiopedilum callosum

Paphiopedilum callosum var. *sublaeve*

Paphiopedilum concolor 'Charles'

Left to right: Charles Rowden, Paphanatics, unLimited, Trudi Marsh

Paphiopedilum chaoi

Paphiopedilum charlesworthii 'Jamboree'

Left: H. S. Hua, right: Paphanatics, unLimited

P. hainanense Fowlie
P. wolterianum (Kraenzl.) Pfitzer

This is a relatively uniform grouping. *Paphiopedilum appletonianum* and *P. wolterianum* only appear to differ with respect to stem length. *Paphiopedilum hainanense* merely has leaves that are more silvery and comes from the island of Hainan, but similar leaves are occasionally found among the mainland forms of *P. appletonianum*. This group is closely allied to *P. bullenianum* and has been submerged into that taxon in the past.

Paphiopedilum argus (Reichb.*f.*) Stein
Syn.: *P. sriwaniae* Koopowitz

Paphiopedilum sriwaniae was described as a new species on the basis of floral characteristics seen in several different plants flowering for the first time (Koopowitz 1991) at Ray Rands' nursery. At that time, they appeared to be substantially different from *P. argus* in the shapes of both the pouches and petals. However, subsequent flowerings of the same specimens produced flowers that were identical to those of *P. argus*. Some type of environmental treatment must have caused the differences in floral morphology. It seems best to treat *P. sriwaniae* within the concept of *P. argus*.

Paphiopedilum armeniacum S. C. Chen & Liu

Initially this species was thought to be a yellow form of *P. delenatii*, but the proportions of the staminode and labellum, as well as vegetative growth habits, clearly place *P. armeniacum* in its own taxon, and there is no longer any argument that this is indeed a distinct species.

Paphiopedilum barbatum (Lindl.) Pfitzer

Several workers in the past have noted the close relationship of this taxon with both *P. callosum* and *P. lawrenceanum*. Karasawa (1979), however, demonstrated clear differences in chromosomal number among the three species. In several cases within *Paphiopedilum*, extremely similar "species" may differ from each other by slight differences in chromosome number. Such species may be considered cryptic species; i.e., they look morphologically very alike but in the wild are genetically isolated from each other.

Paphiopedilum barbigerum Tang & Wang
Syn.: *P. insigne* var. *barbigerum* (Tang & Wang) Braem

Braem (1988) considered this to be merely a variety of *P. insigne*, but in his revision of the genus (Braem et al. 1999), he now regards it as a species in its own right. While clearly closely allied to *P. insigne*, the differences between *P. insigne* and *P. barbigerum* are more than sufficient to justify retaining them as independent taxa.

Paphiopedilum bellatulum (Reichb.*f.*) Stein

There is no argument about the status of this distinctive species.

Paphiopedilum bougainvilleanum Fowlie

To my mind, this is merely a very pale variety of *P. violascens* and should be reduced to a variety of that taxon, despite the fact that both types differ in chromosome number. There are many other well-known examples where members of the same species have populations with differing chromosome numbers. Cribb (1998) as well as Braem, Baker & Baker (1999) seem to agree with this assessment, but they still retain *P. bougainvilleanum* as a separate species name.

Paphiopedilum bougainvilleanum var. *saskianum* Gruss & Röth
See under *Paphiopedilum violascens*.

Paphiopedilum braemii Mohr
Syn.: *P. tonsum* var. *braemii* (Mohr) Gruss

This appears at first glance to be a distinctive miniature plant with green flowers and a relatively narrow, flat dorsal sepal. Although I have seen flowers that are intermediate in both size and form between this and *P. tonsum*, they are rare. Since 1995, I have observed many more specimens of this and seen the results of a sibling cross between two plants. They seem quite uniform, and while the two concepts are obviously very closely related, it now seems more sensible to treat *P. braemii* as a distinct and separate species.

Paphiopedilum bullenianum (Reichb.*f.*) Pfitzer
Syn.: *P. amabilis* (Hallier) Merr.
P. johorense Fowlie & Yap
P. linii Schoser
P. tortipetalum Fowlie

This group is a taxonomist's nightmare, but all of the above appear to be minor variants on a theme and fit comfortably into the *P. bullenianum* concept. There are slight differences in the positioning of the petals and shapes of the staminode. It may be that with further investigation some will be elevated to varietal or even species rank. There still also exists the possibility that this concept should be lumped with that of *P. appletonianum*.

Paphiopedilum bullenianum var. **celebesense** (Fowlie & Birk) Cribb
Syn.: *"P. ceramensis"* Birk *nom. nud.*

Cribb (1987) combined this group with that of *P. bullenianum*. I leave it like that, but I remain to be convinced that it is really distinct enough to warrant special status.

Paphiopedilum callosum (Reichb.*f.*) Stein

Although this is a widespread and variable species, it remains relatively distinct. The feature that sets it apart from *P. barbatum* and *P. lawrenceanum* is the relatively broad petals with ciliate warts primarily on the upper margin. In addition, the placement and poise of the petals have a characteristic down-swept curve.

Paphiopedilum callosum var. **sublaeve** (Reichb.*f.*) Cribb
Syn.: *P. birkii* Hort.
P. sublaeve (Reichb.*f.*) Fowlie
P. thailandense Fowlie

These are a constellation of smaller forms of this species

that fit comfortably into the concept of *P. callosum*. The differences between these and *P. barbatum* are mainly with the width and stance of the petals.

Paphiopedilum callosum var. **potentianum** (Gruss & Röth) Cribb

Superficially this variety looks like *P. callosum* but differs in the absence of warts and the prescence of hairs around the opening of the lip. Gruss (pers. communication) does not think that the picture used to depict this plant in Cribb (1998) is one of var. *potentianum*. Like other plants for which there appears to be a single specimen, it is difficult to decide the true taxonomic status. Over the years, several other pictures have surfaced of forms of *P. callosum* with brownish coloration and reduced warting; whether or not these are also forms of var. *potentianum* remains to be determined. Until additional information is available, I favor following Cribb and reducing this to varietal status.

Paphiopedilum cerveranum Braem

Syn.: *P. robinsonii* Hort., *non* (Ridley) Ridley

Guido Braem has pointed out that this plant resembles *P. appletonianum* but appears to have a distinctively different staminode. Braem reduced *P. robinsonii* to a form of *P. bullenianum*. Averyanov has clearly demonstrated the variability of *P. appletonianum* staminodes and those of *P. cerveranum* fall into that concept.

Paphiopedilum chamberlainianum (O'Brien) Stein

Braem, Baker & Baker (1998) have resurrected this name although the *Cochlopetalum* species have not yet been described in their works. I feel more comfortable following Cribb (1998) in considering this as synonymous with *P. victoria-regina*. Some of the plants still masquerading under this name are bred originally from a plant known as *P. chamberlainianum* 'Tip Top' that looks as if it is the natural hybrid between (what I call) *P. liemianum* and *P. moquettianum*. These plants can be distinguished by the maroon-brown speckling on the dorsal sepal, which has a base color of greenish yellow fading to white at the edges.

Paphiopedilum chaoi Hua

Syn.: *P. henryanum* var. *christae* Braem
P. henryanum forma christae (Braem) Cribb *ex* Gruss & Röth

Paphiopedilum chaoi was based on a single specimen collected in China. This is obviously a member of the *P. insigne* alliance and has some resemblance with *P. henryanum*. However, it differs from the latter in its distinctive color pattern bearing an unusually mottled pouch and an unspotted dorsal sepal. This flower bears such a close resemblance to *P. henryanum forma christae* Braem that it seems reasonable to assume that the two plants belong to the same concept. Whether or not *P. chaoi* should be submerged into *P. henryanum* still remains to be determined.

Paphiopedilum charlesworthii (Rolfe) Pfitzer

This small and colorful species is set aside from others of the *P. insigne* alliance by its white staminode.

Paphiopedilum ciliolare (Reichb.*f.*) Stein

Wood (1981) made this a subspecies of *P. superbiens*. Both petal and leaf characteristics clearly distinguish the two taxa. In addition, the breeding behavior in hybridization is distinctly different from that of *P. superbiens*.

Paphiopedilum concolor (Lindl.) Pfitzer

This dwarf species has flowers that are usually not confused with others in the genus. There is a putative hybrid swarm from China known as *P.* ×*conco-bellatulum* but very few of them show obvious hybrid characteristics other than somewhat larger sized flowers. They should probably be sunk into the *P. concolor* concept.

Paphiopedilum dayanum (Lindl.) Stein

Syn.: *P. petrie* (Reichb.*f.*) Pfitzer
Cypripedium superbiens var. *dayanum* (Lindl.) Reichb.*f.*

The long, smooth petals fringed with long cilia and without marginal or petal surface warts, set this species apart from others in the *Barbata* Section.

Paphiopedilum delenatii Guillaumin

The clear, soft pink coloration, the relatively small pouch, and a large staminode set this species apart from other members of the *Parvisepalum* Subgenus. The rediscovery of this taxon in Vietnam indicates that it is relatively homogenous and with minimum variation except for depth of color in the pouch.

Paphiopedilum dianthum T. Tang & Wang

Syn.: *P. parishii* var. *dianthum* (Tang & Wang) Cribb & Tang

Cribb & C. Z. Tang (Cribb 1982) reduced this to a subspecies of *P. parishii;* however, Cribb reversed himself in the second edition of *The Genus Paphiopedilum*. Major differences that are found in *P. dianthum* include an erect inflorescence with relatively few widely spaced flowers, a glabrous ovary, a differently shaped labellum, and a primarily white dorsal sepal. In *P. parishii* the ovary is pilose and the horizontal inflorescence bears many closely spaced flowers with straw to yellow-green colored dorsal sepals.

Paphiopedilum druryi (Bedd.) Stein

This is a distinct species that is not questioned. Once thought extinct we now know of a protected population bearing a few thousand individuals. This species is distinct, being a member of the *P. insigne* alliance that has long rhizomes between the ramets.

Paphiopedilum elliotianum (O'Brien) Fowlie

Although this species is usually taken to be a synonym of *P. rothschildianum* (and I follow that in this work also), the actual usage of the name has produced an intriguing puzzle. Much of this has been discussed in great detail (Asher 1983). Braem (1988) considered that the epithet referred to what is now commonly known as *P. adductum*, which it is clearly not. Part of the problem is that the original floral descriptions are from a damaged

Center: T. Marsh, others: Paphanatics, unLtd.

Paphiopedilum delenatii

Paphiopedilum druryi

Paphiopedilum emersonii (type flower)

Center: Charles Rowden, others: Trudi Marsh

Paphiopedilum exul

Paph. fairrieanum 'Jamboree Fire' B/CSA

Paphiopedilum gratrixianum

Left: R. Wellenstein, right: unknown

Paphiopedilum dianthum

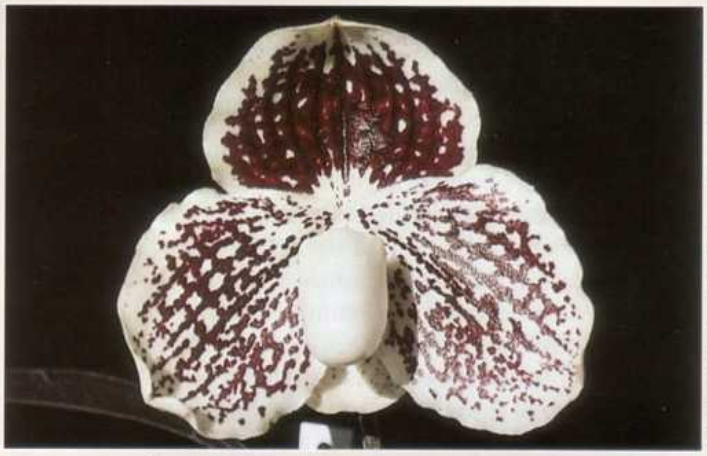
Paphiopedilum gigantifolium

Left: Trudi Marsh, right: Paphanatics, unLimited

Paphiopedilum glaucophyllum

Paphiopedilum fowliei

Paphiopedilum godefroyae



Paphiopedilum godefroyae var. *leucochilum* 'Emily' AM/AOS

Left: Trudi Marsh, right: Paphanatics, unLimited

Paphiopedilum hangianum

Paphiopedilum haynaldianum 'Winfield' B/CSA

Left: O. Gruss, right: courtesy of CSA Files

Paphiopedilum helenae

Paphiopedilum hennisianum

Left: unknown, right: Trudi Marsh

Paphiopedilum henryanum 'Jamboree' HCC/AOS

Paphiopedilum herrmannii

Left: Charles Rowden, right: O. Gruss

specimen, which was described by several people almost simultaneously. Other subsequent plants that seem clearly to be *P. rothschildianum* were later described and illustrated. The important specimen is the initial one used in the description. There is a line drawing in an advertisement published by the firm of Sander & Co. at the same time. The remarkable feature of the drawing that no modern reviewer has commented on is that it looks almost exactly like the flowers of some of the *P. sanderianum* hybrids that are currently blooming. In addition, Reichenbach described the ovary in the original specimen as being "Ovaries white, with red ribs." A white ovary is a diagnostic feature of *P. sanderianum* that appears in nearly all of its primary hybrids as well. In addition some of the *P. sanderianum* hybrids have red ribs. Braem, Baker & Baker (1998) have revisited the problem of this name, and Braem is now inclined to accept that *P. elliotianum* was in fact a natural hybrid of some sort.

Paphiopedilum emersonii Koop. & Cribb
Syn.: *P. huonglanae* Hort. *nom. nud.*

Paphiopedilum emersonii appears to be closely related to *P. hangianum*. Other members of the subgenus tend to have darkly tessellated leaves while *P. emersonii* and *P. hangianum* both have thick almost succulent plain green leaves. The leaves of plants under stress occasionally show faint mottling or the presence of veins. Much has been made of this by Braem, who has tried to enforce the idea that the leaves in this species are mottled; regardless, the leaves of *P. emersonii* are distinctly different from most of the other *Parvisepalum* species. Recent discoveries in Vietnam were described as *P. huonglanae*. Apparently the name *P. huonglanae* was never properly described. The Vietnamese populations do appear to have longer leaves and perhaps somewhat larger flowers, but nothing appears to warrant their acceptance as a discrete variety.

Paphiopedilum exul (Ridley) Rolfe

Originally in 1891 *P. exul* was described as a variety of *P. insigne* by Ridley. Rolfe considered it a separate species and Cribb (1987) treated it as such. Braem (1988), on the other hand, resurrected its variety status. In his current treatment Braem treats *P. exul* as a legitimate species. In Braem's (1999) treatment there appears to be a mix up in his pictures (page 227): the inset with his picture of *P. exul* is clearly that of *P. insigne* 'Sanderae' while the main picture he has labeled as *P. insigne* (page 231) is obviously also one of *P. exul*.

Paphiopedilum fairrieanum (Lindl.) Stein

There is no argument about the status of this species. However, there appears to be some uncertainty about the spelling of the specific epithet. The species was named for Mr. Fairrie, but due to a publishing error one of the *r*'s was dropped. Such orthographic errors can be corrected and, as Cribb (1987) pointed out, the name should have a double *r*.

Paphiopedilum fowliei Birk
Syn.: *P. hennisianum* var. *fowliei* (Birk) Cribb

This is a small but distinct species that has affinities with members of the *Barbata* Section. The differences between *P. fowliei* and *P. hennisianum* are as distinct as any of the accepted parameters separating other members of the *Barbata* Section. In his recent treatment, Cribb (1998) now also recognizes *P. fowliei* as a legitimate species. Braem had earlier sunk this into *P. lawrenceanum*. It will be interesting to see how he places this species when he revises Section *Barbata*.

Paphiopedilum gigantifolium Braem, Baker & Baker
Syn.: *P. ayubii* Hort. *ex* Parnata

One of the newly discovered species, this plant appears to have similarities with *P. supardii* but is a much larger plant with white ovaries similar to those of *P. sanderianum*. The name refers to the very wide and long leaves that are reminiscent of *P. kolopakingii*. This appears to be a good species, differing from *P. supardii* not only in the ovary color but also the tomentose bracts.

Paphiopedilum glanduliferum (Blume) Stein

In the previous checklist I followed Cribb in considering this and *P. praestans* as synonymous. But I am now swayed by Braem, Baker & Baker (1999), Garay (1995), and Christenson (pers. communication) that *P. glanduliferum* is a New Guinea species with a non-striped flower and a very different staminode that separates it from *P. praestans*. Cribb considers that the staminode in the whole complex is very variable. However, the hairs at the base of the staminode in Blume's original drawing are much longer than those in *P. praestans*, and their distribution, being clustered only at the base rather than down the sides of the staminode, is also significantly different. The staminode of the new Bornean species *P. ooii* bears a remarkable similarity to that of the original *P. glanduliferum* drawing; but geography, stripes, and lack of hairy warts suggest that *P. ooii* is not synonymous. Perhaps new discoveries in New Guinea will eventually reveal the true *P. glanduliferum*. For the moment this must be considered a "lost" species.

Paphiopedilum glaucophyllum J. J. Smith

Another difficult part of the genus with which to work is the *Cochlopetalum* Section. Not only has the nomenclature been confused for nearly a century, but it has been radically reworked in quite different ways by modern authors (Braem 1988; Cribb 1987; Wood 1976; Karasawa 1983). I do not include the concept of *P. moquettianum* under *P. glaucophyllum* var. *moquettianum* as do several of those authors.

Paphiopedilum godefroyae (Godefroy-Lebeuf) Stein
Syn.: *P. ang-thong* Fowlie

This is another of those species concepts that has been difficult to assess accurately. The original plant described was a white flower from islands off the coast on the eastern portion of the Thailand peninsula. The plants currently known from that area have been called *Paphiopedilum niveum* var. *ang-thong* or just *P.* ×*ang-thong*. These smaller, white-flowered forms are also difficult to differentiate from the purported natural hybrid of *P. godefroyae* and *P. niveum* called *P.* ×*greyii*. *Paphiopedilum niveum* proper is not

known to occur in the region where *P.* ×*ang-thong* is found. Unfortunately many plants were originally brought into cultivation under the name of *P. niveum* var. *ang-thong* and still masquerade under the epithet of *P. niveum* having lost the hybrid designation, thus further confusing the picture.

Paphiopedilum godefroyae var. **leucochilum** (Masters) Hallier

Syn.: *P. leucochilum* (Rolfe) Fowlie

Most of the plants currently known under the concept have unspotted lips and the petals have markings in the form of fine reticulated blotches. They are found on the islands bordering the west coast of the Thailand peninsula. Some people consider those with unspotted lips to belong to a different species concept. Several years ago, I did observe a small number of plants in original importations of the species, which had some speckling on the lips although most of the individuals bore concolor lips. Flowers with either white or yellow backgrounds have been observed in the same wild populations (Plested, pers. communication). These plants also have a different flowering season from those described from the eastern coast of the Thailand peninsula.

Paphiopedilum gratrixianum (Masters) Guillaumin

Syn.: *P. villosum* var. *gratrixianum* (Masters) Braem

Despite some variation in dorsal sepal color and flower petal stance, these seem to be most usefully dealt with as a distinct species.

Paphiopedilum hangianum Perner & Gruss

Another newly discovered Vietnamese species that belongs to the Subgenus *Parvisepalum*. While this plant bears a superficial resemblance to the man-made hybrid between *P. emersonii* and *P. malipoense*, it is in fact quite distinct. The leaves resemble those of *P. emersonii* in not being tessellated, and the pale green flower is said to have a distinctive odor.

Paphiopedilum haynaldianum (Reichb.*f.*) Stein

This Philippine species is clearly defined and without any contention. The dorsal sepal normally carries large, irregular (although somewhat rounded) markings. The photograph used by Braem, Baker & Baker (1998) is, therefore, rather atypical.

Paphiopedilum helenae Averyanov

This is one of the smallest species in the genus in terms of both plant and flower size. It is distinctive and, while related to *P. barbigerum*, is clearly quite different. Among the distinct features of this species are the narrow linear petals without undulate edges that are held forwards at an angle of 45 degrees.

Paphiopedilum hennisianum (M. W. Wood) Fowlie

A uniform group of plants in the Section *Barbata*, this is allied to *P. lawrenceanum* and *P. fowliei*. There is little controversy about its status although it probably bears its closest relationship to *P. lawrenceanum*.

Paphiopedilum henryanum Braem

Syn.: *P. dollii* Lueckel

This species is readily distinguished from other closely related members of the *P. insigne* alliance by its distinctive color pattern.

Paphiopedilum herrmannii Fuchs & Reisinger

The status of this species is still in question. It has been considered a natural hybrid by both Braem and Cribb. The latter author considered the putative parents as *P. henryanum* and *P. hirsutissimum*. Man-made hybrids between these two species, however, bear little resemblance to *P. herrmannii*. Averyanov (pers. communication) considers this to be a hybrid between *P. helenae* and *P. hirsutissimum*. The staminode in *P. herrmannii* looks like that of *P. insigne*, and I see no influence from the distinctive *P. hirsutissimum* staminode in its structure. Usually *Paphiopedilum* natural hybrids occur in small numbers and infrequently. So many plants of *P. herrmannii* exist that one must question the assertion that it is a natural hybrid. I am inclined to believe that it must be a good species in its own right and not a hybrid.

Paphiopedilum hirsutissimum (Lindl. *ex* Hook) Stein

This species is closely allied to *P. tigrinum*. Because of the plain green leaves and single flowered inflorescence, these plants are usually placed in Subgenus *Paphiopedilum* together with *P. fairrieanum* and the constellation of species that resemble *P. insigne*.

Paphiopedilum hirsutissimum var. *chiwuanum* (Tang & Wang) Cribb

This variety was originally described as an independent species, but Cribb combined it with *Paphiopedilum hirsutissimum*. Described from China, it is a rather small flower, barely 5 cm in diameter. I have seen several specimens recently, which suggest that they are clearly a form of *P. hirsutissimum*. Whether or not it deserves special recognition as a distinct variety is a moot point.

Paphiopedilum hirsutissimum var. **esquirolei** (Schltr.) Cribb

The flowers are very similar to the *P. hirsutissimum* type and differ in small characteristics of the flower. It is most easily distinguished by the taller flower stems and less hairy flower stem and ovary.

Paphiopedilum hookerae (Reichb.*f.*) Stein

There has been little argument over the nature of this species.

Paphiopedilum hookerae var. **volonteanum** (Sander *ex* Rolfe) Kerchove

This differs in subtle ways from *P. hookerae* var. *hookerae*. The variety *volonteanum* tends to have smaller leaves with a purple tinge to their undersides and margins. In addition, the pattern of coloration of the petals is somewhat different. In particular, the staminode has long been taken as a dividing factor between the two types, but examination of over twenty-five plants of *P. hookerae* var.

Left: Trudi Marsh, right: Richard Clark

Paphiopedilum hirsutissimum 'Wakefield' AM/AOS

Paph. hirsutissimum var. *esquirolei* 'Bar All Surprises' AM/AOS

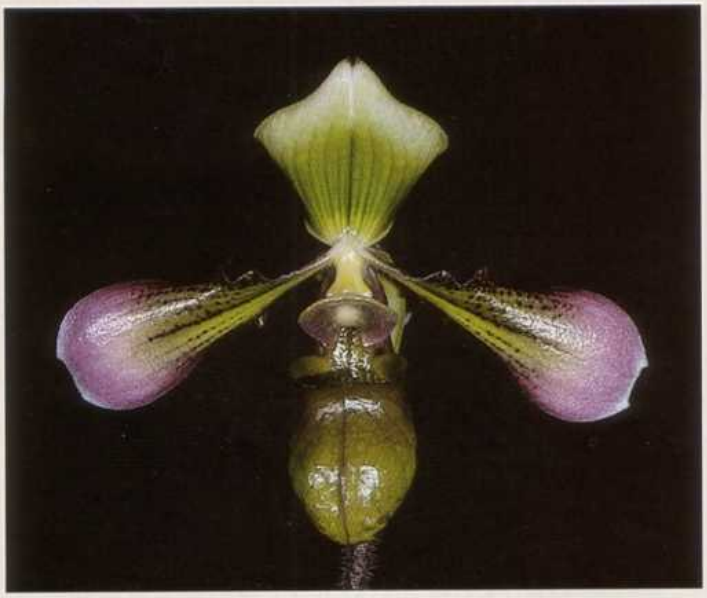
Left to right: Paphanatics, unLimited, Trudi Marsh, O. Gruss

Paphiopedilum hookerae

Paphiopedilum insigne

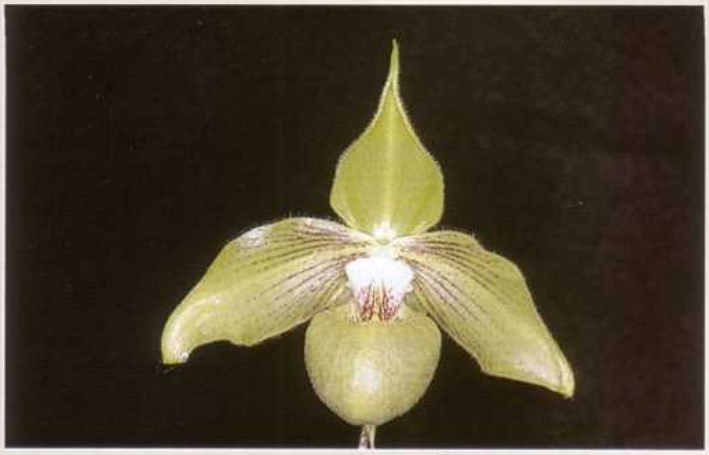
Paphiopedilum intaniae

Trudi Marsh



Paphiopedilum hookerae var. *volonteanum*

Paphiopedilum javanicum 'Lasca'



Paphiopedilum jackii

Paphiopedilum jackii var. *hiepii*

Left: unknown, right: Leonid Adrayanov

Paphiopedilum lawrenceanum

Paphiopedilum liemianum

Left: Paphanatics, unLimited, right: Trudi Marsh

Paphiopedilum lowii

Paphiopedilum lynniae

Left: Paphanatics, unLimited, right: R. Wellenstein

Paphiopedilum malipoense 'Green'Gold'

Paphiopedilum malipoense (left) and *Paph. jackii*

Paphanatics, unLimited

volonteanum showed a range in staminode shapes from unnotched circular disks to notched disks resembling the condition in *P. hookerae* var. *hookerae*. If the epithet of *volonteanum* needs to be conserved, then it is best done as a varietal epithet. This appears to be an altitudinal cline with *P. hookerae* var. *hookerae* at lower altitudes that merge into *P. hookerae* var. *volonteanum* at higher levels.

Paphiopedilum insigne (Wall. *ex* Lindl.) Pfitzer

This is a highly variable group with a wide range of forms that have either been lost or no longer exist in cultivation. But Braem unnecessarily includes a series of quite distinct species into his *P. insigne* alliance. His reasons are not clear because species such as *P. barbigerum*, *P. helenae*, and *P. tranlienianum* are self-evidently very different from the variation normally found within *P. insigne*.

Paphiopedilum intaniae Cavestro

This is another new multifloral striped species, this time from Sulawesi, having a striped dorsal sepal similar to that of *P. philippinense*, but this appears to be different in having a scape and flower buds that are distinctly pilose. More than eight flowers appear to be carried in the inflorescence. This appears to be a good species.

Paphiopedilum jackii Hua

Syn.: *P. malipoense* var. *jackii* (Hua) Averyanov

Initially I was inclined to consider this a distinct variety of *P. malipoense*, as did Braem (1988) and Cribb (1998). But there are several reasons that it should be considered a valid species in its own right and the resemblance to *P. malipoense* merely superficial. We now know a great deal about these species. *Paphiopedilum malipoense* is relatively widespread and very variable, but there are two consistent features shared by all of those plants. In *P. malipoense*, the staminode is sharply divided between an upper, matte-white portion and a lower, glossy, purple-black part and has a distinctive shape as well. All of the flowers have a non-varying fragrance reminiscent of raspberries. Furthermore the hybrids of *P. malipoense* inherit this distinctive fragrance even through several generations. Not only are the markings quite different on the staminode of *P. jackii*, but the staminode shape is also different as well. *Paphiopedilum jackii* is known from several discrete populations that are separated from those of *P. malipoense*. The plants of *P. jackii* in those populations have a light floral fragrance very different from that of *P. malipoense*.

Paphiopedilum jackii var. **hiepii** (Averyanov) Koop. **comb. nov.**

Syn.: *P. hiepii* Averyanov, Orchids 67 (3): 261; 1998
P. malipoense var. *hiepii* (Averyanov) Cribb

The status of *P. hiepii* is currently uncertain. There is some concern that the type specimen represented an aberrant blossom. Cribb combined it under the concept *P. malipoense*, but if it follows that *P. jackii* is a distinct species based on its staminode shape and coloring, then *P. hiepii* would be more closely allied to *P. jackii* than *P. malipoense* and should be a variety of *P. jackii* instead. Very recently a second plant was reported to have flowered, and this had a normally shaped pouch similar to that of *P. jackii*. A series of plants imported into Japan as *P. hiepii* flowered and all turned out to be indistinguishable from *P. jackii*. But we will need additional information before we can decide whether this is distinct or should be considered synonymous with *P. jackii*.

Paphiopedilum javanicum (Reinw. *ex* Lindl.) Pfitzer

Syn.: *P. purpurascens* Fowlie
P. virens (Reichb.*f.*) Pfitzer

Both *Paphiopedilum purpurascens* and *P. virens* fall comfortably into the concept of *P. javanicum*. Differences seem to be so small that it hardly seems useful to maintain them as distinct varieties.

Paphiopedilum kolopakingii Fowlie

Syn.: *P. topperi* Braem & Mohr.

There appear to be two forms of this species, one where the flower is primarily green in background and another where the base color of the flower is more of a straw-yellow color. Plants cultivated in Europe seem to be of the greener forms, and those in the United States are of the yellower type. Sometimes the green form is referred to as *P. topperi*. There is little convincing evidence that the two forms should be considered separately.

Paphiopedilum lawrenceanum (Reichb.*f.*) Pfitzer

Syn.: *P. barbatum* subsp. *lawrenceanum* (Reichb.*f.*) M. W. Wood

This species is closely related to both *P. callosum* and *P. barbatum* but differs from them by its narrow, horizontally held petals that bear warts on both the upper and lower margins and the rounded dorsal sepal. There is some concern that this Bornean species may be extinct.

Paphiopedilum liemianum (Fowlie) Karasawa & Saito

Syn.: *P. chamberlainianum* var. *liemianum* (Fowlie) Braem

This is the name accepted by Cribb. The leaves, which have purple bands of spots on their undersides and hairy margins, distinguish the species. The flowers tend to, but do not always, have a distinct white margin around the edge of the dorsal sepal.

Paphiopedilum lowii (Lindl.) Stein

This is a widespread species and it is not surprising that it should have given rise to a number of very distinct types. In my checklist (Koopowitz 1995) I considered them to be varieties of *P. lowii*. However, in order to achieve some consistency where species levels are separated from varieties, I am now treating *P. lynniae* and *P. richardianum* as distinct species. There is no argument that they are closely related and derived from *P. lowii*.

Paphiopedilum lynniae Garay

Syn.: *P. lowii* var. *lynniae* (Garay) Gruss & Röth

Obviously closely related to *P. lowii*, this plant differs in the smaller number of flowers (two to three) per inflorescence, as well as the glabrous stipe and ovary. The flowers have somewhat different markings, i.e., discrete basal speckling and spots on the dorsal sepal, unlike the smooth

blaze of brown found at the base of the dorsal sepal in *P. lowii*. This is another species that is based on a single specimen in cultivation.

Paphiopedilum malipoense Chen & Tsi

This very distinctive member of the subgenus *Parvisepalum* is not in dispute, but two newer species, *P. jackii* and *P. hiepii*, were sunk as varieties of this species (Cribb 1998). I now consider *P. malipoense* var. *jackii* to be distinct enough to be raised back to species level, and *P. malipoense* var. *hiepii*, which is a problematic taxon, should be treated as *P. jackii* var. *hiepii* for the time being.

Paphiopedilum mastersianum (Reichb.*f.*) Stein

The taxonomic status of this fine species has not been questioned. It is distinctive and has been much used in modern hybridizing.

Paphiopedilum mastersianum var. **mohrianum** (Braem) Koop. **comb. nov.**

Syn.: *P. mohrianum* Braem, Orchid Digest 53 (2): 73; 1989
P. ×mohrianum (Braem) Cribb

Somewhat intermediate in form between *P. mastersianum* and *P. bullenianum* but favoring the former species more strongly, I am reluctant to award this plant separate species status. It really looks like a form of *P. mastersianum*. The fact that *P. mohrianum* is now endemic to one island (Flores) a few hundred miles from the others (Moluccas) where *P. mastersianum* occurs is not sufficient grounds to consider it a separate species. About 10,000 to 6,000 years ago many of today's current islands in that region were joined in a continuous landmass. Cribb postulated that this was a natural hybrid between *P. bullenianum* var. *celebesense* and *P. javanicum*, but that seems unlikely. However, *P. mastersianum* and *P. bullenianum* do have overlapping distributions and this could possibly be a natural hybrid between those two species. For the time being I consider it to be a distinct variety of *P. mastersianum*.

Paphiopedilum micranthum Tang & Wang

I tentatively accept this name for the species in the Subgenus *Parvisepalum* for which it is commonly used. However, without a molecular analysis of the type specimen, it is impossible to correlate the modern concept with the original type description. The type description is based on a tiny flower, purported to be a dissected flower bud with dimensions smaller than normally encountered even in a flower bud. The bud itself must have been at an early stage of development. The dried leaves are not diagnostic. Jack Fowlie recognized several distinct varieties of *P. micranthum* (Fowlie 1989, 1993) but failed to provide Latin diagnoses or types. Of these the population from Guangxi is the most distinct, having leaves bearing finer tessellation than the other forms and with a white rather than pink pouch. That population certainly warrants varietal status.

Paphiopedilum moquettianum (J. J. Smith) Fowlie

Syn.: *P. glaucophyllum* var. *moquettianum* J. J. Smith

To me, this is one of the most distinctive of the entire *Cochlopetalum* Section. It has very large flowers with dorsal sepals having a clear yellow background, over which is a fine speckling of brownish purple. Referring to Wood, Cribb reports that intermediate-sized flowers are known. Cribb also hints that intermediates in color may also exist. It is equally likely that such intermediate plants may be natural hybrids between *P. glaucophyllum* and *P. moquettianum*. His photograph (Cribb 1998, page 202) of *P. moquettianum* is atypical and that plant does look like a hybrid.

Paphiopedilum niveum (Reichb.*f.*) Stein

A distinctive, small white flower, this species belongs to the Subgenus *Brachypetalum*.

Paphiopedilum niveum var. *ang-thong*

This name combination is in common horticultural usage but does not appear to have been formalized. The plants should be referred to as *P. godefroyae*. Unfortunately plants imported as *P. niveum* var. *ang-thong* were later interbred with the true *P. niveum* species and have been displayed under the name *P. niveum*. Such plants should be called *P. ×greyii*, the hybrid grex name for plants derived from *P. niveum* by *P. godefroyae*. See under *P. godefroyae* for additional information.

Paphiopedilum ooii Koopowitz

Hailing from Borneo, this is a very tall multifloral species with a striped dorsal sepal. It has a staminode that resembles that in the original description of *P. glanduliferum* but lacks warts on the petals. There is some variation in color forms but it is otherwise a distinctive species.

Paphiopedilum papuanum (Ridley) Ridley

Syn.: *P. zieckianum* Schoser

These plants show affinities to *P. violascens* and *P. mastersianum*. *Paphiopedilum zieckianum* merely appears to have slightly more speckling at the base of the petals; furthermore, Cribb (1998) and Braem, Baker & Baker (1999) are in agreement that both *P. papuanum* and *P. zieckianum* are the same species. It is interesting that those authors seem to consider that *P. wentworthianum* is distinctly different from *P. papuanum*. Schoser and Fowlie thought *P. wentworthianum* was allied to *P. violascens* and *P. papuanum*. I find that the similarities between *P. papuanum* and *P. wentworthianum* much closer than with either *P. violascens* or *P. mastersianum*. The differences besides geographical locality and some speckling at the petal bases of *P. papuanum* are minor.

Paphiopedilum parishii (Reichb.*f.*) Stein

This is a robust and distinctive species with horizontally held inflorescences. See *P. dianthum* for further discussion.

Paphiopedilum parnatanum Cavestro

Syn.: *P. usitanum* Gruss & Röth

Newly described, this is a relatively unexciting species from the Philippines. It bears resemblances to *P. schoseri*.

Left: Paphanatics, unLimited, right: Richard Clark

Paphiopedilum mastersianum

Paphiopedilum micranthum 'Jumbo Jamboree' FCC/AOS

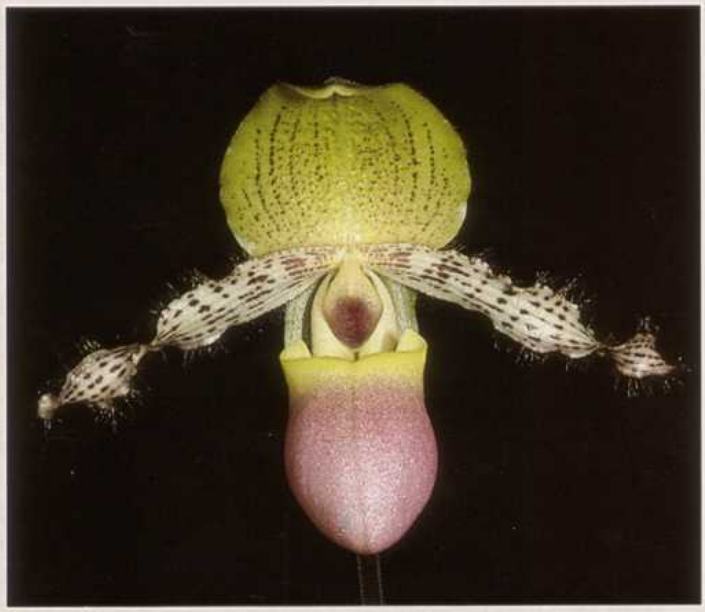
Left to right: Paphanatics, unLimited, J. Fischer, Richard Clark

Paphiopedilum kolopakingii

Paphiopedilum ooii

Paphiopedilum parishii 'Jaron' HCC/AOS

Trudi Marsh



Paphiopedilum moquettianum

Paphiopedilum niveum 'Charles'

Paphiopedilum papuanum

Paphiopedilum parnatanum

Left: Paphanatics, unLimited, right: O. Gruss

Paphiopedilum philippinense

Paphiopedilum philippinense var. *roebelinii*

Paphiopedilum praestans

Right: Trudi Marsh, others: Paphanatics, unLimited

Paphiopedilum purpuratum

Paphiopedilum randsii

Left: Paphanatics, unLimited, right: Trudi Marsh

Paphiopedilum philippinense (Reichb.*f.*) Stein
Syn.: *P. cannartianum* Linden
P. laevigatum Bateman
This is a highly variable species in regard to size, shape, and coloration of the flowers. Nonetheless plants form a continuum making it difficult to separate some of the forms from each other in a convincing manner.

Paphiopedilum philippinense var. **roebelinii** (Veitch) Cribb
Syn.: *P. roebelinii* (Veitch) Pfitzer
This name is usually reserved for those forms with long twisted petals.

Paphiopedilum potentianum Gruss & Röth
This is based on a single cultivated plant but one that was rumored to exist for a long time as a "brown" *P. callosum*. Cribb treats this as a variety of *P. callosum* and I follow that here. Cribb's plant differs from the type description, but he claims to have examined other plants from the original introduction. I have examined other pictures purported to be of this type and these were sparsely spotted on the petals. This points out why it is necessary sometimes to examine population variation.

Paphiopedilum praestans (Reichb.*f.*) Pfitzer
Syn.: *P. bodegomii* Hort. *nom. nud.*
P. gardineri (Guillaumin) Pfitzer
P. striatum Clements & Jones
There is still much controversy regarding the correct name of this plant. Cribb still considers this to be synonymous with *P. glanduliferum*. I am now following several other authors (see under *P. glanduliferum*) in reinstating *P. praestans* for those plants with larger flowers having a yellow background, twisted petals, and a relatively narrow and oblong yellow staminode surrounded on three sides with short red-brown bristles. Cribb also considers that *P. bodegomii* and *P. striatum* are forms of *P. wilhelminiae*, but live plants that I have seen of the former, labeled under that name, appear to me to be closer to *P. praestans*. *Paphiopedilum striatum* from its description also appears to me to be more similar to *P. praestans* than *P. wilhelminiae*.

Paphiopedilum primulinum M. W. Wood & Taylor
This is a distinctive small form that is easy to distinguish from other members of the *Cochlopetalum* Section. The original species described was an albinistic form but both colored and albinistic forms are now known.

Paphiopedilum primulinum var. *purpurascens* (M. W. Wood) Cribb
In the normal course of events one might have expected that this form would have been described first and that *P. primulinum* var. *primulinum* should have been a rare albino form. Selfings of *P. primulinum* var. *purpurascens* often produce albinistic flowers indistinguishable from the original albino form. For this reason the colored forms are not a distinct biological population and do not merit varietal status as it is currently used.

Paphiopedilum purpuratum (Lindl.) Stein
Syn.: *P. sinicum* (Hance *ex* Reichb.*f.*) Stein
This dwarf species is not under contention.

Paphiopedilum randsii Fowlie
This species has very distinctive short petals with blunt tips; the petals are held in an inverted U that clearly differentiates it from its relatives.

Paphiopedilum richardianum Asher & Beaman
Syn.: *P. lowii* var. *richardianum* (Asher & Beaman) Gruss
Earlier I considered this to be a variety of *P. lowii*, and Cribb concurs, but after examination of several additional specimens I am now inclined to recognize this as a good species.
The differences between this species and *P. lowii* are as follows: *Paphiopedilum richardianum* has an erect inflorescence with flowers that are substantially smaller than those of *P. lowii*. The petal tips are cream with a violet picotee and the petal itself is glabrous. In *P. lowii* the petal tips are pinkish-purple, and the petal has a velvety matte surface. In *P. richardianum* the dorsal sepal is basically cream with faint longitudinal veining while that in *P. lowii* is yellow-green with a central and basal darker brown blotch. There are also slight differences in the shape of the pouch and the extent of the prominence arising from the staminode.

Paphiopedilum robinsonii (Ridley) Ridley
See under *P. cerveranum* Braem

Paphiopedilum rothschildianum (Reichb.*f.*) Stein
Syn.: *Cypripedium neo-guineense* Linden
P. elliotianum (O'Brien) Stein
P. nicholsonianum ex Hort.
Both Cribb and Braem discuss this magnificent species at length. There seems to be little doubt that the current name has precedence.

Paphiopedilum sanderianum (Reichb.*f.*) Stein
There is no controversy over the naming of this species, faméd for having among the longest petals of any flowering plant.

Paphiopedilum sangii Braem
Let it not be said that I will not acknowledge a mistake. In 1995 I amended Braem's original description and that was not warranted, although he does still keep referring to certain teratological features in the dorsal sepal of the type specimen that I mistakenly thought were part of the type diagnosis.

Paphiopedilum schoseri Braem & H. Mohr.
Syn.: *P. bacanum* Schoser & Deelder
This plant is a mystery to me. Originally from the Philippine island of Bacan, it seems to be an obviously natural hybrid swarm involving *P. javanicum*, which currently does not occur there. Many years ago importations of *P. bacanum* flowered out to be plants that I identified as probably *P. javanicum*. The original line

drawings published with the type description are particularly poor and can also be interpreted as *P. javanicum*. Those drawings seem only remotely related to the photograph of *P. schoseri* as published in the *Orchid Digest* (page 156, 1988). That photograph bears a remarkable resemblance to *P. urbanianum* except for the shape of the staminode, which resembles that of *P. javanicum*. Hasegawa (pers. communication) has suggested that *P. schoseri* may be a natural hybrid between *P. acmodontum* and *P. virens*. I recently examined four different clones of *P. schoseri*. All flowers had the small median projections on the rim of the pouch that betrayed their relationship to *P. acmodontum*. But Tom Kalina reports that his plants do not possess the median lip tooth. *Paphiopedilum acmodontum* is confined to the Philippine island of Negros, some distance from Bacan. There are also strong similarities between these plants and the newly designated *P. parnatanum*. In fact, the illustration that Cribb (1998, page 372) uses to illustrate *P. schoseri* looks to me very much like *P. parnatanum*. A selfing of *P. schoseri* may shed some light on the problem of its identity.

Paphiopedilum spicerianum (Reichb.*f. ex* Masters & T. Moore) Pfitzer

The identity of this species is not in contention.

Paphiopedilum stonei (Hook.) Stein

While the identity of this species does not appear to be in contention, there is a plant, *P. stonei* var. *latifolium* 'Ruth Kennedy', which seems to be misplaced. This plant was one of a consignment of similar plants that were originally imported many years ago by Fumimasa Sugiyama. The clone 'Ruth Kennedy' appears to be more closely related to *P. kolopakingii*, but has a dorsal sepal with obvious *P. stonei* affinities. Unfortunately, this clone has been selfed as well as used for hybridization. Its progeny are widely cultivated under the name of *P. stonei* var. *latifolium*, and its hybrids registered under the name *P. stonei*, creating a certain amount of confusion. Those plants breed true and should probably be described as a separate species.

Paphiopedilum sukhakulii Schoser & Senghas

This is a very distinctive though variable species, but there appears to be no controversy regarding its identity.

Paphiopedilum supardii Braem & Loeb

Syn.: *P. devogelii* Schoser & Deelder
P. 'victoria' De Vogel

Although this has been known for a long time, it was only recently named. It is a valid species.

Paphiopedilum superbiens (Reichb.*f.*) Stein

Syn.: *P. curtisii* (Reichb.*f.*) Stein

The use of both names has led to some confusion. Cribb considers both concepts to overlap. However, there is a difference in chromosome number, and *P. curtisii* has been counted with 2n=36 (Karasawa 1979), while the morphologically similar *P. superbiens* has 2n=38 (Karasawa 1979). But differences in chromosome number need not be grounds for separation into different species.

Paphiopedilum superbiens var. **curtisii** (Reichb.*f.*) Braem

The shorter and more pendulous and twisted petals differentiate this variety. The shape of the dorsal sepal is shorter and squatter.

Paphiopedilum tigrinum Koop. & N. Haseg.

Syn.: *P. markianum* Fowlie

Braem has generated considerable confusion about the correct name to be applied to this concept. However, *P. tigrinum* was validly and clearly published well before *P. markianum*, and *P. tigrinum* is now the accepted name. Jack Fowlie is long dead, it is time for Braem to forgo his pretense that *P. markianum* has any validity.

Paphiopedilum tonsum (Reichb.*f.*) Stein

There are several forms of this species differing from each other by the degree of red or purple pigmentation. There is also a fine green form.

Paphiopedilum tranlienianum Gruss & Perner

An interesting dwarf species in the *P. insigne* alliance, this looks at first glance as is it may have affinities with *P. spicerianum*, but the two species have markedly different staminodes.

Paphiopedilum urbanianum Fowlie

Here is a distinct species without controversy.

Paphiopedilum venustum (Wall.) Pfitzer *ex* Stein

Syn.: *P. pardinum* (Reichb.*f.*) Pfitzer

This is a highly variable group of species for which many varieties have been described. Most of the varieties differ in the coloration and pattern of the leaves. Some of the earlier varieties are based on clonal differences and may not reflect population differences.

Paphiopedilum victoria-mariae (Sander *ex* Masters) Rolfe

There has been great confusion between this and the next species. Most of the plants in cultivation are labeled as *P. victoria-regina*, the name as recognized by Braem. It is the largest plant and carries the tallest spikes among the species in this group. Flowers lack distinct and dark striping on the dorsal sepal, but the petals usually have darker margins or are concolored with an unstippled pouch.

Paphiopedilum victoria-regina (Sander) M. W. Wood

Syn.: *P. chamberlainianum* (O'Brien) Stein

Cribb uses this name for the plants formerly known as *P. chamberlainianum* for which *P. victoria-regina* is now the commonly accepted name. *Paphiopedilum liemianum* differs from *P. victoria-regina:* the former have distinctive leaves with red-spotted pigment on their undersurfaces and the relatively wide, white picotee on the dorsal sepal.

Left: Paphanatics, unLimited, right: Richard Clark

Paphiopedilum richardianum

Paphiopedilum rothschildianum 'Billy's' AM/AOS

Left to right: Trudi Marsh, courtesy of The Orchid Zone, Richard Clark

Paphiopedilum primulinum

Paphiopedilum sanderianum 'Deep Pockets'

Paphiopedilum sangii 'Hairy Terry' CBR/AOS

Left: Tom Kalina, right: Trudi Marsh

Paphiopedilum schoseri 'Birchwood' CBR/AOS

Paphiopedilum spicerianum

Paphiopedilum stonei

Paphiopedilum superbiens

Paphiopedilum superbiens var. *curtisii*

Paphanatics, unLimited

Paphiopedilum sukhakulii 'Muscle Bound' B/CSA

Paphiopedilum tigrinum

Left: Charles Rowden, right: Paphanatics, unLimited

Paph. supardii 'Golden Pheasant' HCC/AOS

Paphiopedilum tonsum 'David' AM/AOS

Paphiopedilum tranlienianum

Left to right: Richard Clark, Trudi Marsh, Mr. Kao

Paphiopedilum victoria-regina var. **kalinae** (Braem) Koop.

Syn.: *P. kalinae* Braem

This group appears to be most closely related to *P. victoria-regina*, but also bears some similarities with *P. liemianum*. These plants differ in having a compressed inflorescence of dark emerald-green buds with long dense hairs. The flowers have distinctively speckled urceolate pouches. There are deep chocolate-brown blotches and streaks on the dorsal sepal and the petals also bear dark markings. In nearly all respects, the flowers merely exaggerate features found in *P. victoria-regina*, and Cribb may be correct in not recognizing this variety.

Paphiopedilum vietnamense Perner & Gruss

Syn.: *P. hilmarii* Senghas & Schettler
P. mirabile Cavestro & Chiron

Without a doubt this is one of the most desirable of the new species to have surfaced in many years, and there was a rush to name it. Because Perner & Gruss were able to beat the competition, their name stands. A member of the Subgenus *Parvisepalum*, this species has large pink flowers and big, glossy tessellated leaves. There is considerable variation in shape and depth of coloration in the flowers. Despite its conservation status there appears to have been considerable black-market commerce in this species and Averyanov (pers. communication) avers that the initial two sites where it was collected have been totally depleted of plants.

Paphiopedilum villosum (Lindl.) Stein

Plants of this taxon seem to be quite variable in terms of flower color, although shape tends to be rather constant. Many different varieties were described in the past.

Paphiopedilum villosum var. **affine** (De Wilderman) Braem

Syn.: *P. villosum* var. *annamense* Rolfe

These forms which have a deep purple basal blotch on a white dorsal sepal are known from the Laotian area.

Paphiopedilum villosum var. **boxallii** (Reichb.*f.*) Pfitzer

Syn.: *P. boxallii* Reichb.*f.*

This variety can be distinguished from other forms by the discrete spotting on the white-edged green dorsal sepal. This was an important plant in the nineteenth century when it contributed heavily to breeding standard complex hybrids.

Paphiopedilum viniferum Koop. & Haseg.

This distinctive plant has been in cultivation for decades under the name *P. callosum* 'JAC'. Cribb dissuaded me years ago from naming it, but as my understanding of the genus has grown, it has become increasingly obvious to me that this plant is clearly different from *P. callosum*, both in the shape of the petal tips and their distinctive pattern of small raised warts on the petal blades. Although very dark forms of *P. callosum* are known, the genetic basis for *P. callosum* coloration and its inheritance is quite different from that of *P. viniferum*. Cribb considers that this is merely a form of *P. callosum* despite its obvious differences.

Paphiopedilum violascens Schltr.

The plants in this group have petals characterized by the tendency for the petals to arch downwards. Most have rather small dorsal sepals.

Paphiopedilum violascens var. **bougainvilleanum** (Fowlie) Koop.

Syn.: *P. bougainvilleanum* Fowlie

Cribb considers *P. violascens* and *P. bougainvilleanum* to be separate species, but Braem considered the two to be synonymous, although he discusses them as separate species in his most recent review. These two taxa are geographically isolated and can be differentiated. *Paphiopedilum bougainvilleanum* is of paler color, mainly green with a hint of violet, and both have different chromosome numbers (2n=40 for *P. violascens* var. *bougainvilleanum* compared to 2n=38 for *P. violascens* [Karasawa 1979]). Otherwise, the two forms are almost impossible to differentiate. To me it still makes more sense to consider *P. bougainvilleanum* a distinct variety of *P. violascens*.

Paphiopedilum violascens var. **saskianum** (Gruss & Röth) Koop. **comb. nov.**

Syn.: *P. bougainvilleanum* var. *saskianum* Gruss & Röth, Die Orchidee 50:533-536, 1999

Recently described from the island of Malaita in the Solomons, this differs only slightly from *P. violascens* var. *bougainvilleanum* and should perhaps not be given different status. It would be interesting to know what the chromosome count is for this taxon. It bolsters the idea that just because *P. violascens* and *P. bougainvilleanum* occur on different islands, they should not be treated as separate species.

Paphiopedilum wardii Summerh.

Paphiopedilum wardii is clearly a legitimate species in its own right. In his latest revision, Braem (Braem et al. 1999) still considers that *P. wardii* is the hybrid between *P. sukhakulii* and *P. venustum* despite the fact that the artificial hybrid *P.* Double Deception bears almost no resemblance to *P. wardii*. Furthermore, the genetic basis for petal patterning appears to be quite different as well.

Paphiopedilum wentworthianum Schoser & Fowlie

Syn.: *P. denisii* Schoser

Braem also considered *P. wentworthianum* and *P. papuanum* to be synonyms of *P. violascens*, while Cribb considered it to be a valid species. While this plant approaches both *P. violascens* and *P. papuanum* in its floral characteristics, it appears to me to be much closer to *P. papuanum* from which it differs only in the speckling of its petals. The photograph in Braem, Baker & Baker

(1999) seems atypical to me while the photographs used by Cribb (1998) are much more typical of the concept. More living material, however, needs to be studied, and I am tentatively leaving it as a separate species, but I believe that this is really only a variety of *P. papuanum* and should be reduced to that rank.

Paphiopedilum wilhelminiae L. O. Williams
Syn.: *P. gardineri* L. O. Williams
P. praestans var. *wilhelminiae* (L. O. Williams) Braem

Cribb originally sunk this concept into *P. glanduliferum*, but he now treats it as a good species. Braem, on the other hand, has made this a variety of *P. praestans*. In general, *P. wilhelminiae* plants are smaller, bearing fewer flowers with a white background color rather than yellow. The flowers have richer brown striping and markings on the petals and sepals. The petals are not nearly as spiraled as *P. glanduliferum*. The orange staminode in *P. wilhelminiae* is more squared with a heavier fringe of brown hairs and two small horns on the upper margin. There is also a wider spacing between florets on the inflorescence. I agree with Cribb.

Summary

There appears to be a merging consensus among workers in this field to define species of *Paphiopedilum* at a much finer level than previously. There is more of a tendency these days to be a splitter rather than a lumper. No single list, however, will satisfy everybody. There are so many players, both amateurs and professionals, in this field that it may be impossible to persuade all or even most people. Even "consensus" lists, such as that produced for CITES, merely reflect the opinions and interpretations of a few people.

Part of the problem rests in the fact that we do not have detailed knowledge about variation within populations in the field. Distant outliers may vary considerably from most of the population and yet be integral parts of interbreeding populations. Most species descriptions are based on single examples of a population, and the extent of variation within the population may be totally unknown. It seems unlikely that we will ever achieve a good biological understanding of the natural species level for the entire genus as populations continue to be eroded in the face of land conversion and black-market collections.

In the absence of studies on the nature and extent of remaining natural populations of the wild species, we cannot hope to understand all of the questions posed by this group. In fact, some of the problems in *Paphiopedilum* taxonomy may not ever be solved. For those species that are now threatened with extinction due to either over-collecting or habitat conversion, the possibility of resolving some of the ambiguities in their taxonomy may be impossible. The natural limits, i.e., edge populations, are so disrupted that their extents can not be gauged, and we can not tell where one wild species stops and another starts.

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Trudi Marsh

Paphiopedilum urbanianum

Paphiopedilum venustum

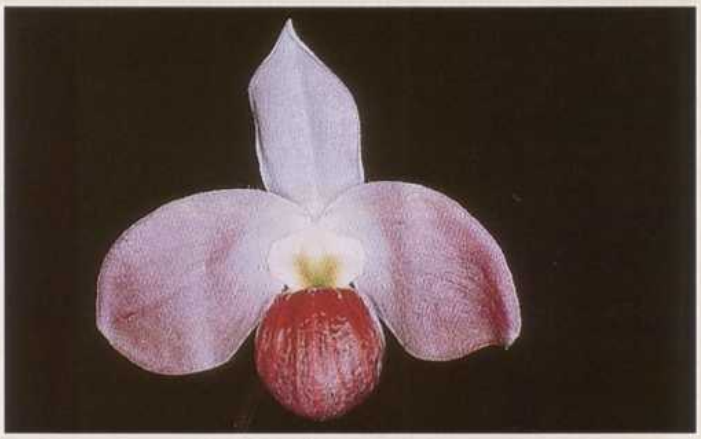
Paphanatics, unLimited

Paphiopedilum victoria-mariae 'Gordon' B/CSA

Paphiopedilum victoria-regina

Left: Paphanatics, unLimited, right: O. Gruss

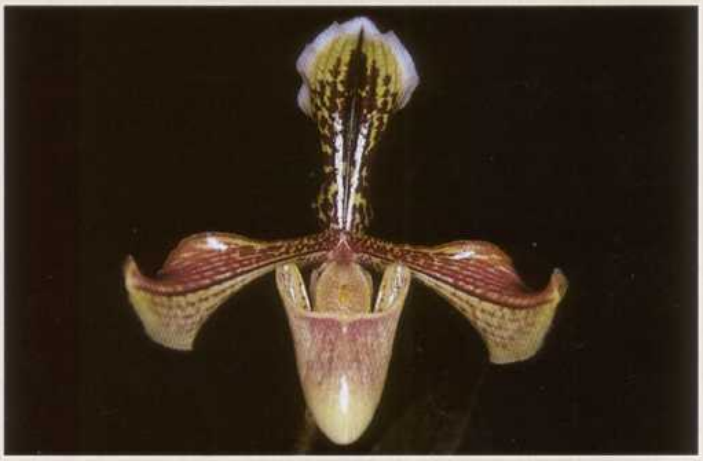
Paphiopedilum victoria-regina var. *kalinae*



Paphiopedilum vietnamense

Left: Paphanatics, unLimited, right: Tom Kalina

Paphiopedilum villosum var. *affine*

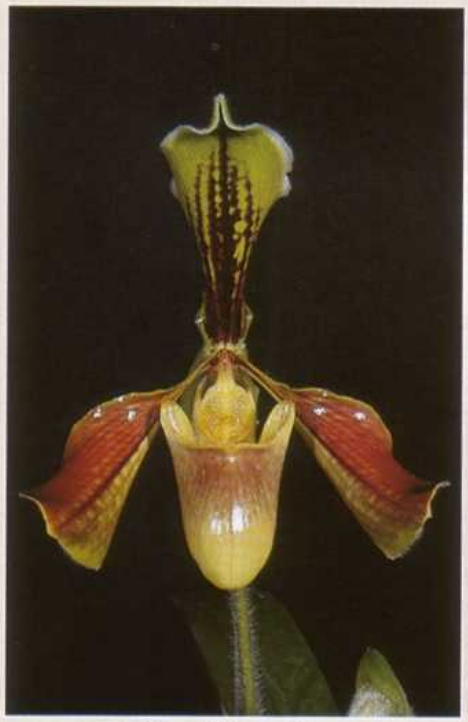


Paphiopedilum villosum var. *boxallii*

Paphiopedilum wardii 'Jamboree Magic' B/CSA

Paphiopedilum violascens

Left: Paphanatics, unLimited, right: E. Charles



Paphiopedilum villosum

Paph. viniferum 'Black-Jac' HCC/AOS

Paph. violascens var. *bougainvilleanum*

Left to right: Trudi Marsh, Richard Clark, Paphanatics, unLimited

Paphiopedilum wentworthianum

Paphiopedilum wilhelminiae

Paphanatics, unLimited