

THE GENUS **PAPHIOPEDILUM**

A treatise on the conduplicate-leaved
slipper orchids of Asia

GUIDO J. BRAEM

IN COLLABORATION WITH SANDRA L. ÖHLUND



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A Monograph of the conduplicate-leaved
slipper orchids of Asia

3RD EDITION

GUIDO J. BRAEM

IN COLLABORATION WITH
SANDRA L. ÖHLUND



PROF. DR. GUIDO JOZEF BRAEM

FOR GUDRUN

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PAPHIOPEDILUM ROTHSCHILDIANUM
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC

INTRODUCTION

Orchids are one of the most successful groups in the plant kingdom, having conquered a niche in nearly every ecological system on earth, with the exception of the Polar Regions. They can be found in the temperate and in sub-tropical and tropical areas, in wet rainforests as well as in semi-arid and arid deserts. Whereas tropical orchids have been known to be of interest in China for hundreds of years, they reached Europe only in modern times. We know that tropical orchids were cultivated in England around the middle of the eighteenth century. However, there may well have been earlier "imports" of which there are no surviving records. We do not know when these tropical plants were first deliberately grown in the gardens of North America, but we doubt that it was much later than in Europe. Today, orchids are among the most popular groups of flowering plants all over the world.

Slipper orchids were known before 1753, the year in which Carolus Linnaeus published his famous SPECIES PLANTARUM, the book that was the origin of the science of plant taxonomy and systematics. We find a description of *Cypripedium calceolus* as *Calceolaria* by Heister in 1748. *Paphiopedilum purpuratum* was in cultivation (as *Cypripedium sinicum*) at Loddiges's nursery at Hackney in the British Isles before 1760. The exotic flowers of the plants we now classify under the genus *Paphiopedilum* have attracted interest from botanists and amateur growers since that time. By now, the genus *Paphiopedilum* is one of the most widespread orchid genera in cultivation. Their flowers are a unique development of nature, complex and interesting, with many species showing considerable variation. This variation has resulted in a large group of plants in which each and every individual is intriguing. It is, therefore, understandable why some orchid enthusiasts grow only these orchids. Furthermore, one should remember that plants of this genus were among the first to be used for artificial hybridising, the first recorded hybrid being *Paphiopedilum Harrisianum*¹ (*barbatum* x *villosum*) made by John Dominy and registered by Veitch & Sons in 1869.

The literature about plants now treated under the genus *Paphiopedilum* was sporadic until 1894 and resulted mainly out of the discovery and subsequent description of new species. During that time all the species were treated under the genus *Cypripedium* (as established by Linnaeus in 1753). Some pertinent literature, such as the FLORA TELLURIANA, published by Rafinesque in 1837 and 1838, was overlooked or not considered important. Although *Paphiopedilum* was established as an autonomous genus by Pfitzer in 1886, no extensive study was published before 1894. Between 1894 and 1903 the literature about *Paphiopedilum* and slipper orchids in general was plentiful. After 1903 it ceased abruptly. There was really no complete treatment of the genus

1 Named for John Harris, a surgeon of Exeter, who first suggested to Dominy [Veitch's gardener] the possibility of obtaining hybrid orchids, and explained to him the structure of the orchid flower and the process of pollination.

Paphiopedilum between 1903 and 1987, and literature about *Paphiopedilum* remained scarce until, in the early nineteen seventies, Dr. Jack Fowlie (1929-1993) took an interest in the genus. Jack, a medical doctor by profession, travelled widely and was a prolific author. In his function as editor of the ORCHID DIGEST, Fowlie published a series of articles on the genus *Paphiopedilum*, articles that have by now become true classics, notwithstanding the fact that his understanding of taxonomy and systematics did not always stand up to scientific scrutiny.

Since Fowlie, many articles on the genus have been published. The great majority of these have provided more or less specific information on a single species, a group of related species, or the species occurring in a defined geographical area. Several books were published, most of which were not very helpful in respect to the clarification of the natural history of the genus. In 1988 Dr. Guido Jozef Braem published his first monograph on the genus. Many new species and varieties have been published since and the knowledge about the genus is constantly increasing.

We sincerely hope that this monograph will add to the understanding and enjoyment of the genus *Paphiopedilum*.

Prof. Dr. Guido J. Braem - Lahnau, Germany, 2021



PAPHIOPEDILUM LUNATUM

WATERCOLOUR PAINTING BY RIEKA BONITA HUTAGALUNG

COURTESY OF RIEKA BONITA HUTAGALUNG

THE GENUS PAPHIOPEDILUM

GENERAL SECTION

INTRODUCTION TO THE TAXONOMY AND NOMENCLATURE OF THE GENUS *PAPHIOPEDILUM*

Taxonomy is part of biology. It is the study of classification, including its rules, theories, principles, and procedures. Plant taxonomists have been trained to identify plants and to classify them into a hierarchical system. Furthermore, if they come to the conclusion that the organism under evaluation is new to science, they have learned to prepare and publish a scientifically correct description with a name for the new plant. A classified organism or a group of classified organisms thus becomes a taxonomic unit and is referred to as a taxon (plural taxa). A taxon therefore can be a family, a genus, a species, etc. To do such classification, the taxonomist uses a number of techniques, covering, in effect, nearly the entire scope of the biological sciences (anatomy, morphology, biochemistry, cytogenetics, electron microscopy, etc.). Thus, in order to be a good taxonomist, one must master these fields and *de facto* be a good general biologist. But the work of a modern taxonomist does not stop here. It continues into the study of the interrelationships among the various taxonomic entities. This newer form of taxonomy, which is not limited to classification, is usually called systematics. The two terms, however, are often used interchangeably.

Biological research is neither restricted to a single country nor to a single language area. Thus, a taxonomist must have an understanding of various languages. It is not acceptable to do taxonomy based only on material published in one or two languages or in any given country. Of course, one cannot expect all taxonomists to master all languages. That would be nice, but hardly achievable within the limited scope of the human lifetime. However, not mastering a language is by no means an excuse for neglecting work published in that language, and no taxonomist, or anyone for that matter, ought to be ashamed to solicit the help of a translator to help him/her comprehend the contents of a foreign language article. Misinterpreting materials often leads to misunderstandings and erroneous conclusions. We have already mentioned that literature is one of the prime sources for the taxonomist and taxonomy. One journal and a few general books that discuss orchids in a more or less superficial way are simply not enough, but most orchid hobbyists, in all countries, are limited to just that.

So, what are the requirements for good taxonomy? The answer is simple: a well-trained botanist who has studied systematics, who speaks several languages, and who has access to the pertinent literature.

Unfortunately, taxonomy is the most underrated and misunderstood branch of the biological sciences, even though it is probably the most important. Of course one may argue that it is possible to study any aspect of biology without knowing the identity of the organism under examination, but just try to publish your results ... well, one can always refer to the object of study as "the thing" ...

The following anecdote is offered to illustrate this situation.

An American university professor once found a hand-written note pinned to the door of his office. It read:

10:38 AM 5/22

In Bio. faculty Library 2nd floor until 2 PM today (tall guy in green tee-shirt)

Dear Sir,

I need a one hour lesson in keying out plants of the Cascades. I have a job in which I am looking for 25 "endangered plants" in *genie (sic)* of *Eriogonum*, *Delphinium*, *Hackelia*, *Silene*, *Astragalus*, etc.

I will pay \$ 50.00 for this lesson ... I must leave for this job by tomorrow afternoon

(...) 321-6505

We do not know whether the professor ever contacted the "guy in the green tee-shirt", what was said if they did meet, or how far the student's career went in the biological sciences.

PROBLEMS IN BOTANICAL TAXONOMY

The great majority of those who read this book will not be familiar with taxonomic questions in general. So we are presenting a short discussion of some of the taxonomic principles insofar as they are pertinent to our treatment of the genus *Paphiopedilum*. Those who are interested in obtaining in-depth knowledge of all aspects of taxonomy are advised to obtain a textbook dealing with that subject.

The *Orchidaceae* are generally classified within the monocotyledons (generally referred to as “monocots”). Monocots are plants which, upon germination, produce a single seed leaf (cotyledon) that provides nourishment (by photosynthesis) for the germinating seedling. This classification is not perfect as only some orchids produce cotyledon-like structures. Hence, the classification of the *Orchidaceae* as a “monocot” family finds its reason in practicality and convenience only. The alternative would be to create a third “division” since the currently accepted categories are monocots and dicots (plants generating two seed leaves upon germination).

THE SPECIES CONCEPT

In a letter to the American botanist Asa Gray, dated 20 July 1857, the great Charles Robert Darwin wrote² that he had come to the conclusion that species are but strongly defined varieties. The species concept was by no means solved by that statement, and in the plant kingdom the issue has been a special problem for many years and still remains unresolved. Numerous definitions of “a plant species” have been phrased. All of them are extremely arbitrary and include terms that are open to interpretation. A few are more or less usable, but even those contain a number of criteria which require further clarification. The reason for this problem is that there are no generally accepted rules for the delimitation of a species or any other taxon. Hence, it is quite possible that different authors accept different criteria to differentiate among taxa at any level. The only generally applicable definition of a plant species is: “A plant species is that which a competent botanist considers it to be.” (A.J. Richards, personal communication, 1982)

In *Paphiopedilum*, most species, such as *Paphiopedilum delenatii*, *P. sanderianum*, *P. spicerianum*, *P. druryi*, *P. sangii*, *P. canhii*, *P. henryanum*, etc., present no problem in respect to taxonomy. The overall structure and morphology of their flowers is so unique that they are easy to identify even though they show some variation.

Others, however, do present serious problems, and they cannot be readily identified as valid species. For example, there are problems with *Paphiopedilum gardineri* and *P. roebbelenii*, as well as with several taxa in the subgenus *Cochlopetalum*. In these cases, the interpretation of each and every one of these taxa is very subjective and depends on where one draws the line regarding how much variation is reasonable within a naturally occurring entity. For this reason, we have combined some debatable taxa into

² See Guido J. Braem (2015), DARWIN – THE POWER OF OBSERVATION AND REFLECTION, ISBN 978-81-211-0901-7.

complexes, and we leave it to our readers to decide for themselves what interpretation of the term “species” best suits their understanding and meets their needs.

For the same reason, we often use the word *taxon* (singular) or *taxa* (plural) instead of *species*. Referring to the *taxon* *Paphiopedilum roebbelenii*, for example, leaves room to interpret it as a separate, autonomous species, or as a variant (at whatever infra-specific level) of *Paphiopedilum philippinense*.

Most of the problems we encounter, however, are man-made. Some, but by no means all, are discussed in the following sections.

TRAINING

Most orchid taxonomy is done by people who have little if any adequate training in botany. Whereas no one would dream of letting a baker or a plumber take out his/her appendix, we find that many (far too many) in the orchid community feel called upon to do orchid taxonomy. Some of these people, in fact, do produce fairly decent to good material. Many, however, haven't the faintest idea what they are talking and/or writing about. And that is not a surprise. After all, they do not have the training or the plant resources or the library or the ability to use them. These people may be very good in their learned professions, but that does not mean they are competent in the field of taxonomy.

MISIDENTIFICATIONS

Very often, commercial growers import plants without flowers and rely on the information they receive from their supplier or collector. Thus, whatever plant is supplied as “*Paphiopedilum lowii*”, for example, is labelled, treated, and sold as “*Paphiopedilum lowii*”. If, upon flowering, this proves to be wrong, the name is usually, but not always, corrected in the nursery. The clients, however, who have already obtained one of these plants, often do not recognise the mistake. They are, of course, not notified by the supplier, and end up with a misidentified plant in their collection. Thus if one calls attention to a misnamed plant in a hobbyist greenhouse, one is often told, “Well, that is what so-and-so says it is.” or “Well, that is what the tag says.” This especially applies when a plant has received a horticultural award. Good examples of this are *Paphiopedilum stonei* var. *latifolium* ‘Ruth Kennedy’, *Phragmipedium schlimii* ‘Wilcox’ and *Phragmipedium schlimii* ‘Birchwood’. These were misidentified decades ago and awarded under their erroneous names by various orchid societies. The fact that “*Paphiopedilum stonei*” var. *latifolium* has more recently been described as an autonomous species has not changed and will not change matters much. At one time, The Orchid Zone, a very renowned California orchid nursery, sold thousands of seedlings of the primary hybrid *Paphiopedilum* Prince Edward of York (*P. sanderianum* x *P. rothschildianum*) as pure *P. sanderianum*. The debacle soon became known among insiders, but one can be certain that many of these seedlings, now mature plants, are part of collections as *P. sanderianum* and that some of those might even have been (and perhaps are still) used in hybridisation. As of March 2013, at least one German commercial nursery still sold these plants as *P. sanderianum*, and on the website of a horticulturist for Pinecrest Gardens in Florida, a plant of *P. Prince Edward of York* was being depicted and praised as *P. sanderianum*.

BAD TYPIFICATION

Botanists assign a so-called type specimen to each taxon (family, genus, species, subspecies, variety, form, etc.). The designation of a type specimen is a prerequisite for a valid description according to the INTERNATIONAL CODE OF NOMENCLATURE FOR ALGAE, FUNGI, AND PLANTS (formerly: INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE), generally referred to as the “CODE”. Typification is one of the six principles of the CODE. A type specimen is generally a plant, or a part thereof, which was deposited in an herbarium. In principle, the type should allow for a positive identification of the taxon that has been described. It can be a dried plant, or a dried flower. However, dried specimens are very often useless as they are many times damaged beyond proper recognition during the drying and mounting process. Typically collections of dried plants glued to paper are prime habitats for lower organisms that have cellulose on their favourite menu. This material, therefore, is only useful for taxonomy if the specimens are kept in proper cases and proper facilities. Unfortunately, this is something most botanical institutes cannot afford to do. Herbarium collections need to be cared for, but again, most institutes are understaffed and under-budgeted (the former, of course, generally being a result of the latter).

Alcohol specimens are an excellent alternative to the “classical” dried specimens. They have many advantages, but they too have their problems. Whereas, for example, one will have no trouble finding a suitable receptacle to harbour a flower of *Masdevallia*, *Oncidium*, or most *Paphiopedilum* species, one will undoubtedly be challenged if one is to look for a receptacle to accommodate an entire plant of, say, *Paphiopedilum sanderianum*. And just imagine trying to conserve a plant of *Grammatophyllum* with its 2.5 m long pseudobulbs and 3 m long inflorescence in alcohol. But having overcome this “minor” problem, we will soon realise that alcohol specimens require special care, also. As there is leakage, the volatile alcohol diminishes constantly and needs to be replaced, and the bottles must be stored properly. Another important drawback is that the alcohol mixture generally used to preserve the specimen contains formaldehyde, a carcinogenic component, and is highly flammable. Therefore, it must be handled with great care and in compliance with insurance and fire department rules. The great advantage of the storage of specimens in alcohol is that they retain their form. If you don’t think this to be important just try to restore the staminode of a slipper orchid from a dried specimen! However, alcohol specimens decolourise quite rapidly. For that reason, they should always be paired with a colour photograph of the flower. Unfortunately, this is not required by the CODE and almost never done. Sometimes these types are very useful, quite often they merely add to the confusion surrounding a given taxon, and in some cases they may even be the primary cause for such confusion. As we have already stated, type specimens can be damaged beyond certain recognition. They may be lost or destroyed. During one single bombing raid on Berlin in World War II, for example, nearly the entire Schlechter Herbarium was lost. Another problem case is the Reichenbach Herbarium in the Vienna Museum of Natural History. H.G. Reichenbach’s herbarium and library were left to the Natural History Museum in the city of Vienna on the condition that “the preserved Orchids and drawings of Orchids” were not to be consulted during the first 25 years after his death. Thus, Reichenbach’s types were inaccessible between 1889 and 1914. Of course, Reichenbach’s decision was met with

the most various reactions from his colleagues, ranging from disbelief and anger to dismay. Joseph Dalton Hooker claimed that Reichenbach had promised the herbarium to Kew and expressed great disappointment (although he had always kept Reichenbach from publishing in CURTIS'S BOTANICAL MAGAZINE and other Kew-controlled publications). C.A. Backer (1936) may have been close to the truth when he wrote:

"And so not mindful of the lesson in Galat. 5, 26 'Let us not seek vain glory', in order to remain the mourned specialist himself, he made work difficult for others for a quarter of a century after his death."

H.G. Reichenbach (generally referred to as Reichenbach fil.) is infamous among botanists for his short (to extremely short) and vague descriptions that in many instances simply may be regarded as useless, especially when the specimens upon which the descriptions are based are not available. Add to the 25 years of "unavailability by testament" the years of World War I and the result is that the Reichenbach material (including many types) was not accessible for at least one entire generation of botanists.

Another problem is that sometimes reference is made to types that have never reached the herbarium, for whatever reasons. If no type material can be located the rules of taxonomy call for the designation of new plant material which is then called a neotype. Too many neotypes, however, are subject to interpretation as they can be designated by any person who discovers that a type specimen is missing. A neotype, therefore, often mirrors that person's interpretation of the original description. That original description itself, as we have seen above, can be very incomplete or dubious. Thus, it is often difficult, if not impossible, to be absolutely certain whether the plant being studied really corresponds to the plant which was available to the author of the original description.

Some botanists, especially those working in herbaria, consider these specimens to be the ultimate and only valid source for determining the identity of a plant. They often overlook the fact that in many cases there is no proof whatsoever that the designated "type" is, in fact, identical with the described plant. A good example of this is *Paphiopedilum elliotianum*, for which the supposed type specimen was produced several years after the original description!

The conclusion must be that herbarium materials, while sometimes very valuable and informative, should not be overrated and should never be relied upon as the only source of information about a plant.

SYNONYMS

Many taxa have several Latin names. There may be various reasons for this. The problem generally occurs when minor or geographical variants are described as species. This is nothing new and cases are known from such famous botanists as Lindley, Blume, Reichenbach, and Schlechter. Commercial growers obtain more revenue from a plant when it is called a "new" species than from that same plant designated as a variety. Thus, plants showing the slightest variation in leaf tessellation and/or flower colour often are given a different name and published as a separate species. Plants also

obtain a new name when they are transferred to a new genus. Most *Paphiopedilum* species, for example, were originally published as *Cypripedium* species, and at one stage, nearly all of them were transferred to the genus *Cordula* by Rolfe. We will re-encounter these names in the descriptive part either as basionyms or synonyms. Sometimes, it is discovered that a designation is invalid. In those cases, a new name must be assigned according to the rules. In other cases, the same plant may be described independently by different authors. One example of this is the confusion and ongoing discussion regarding the names *Paphiopedilum markianum* and *P. tigrinum*. A second example may be found in the three independent publications of the same plant as *Paphiopedilum vietnamense*, *P. mirabile*, and *P. hilmari*. But this phenomenon of multiple descriptions cannot be eliminated. In a field where the nomenclature of a taxonomic group is based upon priority of publication, one can hardly blame anyone for trying to publish his or her concept first, although that race to “fame” sometimes creates conditions that are amusing and irritating. Surely, very few authors inform their colleagues about what they are working on, and what they are about to publish, well knowing that if they did, others would try to publish more rapidly. One would be very naive if one were to believe the field of orchid taxonomy to be without professional jealousy which in recent years has also shown nationalistic features. Indeed, some people do believe that plants native to any given country should be described only by authors of that country. In respect to *Paphiopedilum*, this syndrome is well known from China and Latin America. And some authors just neglect or ignore any publications that are not in their own language, be it out of linguistic chauvinism or pure ignorance.

Our knowledge of the genus *Paphiopedilum* is constantly increasing. New species will be discovered and described. Literature searches and review of old materials may reveal that well-known names are invalid or have been used incorrectly; familiar names may disappear and new ones may need to be added to the inventory of the genus (as in the case of *Paphiopedilum callosum*, now correctly designated as *P. crossii*). Taxonomy is not a static part of science, and orchid taxonomy is by no means an exception.

ORCHIDACEAE AKA ORCHIDS

GENERAL CONSIDERATIONS

Since the publication of Carolus Linnaeus' SPECIES PLANTARUM in 1753, the taxonomy of all living matter has been classified mainly according to sexual characteristics. In flowering plants, these characteristics are found in the flowers, or in other words, in those structures that have been adapted for sexual reproduction; reproduction causes variation, thus producing the basis for evolution. Until about fifty years ago, students of biology had an easy task of dividing the living matter on our planet as either plants or animals. Those organisms having a cell wall were classified as plants and those without a cell wall were considered to be animals. Since then, the world around us has been reclassified, and scientists now generally divide living things into six “kingdoms”: *Bacteria*; *Archaea*; *Protista*; *Fungi* (covering moulds and mushrooms); *Animalia* (multicellular organisms with cells that have an organised nucleus but no cell wall); and *Plantae* (multicellular organisms with cells that have an organised nucleus and a cell wall).

The plant “kingdom” is divided into many different parts, of which the flowering plants, scientifically referred to as Angiosperms, are but one. Within this large group (about 400 families with a total of about 250,000 species), the order Orchidales is of special interest to us and will be the focus of more extensive discussion.

THE ORCHIDS

The orchids, being one of the largest and most diverse groups of the plant “kingdom”, comprise between ten and twelve percent of all known flowering plants. This represents between 25,000 and 35,000 taxa. A total of 59,695 entries of *Orchidaceae* names were included in the INDEX KEWENSIS³, up to June 1996. As of 29 September 2012, the number of entries had increased to 77,915. This number, however, does not give an accurate count of the number of species because it includes subspecies, varieties, forms, as well as synonyms. Orchids are an actively evolving group with extremely specialised flowers that are adapted for attracting, deceiving, and manipulating insects to achieve cross-pollination.

The following characteristics are common to all plants in the orchid family. Some of these characteristics, however, are shared by other groups of plants.

- (1) The inflorescence is either terminal or lateral, meaning that it is generated from the apex or from the side of a plant growth.
- (2) The ovaries are inferior, meaning that the ovary is below the stamens, sepals and petals.
- (3) The flowers are bilaterally symmetrical, meaning that they can only be split into similar halves along one given plane.
- (4) There are six tepals in two whorls.
- (5) The three tepals of the outer whorl are usually referred to as sepals. The three tepals of the inner whorl are called petals.
- (6) The median tepal of the inner whorl is referred to as the labellum or “lip”.
- (7) The number of stamens is always reduced.
- (8) The median stamen of the outer whorl and the lateral ones of the inner whorl are developed as either fertile stamens or as more or less distinct staminodes.
- (9) Stamens and style are fused into a gynostemium which forms a “column”, except in a few genera.
- (10) The gynostemium of the orchids is a unique feature within the monocots, but analogous structures are found in two families of the dicots, namely the *Stylidiaceae* (Trigger Plants) and the *Asclepiadaceae* (Milkweeds).
- (11) The anthers are joined to the filament at its base (basifixed) or for some distance along its dorsal edge (dorsifixed).
- (12) The pollen grains are single in the *Apostasioideae* and *Cypripedioideae*, but cohere in tetrads in the majority of all other orchids.

3 The INDEX KEWENSIS was a list of the plant names and their bibliographic references. It is now incorporated into the INTERNATIONAL PLANT NAMES INDEX (IPNI), an online project of the Royal Botanic Gardens (Kew), Harvard University, and the Australian Centre for Plant Biodiversity Research.

- (13) The ovary may be unilocular, with a single chamber in which the pollen grains develop, or trilocular, with three such chambers. There is wide disagreement about the interpretation of what can be deduced from a cross-section of an orchid ovary (Brown, 1833; Vermeulen, 1966).
- (14) The style is more or less apically inflexed and terminated by a tri-lobed stigma with a sticky surface.
- (15) The development of the embryonic sac is triggered by pollination. Sometimes, however, the actual fertilisation does not occur until five or six months after pollination (Wirth & Withner, 1959).
- (16) The embryo is always immature in the ripe seed.
- (17) The seeds are very minute and numerous, but vary considerably in shape and size.
- (18) Upon germination the embryo forms a tubercle (protocorm) which is covered with hair-like structures on most of its basal part. Eventually several leaves develop from the upper end of the protocorm.
- (19) Under natural conditions, most orchids will germinate only when a symbiosis with a fungus has been established. The adult green plants are usually viable without the presence of the fungus. The relationship of orchids to fungi is still under study and interpretations vary considerably.

The “construction” of the flowers, the numerous small seeds, and the close relationship with the fungi are characteristics that are shared between the orchids and the *Burmanniaceae*, a group of poorly understood, mainly tropical and subtropical monocots of no horticultural merit. For that reason, both groups are sometimes classified into one complex.

Scientifically verifiable facts about the evolution of the orchids are very rare. Unfortunately, the fossil record is very poor in respect to plants. The only fossil hitherto found that can be unambiguously linked to an orchid is the discovery of an orchid pollinarium attached to the mesothorax of an extinct stingless bee (*Proplebeia dominicana*), preserved in Miocene amber from the Dominican Republic (Ramírez et al., 2007). The fossil was dated to be between 15 and 20 million years old. It is assumed that orchids are probably derived from lilylike ancestors with six stamens. The orchid genus *Neuwiedia* may be a relic of an undetermined earlier stage. But this assumption should be regarded as an intelligent guess, and other interpretations are quite possible.

Whereas there is general agreement on the major groups of orchids in respect to their broad outline, there is much disagreement about their ranking and the relationships among them. Many modern treatments follow Garay (1960, 1972) in considering the orchids as consisting of one family, containing five or six subfamilies. However, as early as 1833, John Lindley, the “Father of Orchidology”, suggested recognising three families within the orchids. Lindley did not discuss this division in detail, but the text in his *NIXUS PLANTARUM* is quite self-explanatory. This part of Lindley’s work has been generally neglected. Vermeulen (1966) was the first to resurrect the idea, and Dahlgren, Clifford, & Yeo accepted this division for *THE FAMILIES OF THE MONOCOTYLEDONS*, published in 1985.

It should be noted that, no matter what approach one adopts - three families or a single family with a number of subfamilies - the result is exactly the same. The position of the various taxa is merely shifted by one level within the taxonomic hierarchy.

THE CYPRIPIEDIAE

The *Cypripediae* or “slipper orchids” were among the first orchids mentioned at the generic level (Heister, 1748). In 1753, Linnaeus, the founder of modern taxonomy, created, among others, the genus *Cypripedium* to accommodate *Cypripedium calceolus*, the only slipper orchid present in central Europe.

By the end of the 19th century, the genus *Cypripedium* L. included about one hundred species. Of these, approximately twenty-five percent were known from the temperate regions. The rest originated from the Asian and American tropics and sub-tropics.

In 1818, Rafinesque created the genus *Criosanthes* with the type *Criosanthes arietinum*, a North American slipper orchid. Twenty years later, in volume four of his *FLORA TELLURIANA*, he founded three new genera for Asian slipper orchids:

- (a) *Stimegas* with the type species *Stimegas venustum*,
- (b) *Cordula* with the type species *Cordula insignis*, and
- (c) *Menephora* with *Menephora bicolor* as its type.

Rafinesque's intentions were rather clear in describing these taxa. He wrote (*loc. cit. sub* No.931): “I propose the following subgenera or rather genera ...” and, although his descriptions are very short, his genera *Stimegas* and *Cordula* were clearly typified. We do not know, however, what Rafinesque meant with his genus *Menephora*. His description is not adequate to clarify the identity of the plant designated as *Menephora bicolor*. The description states: “ ... Borneo and Java ... flowers dull purple, but upper petal white, broader ovate.” It has been suggested that *Menephora bicolor* is synonymous with *Paphiopedilum purpuratum* but this latter species does not occur in either Borneo or Java. One explanation is that Rafinesque referred to a plant of the *Paphiopedilum javanicum* complex. Another possibility is that Rafinesque erred about the natural distribution of the plant now generally known as *P. purpuratum*.

Until about forty years ago, the work of Rafinesque was not taken into consideration by most authors. Some just ignored it, and the majority didn't even know of his writings. Indeed, only a few copies of his works have survived in specialised libraries. Upon Rafinesque's death in 1840, the remaining stock of his books was sold as “scrap paper”.

In 1848, Lindley founded the genus *Uropedium* based on materials from the Linden⁴ expedition to the American tropics, and in 1854, another genus, *Selenipedium*, was de-

4 Jean Jules Linden (1817-1898), Belgian explorer and horticulturist (of Luxemburg extraction) was to become the doyen of Belgian horticulture. See Nicole Ceulemans-Schueremans's magnificent book *LINDEN-EXPLORER, MASTER OF THE ORCHID* (ISBN 90 6153 631 6). Nicole is the great-great-granddaughter of Jean Jules Linden.

scribed by H. G. Reichenbach (Reichenbach fil.) to accommodate two other slipper orchids from that continent. *Uropedium* as well as *Selenipedium* suffered a fate similar to that of Rafinesque's work: they were, for the most part, generally ignored.

Pfitzer, a German botanist working in Heidelberg, separated all the tropical species from *Cypripedium* and combined them in a new autonomous genus *Paphiopedilum* (1886). He included a section *Phragmopedilum* for the species with conduplicate leaves from the American tropics, described as *Selenipedium* section *Acaulia* by Reichenbach fil.

In 1896, Rolfe elevated Pfitzer's section *Phragmopedilum* to the genus *Phragmipedium* in his review entitled *The Cypripedium Group*. Rolfe differentiated among the genera *Selenipedium* Reichenbach fil., *Phragmipedium* Rolfe, *Cypripedium* L., and *Paphiopedilum* Pfitzer. In 1901, Rolfe changed the name of the genus *Phragmipedium* to "*Phragmopedilum*" as he considered the latter a more linguistically correct spelling. However, the rules of nomenclature do not permit such corrections, no matter whether they are linguistically indicated or not.

In the meantime, a rather extensive study by Johannes Gottfried Hallier (Hallier fil.) was published in the *ANNALES DU JARDIN BOTANIQUE DE BUITENZORG*. In that study, Hallier (1897) discussed a new species, *Paphiopedilum amabile*, and presented an "overview" of the entire genus.

Pfitzer (1903) again reviewed all slipper orchids for Engler's series *DAS PFLANZEN-REICH*. Pfitzer based this revision on Hallier's work of 1897 and recognised *Selenipedium* Reichenbach fil., *Phragmipedium* Rolfe as *Phragmopedilum* (Pfitzer) Rolfe emendated (= corrected), and *Paphiopedilum* Pfitzer as separate genera. Pfitzer must have been aware of at least part of Rafinesque's work as he reduced the Rafinesque genus *Criosanthes* to a section of the genus *Cypripedium* L. He did not, however, mention Rafinesque's genera *Stimegas*, *Cordula*, and *Menephora*.

In 1959, the International Botanical Committee conserved⁵ *Paphiopedilum* against the earlier published *Cordula* and *Stimegas*.

In 1971, at the beginning of the publication of the 3rd edition of Rudolf Schlechter's *DIE ORCHIDEEN*, Brieger made a revision of the slipper orchids. Brieger divided the subfamily into four tribes, each with one monogeneric subtribe. On the generic level, Brieger recognised *Selenipedium* Reichenbach fil., *Phragmipedium* Rolfe, *Paphiopedilum* Pfitzer and *Cypripedium* L.

In 1975, *Phragmipedium* was conserved over the earlier published name *Uropedium* at the botanical congress in St. Petersburg (then Leningrad), following a proposal by Dressler & Williams.

⁵ The pertinent article of the CODE states: "Conservation aims at retention of those names that best serve stability of nomenclature." – Unfortunately, this is one of the many ambiguous clauses in the CODE, and we predict that the elasticity of this clause will be interpreted in various ways by the relevant committee at each International Congress of Botanical Nomenclature.

The relationship among the slipper orchids was then the subject of an extensive study by John T. Atwood (1984). One of the conclusions he reached was that the plant generally known as *Cypripedium arietinum* differs quite distinctly from all other species within the genus *Cypripedium*, and also shares two anatomical features with the genus *Selenipedium*. He therefore “revived” the genus *Criosanthes*.

Albert & Chase (1992) founded the genus *Mexipedium* to accommodate a plant originally described as *Phragmipedium xerophyticum*.

The genus *Criosanthes* Rafinesque is not generally accepted; the genus *Mexipedium* Albert & Chase, however, is now well-recognised as an autonomous entity. Up to this time, most authors have considered *Criosanthes* part of *Cypripedium*. Albert (1994) used cladistic analysis of morphological and molecular data to reconfirm that *Cypripedium*, *Paphiopedilum*, and *Phragmipedium*, including *Mexipedium* and *Selenipedium*, are derived from a common ancestor, which was actually common knowledge by all well-trained botanists. Albert & Pettersson (1994) suggested placing *Mexipedium* and *Phragmipedium* back into the genus *Paphiopedilum*. These suggestions are based on data obtained using methods of molecular biology which are enormously overrated and should not be used out of the context of the entire suite of taxonomic methods, especially those now classified as alpha-taxonomy. “Molecular Taxonomy” is based on the molecular comparison of selected regions of nucleic materials and the statistical analysis of these comparisons. In the meantime it has been shown by several authors that the statistical programmes used to obtain these evaluations are (1) not suited for this purpose, and (2) can be easily manipulated to obtain results that are wanted by the respective authors. As one would expect, plants sharing common ancestors should have some characteristics and a number of genetic sequences in common. All that is needed, however, is to put a plant of each of the different genera of the slipper orchids together on a table or greenhouse bench, to make obvious what immense differences there are among them.

On the basis of morphological differences and considering the general biogeography of the slipper orchids, it becomes clear that *Cypripedium*, *Criosanthes*, *Paphiopedilum*, *Phragmipedium*, *Selenipedium*, and *Mexipedium* are best regarded as individual, autonomous entities within the subfamily *Cypripedioideae* (Braem, 1996a), and we have yet to see data that, upon serious and objective scrutiny, indicates anything different.

Key to the six Genera of the Slipper Orchids

1. Leaves with several folds (plicate), alternate (not in two opposite rows). Rhizome distinct. Stems with distinct internodes 2
- 1a. Leaves with one centre fold (conduplicate), arranged in two opposite rows (distichous). Rhizome generally less distinct. Leaf-bearing stems without distinct internodes 4
2. Leaf-bearing stems generally branched. Plants up to 5 meters high. Flowers multiple and small. Ovary 3-celled. Plants from the American tropics *Selenipedium*
- 2a. Leaf-bearing stems never branched. Plants up to 1 meter high. Flowers few and of intermediate size. Ovary 1-celled 3
3. Lateral sepals separate, flowers with a spur *Criosanthes*
- 3a. Lateral sepals united, flowers without a spur *Cypripedium*
4. Sepals overlapping. Ovary 1-celled. Plants from Asia *Paphiopedilum*
- 4a. Sepals not overlapping. Plants from Mexico, Central and South America 5
5. Flowers mainly white, very small, not more than 3 cm in diameter. Leaves very rigid, succulent, ovary 1-celled, plants from Mexico *Mexipedium*
- 5a. Flowers not mainly white, larger than 3 cm in diameter, leaves not succulent, ovary 3-celled. Plants from Mexico, Central and South America *Phragmipedium*

THE GENUS PAPHIOPEDILUM

GENERAL CONSIDERATIONS

At the time Pfitzer (1886) published his concept of the genus *Paphiopedilum*, two or possibly three species belonging to the same group of orchids had already been separated from the genus *Cypripedium*. They were set up as monospecific genera under the names of *Cordula*, *Stimegas*, and *Menephora* (Rafinesque, 1838). Using the rules of botanical nomenclature, this would mean that the first published name, which was *Stimegas*, would have to be given priority over *Paphiopedilum*. In this case, however, the International Botanical Committee (Rickett & Stafleu, 1959) chose to protect the name Pfitzer gave to the genus against the names that were published earlier by Rafinesque.

Since the description of the genus *Paphiopedilum* by Pfitzer, very few comprehensive revisions of the genus have been published. In 1896, R. A. Rolfe discussed all slipper orchids and, in 1897, a discussion of the genus by Hallier fil. was published accompanying his description of *Paphiopedilum amabile*. Hallier divided the genus into sections, and writes [translated from the German original by the senior author]:

“When determining the identity of *Paphiopedilum amabile*, the main drawback which I encountered was the lack of an in-depth division of the genus *Paphiopedilum*.”

and further down in his text we find:

“In order to facilitate the work for those who wish to study the species of the genus *Paphiopedilum* in the future ... I give hereafter a review of the genus.”

Although Hallier noted that Pfitzer had announced a revision of the genus, that review was not published until 1903.

In the nineteen-sixties, publications about the genus *Paphiopedilum* became more abundant again. Dr. Jack Fowlie travelled extensively to locate and study the slipper orchids in their native habitats. He wrote innumerable articles about the genus *Paphiopedilum* which were published in the ORCHID DIGEST, an American orchid journal which he edited for nearly 30 years.

The first of several modern treatments of the genus was published by Brieger (1971), followed by the work of Karasawa & Saito (1982), then Cribb (1987, 1998), Braem (1988, 1998), Braem & Chiron (2003), and Braem, Chiron & Öhlund (2016). Whereas Brieger proposed a new infrageneric taxonomy which was followed and completed by Karasawa & Saito, Cribb chose to follow a separate infrageneric division.

Both Braem and Cribb took a rather conservative view in respect to the acceptance of taxa at the specific level. In respect to the infrageneric division, there are considerable

differences between the two books. Braem largely followed the system as published by Karasawa & Saito. Cribb, on the other hand, claimed that the taxonomic subdivisions used by Karasawa & Saito lacked scientific validity because they were based on the work of Pfitzer (1894) and Hallier (1897), and denied these publications recognition because:

“... in neither account are the ranks of these [infrageneric] categories stated, and therefore, the infrageneric names used in these treatments can be ignored” (Cribb 1987: 59).

Here, Cribb is simply wrong (and should have asked the advice of someone who masters the German language). Pfitzer, in his work *BEITRÄGE ZUR SYSTEMATIK DER ORCHIDEEN* (1894), not only gave an overview of all species of slipper orchids that he knew, but he also classified them at different levels. These levels were respectively numbered with large Roman numerals, large Latin capitals, small Latin capitals and small Greek capitals. From the text, it is evident that Pfitzer considered the divisions he numbered with Roman numerals to be genera and those numbered with large Latin capitals to be sections. On page 39 of his work, while discussing the different divisions (Gruppierungen) within the genus *Cypripedium*, he wrote:

“Furthermore, the species with free sepals form their own, separate section ...”
 (“Ferner müssen die Arten mit freien paarigen Sepalen eine eigene Sektion bilden ...”).

In his classification, the corresponding division was named *Arietinum* and it was numbered with a large Latin capital. Thus, Pfitzer did very well and very explicitly designate his infrageneric categories.

As far as Hallier fil.'s (1897) work is concerned, the facts are similar. The publication was entitled “Über *Paphiopedilum amabile* und die Hochgebirgsflora des Berges K'lamm in Westborneo, nebst einer Übersicht über die Gattung *Paphiopedilum*” and appeared in the *ANNALES DU JARDIN BOTANIQUE DE BUITENZORG*, 14: 18-52. In this article, Hallier gave a classification with 6 different ranks. They were respectively numbered with large Latin capitals, small Latin capitals, small Greek capitals, crosses, large Roman numbers and stars, all admittedly without the name of the rank, but as was appropriate at the time. However, on page 42, Hallier wrote:

“Als Bastard zwischen *P. lowii* und einer Art aus der Sektion *Sigmatopetalum* schliesst sich offenbar *Cypr. Wolterianum* Kränzl. in GARD. CHRON. III. 17 (1895) p. 166 hier an”

“*Cypr. Wolterianum* Kränzl. (GARD. CHRON. III. 17 (1895) p. 166), the hybrid between *P. lowii* and a species belonging to section *Sigmatopetalum* is to be included here.” [Translation from the original by Prof. Braem.]

Because of the combination of the word “Sektion” with the name *Sigmatopetalum* and because the name *Sigmatopetalum* only appeared once in his classification and after a

large Roman numeral, there cannot be any doubt that Hallier fil. intended all names at the 5th rank (the rank numbered with large Roman numerals) to correspond to sections. This is confirmed by the fact that on page 48 of his publication, Hallier explicitly combined the name *Clinopetalum* with the rank of section. Again, “*Clinopetalum*” figured behind a large Roman numeral.

It is interesting that, on the other hand, Cribb based his work on Pfitzer’s 1903 publication, of which at least parts are clearly and explicitly based on Pfitzer’s 1894 work and Hallier’s 1897 publication. Indeed, on page 53 of the second edition of his book on *Paphiopedilum*, Cribb wrote:

“The five sections I have accepted in subgenus *Paphiopedilum* correspond largely with the subgenera of Karasawa & Saito (1982) ...”

These, however, are based either on the Pfitzer work of 1894 or on the Hallier publication of 1897 which Cribb denied recognition.

MORPHOLOGY

LEAVES

The leaves of all *Paphiopedilum* species are conduplicate, in other words, folded along the mid-rib only. They are generally oblong to elliptic in shape. However, it must be noted that leaf shape within any one species may vary under different environmental conditions, but the following general tendencies can be observed.

The leaf margin is usually plain. In *Paphiopedilum hookerae* and *P. volonteantum*, however, the leaf margins are dentate and rough to the touch. Plants belonging to subgenus *Cochlopetalum* have their leaf margins partly or entirely covered by cilia.

The genus *Paphiopedilum* can be divided into two groups based on the surface morphology of the upper side of the leaves. In one group this upper surface is plain, uniformly colored, and pale to deep green. In the second group, the upper leaf surface is mottled with pale to deep, more or less distinct, greenish areas and much lighter greyish, silvery, or whitish areas. The presence or absence of purple spots on the underside (or at least part of the underside) is another characteristic that in some cases can be useful for the differentiation among taxa.

Leaf size and surface morphology can, however, vary widely in certain species, such as *Paphiopedilum tonsum*, *P. purpuratum*, *P. sukhakulii*, *P. hookerae*, etc., and should, therefore, never be used alone to identify a taxon.

Leaf thickness varies considerably in *Paphiopedilum*. Karasawa & Aoyama (1981) report variation between 0.47 mm in *Paphiopedilum glaucophyllum* and 2.1 mm in *P. parishii*. Whereas this variation may be of considerable academic interest, it is hardly useable as a reliable marker in taxonomy.

STEMS AND STOLONS

The stem is the supporting axis to which leaves and inflorescences are attached. *Paphiopedilum* stems are usually very short. An exception is *Paphiopedilum druryi*, which may have stems up to 10 cm long. Some species, such as *Paphiopedilum barbatum*, *P. lawrenceanum*, and others, occasionally generate unusually longer stems in cultivation. This is by no means always so, and it is influenced by many different criteria. Consequently, this characteristic cannot be used reliably to determine whether a plant has been taken from the wild or whether it has been cultivated for a lengthy period of time. Some species, especially members of the subgenus *Parvisepalum*, produce stolons of various lengths. A stolon is an extension of the stem which starts at a leaf axil. The stolon has nodes from which roots and eventually a young plant can be generated.

INFLORESCENCE

As in most genera of the *Orchidaceae*, the inflorescences in the genus *Paphiopedilum* are racemes. In most species, a single flower normally is produced at the tip of the raceme. This characteristic can be found in all taxa of the subgenera *Parvisepalum*, *Brachypetalum*, *Paphiopedilum*, *Sigmatopetalum*, and *Megastaminodium*, but some clones in these subgenera occasionally generate two flowers on a single raceme. The racemes of the subgenus *Polyantha*, however, commonly produce up to six, rarely to 10 flowers, which all, or nearly all, open simultaneously. *Cochlopetalum* is the second subgenus in which the plants have multifloral inflorescences. In these plants, the flowers develop and open one after the other at the tip of the raceme. Plants of this subgenus are known to have continuously produced flowers for more than three years, and in the case of a plant grown in an amateur greenhouse in Portland, Oregon, a plant of this subgenus produced flowers continuously for nearly five years! The sequential development of the flowers is a foolproof taxonomic marker for the recognition of the subgenus.

FLOWER CHARACTERISTICS

Paphiopedilum flowers, like those of all orchids, have a perianth consisting of six parts: three sepals and three petals, of which one is developed into the lip (labellum).

SEPALS

The dorsal sepal can have a variety of shapes including elliptic, ovate, or obovate, and the shape of the dorsal sepal is characteristic for each species. The lateral sepals are always, with the exception of some malformed or mutated clones, joined into a single structure referred to as the synsepal. In most species, the dorsal sepal is larger than the synsepal, but it is sometimes equal in size and in the subgenus *Parvisepalum*, the dorsal sepal is generally smaller than the synsepal. The colour pattern of the dorsal is variable, but a colour pattern is, again, characteristic for each species (except, of course, for the albinos and other colour variants).

PETALS

The shape, size, colour pattern, and hairiness of the floral segments are more highly differentiated in the petals than in the sepals, and the morphology of the petals often

proves to be a good marker for identifying the different species. In some species, the margins of the petals are entirely or partially covered with cilia. In other species, the hairs are produced only from the deep purple to near black warty spots such as the ones that can be seen in *Paphiopedilum barbatum*.

LIP (LABELLUM)

As we have stated above, the third petal has developed into a structure referred to as the labellum or lip. Quite often orchid growers consider the pouch of a slipper orchid to be identical with the lip or labellum. That, however, is incorrect. The lip of all *Paphiopedilum* flowers consists of three lobes. The lateral ones, which are near to the base, are folded inward, forming a tube. It is the apical lobe of the lip that forms a pouch. This pouch varies considerably in shape. It can be calceolate, ovoid, helmet-shaped, or pot-shaped, and to add some confusion, many of these designations are used interchangeably. Lateral auricles ("ears") can be present and the upper margins may curve into the pouch. The shape of the pouch is usually typical for any given group of taxa. However, there are exceptions. In section *Mastigopetalum* of subgenus *Polyantha*, for example, the pouch is generally non-auriculate and has margins that are curved to the inside. Three species of this group, however, differ in respect to the general shape of the pouch. In *Paphiopedilum adductum* and *P. anitum* the margins are not curved into the pouch. They stand straight upward or they are somewhat curved to the outside. In *Paphiopedilum randsii*, the pouch has distinct auricles. In two species of subgenus *Sigmatopetalum*, *Paphiopedilum venustum* and *P. sangii*, the pouch shows a very distinct venation.

MALFORMATIONS OF FLOWER SEGMENTS

Malformations of flower segments are known in many orchids, and *Paphiopedilum* is no exception in this respect. These malformations include the occurrence of an extremely large synsepal, as in *Paphiopedilum insigne* var. *janus*, described by Linden fil. in 1897; plants with multiple pouches; plants with notching of the margin of the dorsal sepal, as seen in *Paphiopedilum sanderianum* (Reichenbach fil.) Stein and the type of *P. sangii* Braem; and the occurrence of extra large petals as in *Paphiopedilum stonei* var. *platytaenium*, described by Reichenbach fil. in 1867. We do not know anything about the history of *Paphiopedilum insigne* var. *janus*, but we may safely assume that just as in *P. stonei* var. *platytaenium*, the malformation occurred in a single clone and that this clone disappeared sometime at the beginning of the 1900s. Therefore, any remarks about the biology of these malformations would be purely speculative. We know, however, that the deformation in *Paphiopedilum stonei* var. *platytaenium* was genetically stable as it occurred during many flowering seasons over about forty years.

Plants with twin pouches have been observed several times in cultivation, and in 1883, the younger Reichenbach reported a specimen of *Paphiopedilum stonei* with five sepals, of which four were united; three "prolonged" petals; and three lips. These abnormalities may or may not be recurrent.

The type specimen of *Paphiopedilum sangii* Braem showed a deformation of the dorsal sepal, which was indented on both sides (Braem, 1987). The same abnormality was

observed in a plant of *Paphiopedilum sanderianum* (Reichenbach fil.) Stein in cultivation in Germany. In both of these cases, the abnormality occurred in a single clone of each species and during a single flowering period only. It is interesting to note that in both cases, the malformations occurred when the plants first flowered in cultivation, a fact indicating that at least some of these malformations may be caused by stress.

STAMINODE

The morphology of the staminodal shield has been considered to be one of the most important characteristics for the classification of species within the genus. Indeed, this feature is important to differentiate among subgenera. However, in some species, for example those belonging to subgenus *Brachypetalum*, staminodes are extremely variable and, consequently, are a less reliable indicator of species status. When taxa are closely related, the differences in staminode morphology can be minimal. In such cases, for example in *Paphiopedilum barbatum*, *P. crossii*, and *P. lawrenceanum*, this characteristic cannot be used to identify any given plant. In many other cases within the genus *Paphiopedilum*, for example in *Paphiopedilum emersonii*, *P. canhii*, *P. charlesworthii*, *P. micranthum*, *P. spicerianum* and others, the staminode morphology is a rather fool-proof taxonomic marker at the species level.

SEED

Seed morphology varies considerably within the genus, but it is usually fairly uniform within a subgenus. Seeds are nearly oval in the subgenera *Brachypetalum*, *Paphiopedilum*, and *Polyantha*, with the exception of *Paphiopedilum rothschildianum*. They are much longer and thread-like in subgenus *Sigmatopetalum*. The morphology of the seeds of the other subgenera and *Paphiopedilum rothschildianum* is intermediate between these forms. The seeds of all *Paphiopedilums* are very small; their length varies between 0.11 and 1.97 mm and their width between 0.07 and 0.4 mm. Their exceedingly small size and shape make them perfectly adapted for wind dispersal. The embryos are always immature in the ripe seed. They do not have any endosperm and require a mycorrhizal fungus for nutrition and germination.

ECOLOGY

Paphiopedilum species grow on a variety of surfaces, including the forest floor, trees, and rocks. Many authors erroneously consider the plants that grow on the ground as terrestrials and those that grow on rocks as lithophytes. This interpretation is extremely confusing. If someone questions this, he or she only needs to try to cultivate a *Paphiopedilum* plant in the same way as one would grow true terrestrials, such as a *Pleione*, an *Epipactis* or as a true *Cypripedium*. The plant will perish within a short time. He or she will have the same experience if a member of this genus is tied to a piece of rock.

This confusion originates in the definition of the term terrestrial, which actually means “on earth”. Indeed, various *Paphiopedilum* species such as *P. armeniacum*, *P. druryi* and *P. praestans* have been reported to grow in “sand” of various consistencies. Some *Paphiopedilums* do appear to grow on the ground or on rocks, but in reality, they are

growing in the lichens and mosses, or on the roots of trees, or in the leafy debris which covers the forest floor and rocky ledges and fills the cracks and crevices. Even the species that grow on trees and that answer to the definition of "epiphytes" have their roots buried in the moss and leafy debris which has accumulated in the crotches of the trees. Unfortunately, no scientifically founded studies regarding the growth habits of *Paphiopedilum* species *in situ* are known. This, however, would be a very rewarding topic of study and would terminate endless years of speculation.

In all instances, *Paphiopedilum* plants have the large velamen-covered roots that are so common in epiphytic orchids. The substrate on which slipper orchids grow is always nutrient-poor. *Paphiopedilum bullenianum* in Sarawak (Borneo) grows in peat-swamp forests where the substrate is undoubtedly acidic. Many more, however, grow in limestone areas where the substrate is either neutral or slightly alkaline. Perner (personal communication) reported *P. armeniacum* to grow in Nu-Shan above the Salween River in "open calcareous soil." Fowlie (personal communication) reported that *Paphiopedilums* are often associated with *Nepenthes*, which are insectivorous plants. It is interesting to note that analogously, at least some of the North American *Cypripediums* grow together in a single habitat with plants of the insectivorous genera *Sarracenia* and *Darlingtonia*. This phenomenon may have no more significance than coincidence, but it suggests some interesting but speculative possibilities. It may be a certain form of mimicry, or both groups of plants may simply utilise the same insects for different purposes. Another possibility is that both groups have adapted to the low-nutrient environment or that both derive benefit from mycorrhiza that is found in a particular area. Other possibilities come to mind, but these questions can only be answered with extensive study. It is interesting to note that the habitats can show very different microclimates within a small area. At one *Paphiopedilum armeniacum* habitat the earth on the southern slopes is burned by the intensity of the sun and inhabited by *Agave* plants (imported from the USA centuries ago). The steep northern slopes, however, which are protected from the sun, are covered with oaks, magnolias, grass, etc. On these slopes, protected by boulders, *P. armeniacum* grows not two meters apart from *Cypripedium plectrochilum*.

The conditions in which *Paphiopedilum* species grow vary from deep shade to full sun, and the geographical orientation of the habitats (north, northeast, etc.) may be variable as well. The preference of most species in respect to this latter criterion is poorly known.

Paphiopedilum habitats can be very small, inhabited by only a few plants. This is not the rule, and a single population may have up to several thousand individuals. Although not known with certainty, it is possible that the conditions in the habitats may change over the years. Plants in the wild often have only a few growths, but sometimes, habitats are found where plants carry up to twenty mature growths, which may indicate that a specific environment has remained stable over a longer period of time. The altitude range in which *Paphiopedilum* plants are found varies from sea level to about 2,300 m, but only few species are found over a wide range of altitudes.



DETAIL OF THE FLOWER OF A PAPHIOPEDILUM WITH THE LABELLUM CUT IN HALF. ONE CAN SEE THE SPOTS ON THE INSIDE OF THE POUCH AND THE WHITE PUBESCENCE OF THE BASAL PART OF THE INSIDE. BOTH CHARACTERISTICS ARE ASSUMED TO AID THE POLLINATING INSECT IN FINDING ITS WAY TO THE OUTSIDE, WHEREBY ITS ONLY CHANCE TO ESCAPE FROM THE TRAP (THE POUCH) IS BY CRAWLING UP AND EXITING THROUGH ONE OF THE NARROW PASSAGES FORMED BY THE INFOLDED SIDE LOBES OF THE LABELLUM. BY DOING SO, THE POLLINATOR INEVITABLY PASSES THE STIGMA AND ONE OF THE ANTHERS. IF THE INSECT CARRIES POLLEN DEPOSITED ON ITS BODY WHEN FINDING ITS WAY OUT OF A PREVIOUSLY VISITED FLOWER, THE FLOWER WILL BE POLLINATED. IF THE INSECT CARRIES NO POLLEN MASS OF A PREVIOUSLY VISITED FLOWER, THE FLOWER WILL NOT BE POLLINATED BUT POLLEN WILL BE DEPOSITED ON THE INSECT'S BODY AND IT WILL THEN POLLINATE THE NEXT FLOWER IT VISITS.

PICTURE COURTESY OF HENK VENTER.

POLLINATION

Much has been said and written about the pollination of slipper orchids in general and *Paphiopedilum* species in particular, but very few specific facts are available regarding the pollination of these plants. Charles Darwin misunderstood the pollination mechanisms of slipper orchids in the first edition of his famous work about the fertilisation of orchids, but in the second edition, on the basis of data communicated by the Harvard professor Asa Gray, those mistakes were corrected, and Darwin meticulously described the experiments in which he used a number of insects to obtain fertilisation in these plants⁶. He came to the conclusion that slipper orchids, like most other plants in the orchid family, were constructed to prevent self-pollination and achieve cross-pollination. Over the years, these findings have been confirmed many times, and some attempts have been made to clarify the slipper orchid pollination syndrome, but much more has yet to be learned. It is generally accepted that slipper orchids are pollinated by insects, such as small bees and flies.

Other adaptations of the slipper orchid flower that may play an important role in the pollination process include the shape and morphology of the petals. Two aspects that are often cited in this respect are the extremely long petals in *Paphiopedilum sandermanianum* and the hairy wart-like structures that are seen on these flower segments in some species such as *Paphiopedilum barbatum*. Van der Pijl & Dodson (1966) as well as Atwood (1985) interpret these hairy structures as a typical adaptation intended to attract flies. The function of the extremely long petals of *Paphiopedilum sandermanianum* (analogous structures are found in the South American long-petalled *Phragmipedium* [Genus *Phragmipedium* subgenus *Phragmipedium*]) remains an enigma. Although these interesting structures are an integral part of the pollination syndrome, no one has hitherto been able to explain their exact role.

Although a number of observations about the insects trapped in the pouches of slipper orchids in cultivation have been published (Delpino, 1873; Schlechter, 1927; Ziegen-speck, 1928; Atwood, 1985), only one detailed study on the pollination of *Paphiopedilum* species in the wild is known (Atwood, 1985). Atwood studied *Paphiopedilum rothschildianum*, *P. volonteatum*, and *P. javanicum* var. *virens* in their natural habitats on Mount Kinabalu in northern Borneo. He was able to determine that the syrphid fly, *Dideopsis aegrota* Fabricius, is the pollinator of *Paphiopedilum rothschildianum*, but no pollinator could be identified for the other taxa. More recently, Dr. Pankaj Kumar, while investigating a population of *Paphiopedilum purpuratum* in the wild, discovered another syrphid fly, tentatively identified as *Ischiodon scutellaris* Fabricius, in the pouch of one of the plants. A smear of pollen on the abdomen of the insect could be distinctly identified, and suggests that the fly may be considered to be the pollinator of the species. The true pollinators for most *Paphiopedilums* (and most slipper orchids) thus remain an enigma, and the clarification of these aspects of insect-plant interaction may present interesting topics and research programs for many future biologists.

6 see Braem 2015 - DARWIN - THE POWER OF OBSERVATION AND REFLECTION, ISBN 978-81-211-0901-7.



A LOOK INTO ONE OF THE GREENHOUSES AT ORCHIDS LIMITED (PLYMOUTH, MINNESOTA, USA).

IN THE CENTRE, JASON FISCHER, THE JUNIOR GENERAL MANAGER. IN HIS RIGHT HAND, JASON IS HOLDING A PLANT OF *PAPHIOPEDILUM GRATRIXIANUM*; IN HIS LEFT HAND HE IS HOLDING *PAPHIOPEDILUM SIOUX* 'BLUEJAY' HCC/AOS, AN AWARDED COMPLEX HYBRID.

PAPHIOPEDILUM CULTURE

ERIC R. SAUER (RIVER VALLEY ORCHIDS)

One of the most intriguing things about growing Paphiopedilums is the large diversity in both plants and flowers within this genus. The various species come from a wide geographical region and provide opportunities for successful culture in many different growing environments⁷. Like other orchids, all Paphiopedilums are very easy to grow. With that being said, what may be difficult is the grower's ability to provide the ideal conditions for each particular orchid to grow and thrive. Understanding both the natural habitat of the individual species as well as one's own growing conditions is critical for long-term success. Information contained in this book will provide much insight related to the individual needs of each species. This discussion on *Paphiopedilum* will look at culture in a more general way to provide a basic understanding for this genus as a whole. There are variations and some specific needs of certain *Paphiopedilum* species that should be provided for success. While species are more sensitive to individual requirements, their hybrids tend to be a bit more relaxed in their specific cultural requirements and are a good choice for someone wanting to try this genus. If a grower experiences problems blooming a particular hybrid, for example, a more in-depth study of the species that make up the hybrid may help resolve the issue. The culture of *Paphiopedilum* is similar in many ways to growing many other orchids in that the control of the growing environment is related to temperature, light, water and fertilizer, air movement, humidity and growing media; all these aspects are equally important. Each of these variables is distinctly interrelated and affects each of the others, creating a unique growing area. As is true with all culture advice, if a grower is having good success with his or her plants, it is unwise to make wholesale changes because another grower is doing things differently. What is wise, however, is to check what variables are different and may be the reason for the other grower's success. Once this is recognized, it may then be possible to make minor adjustments to one's own culture to make improvements. These changes should be done over long periods of time – several months or a year. Individual plants may be tried in a new medium or different container, for example, but simply deciding to make radical changes on a whim is never a good idea. These small trials may ultimately result in major changes based on their success, but many growers have lost large numbers of plants or entire collections because they repeatedly made large untested alterations to their methods of culture.

7 The reader should be aware of the fact that it is impossible to give detailed culture instructions (or advice) that is valid for all geographical and climatic areas of our planet. A very old joke among orchid growers is that when you ask 10 growers how to cultivate any specific orchid, you will get 15 different answers. Orchid growing is "learning by doing". Advice should be gotten from experienced growers, preferably living in the vicinity of and growing under climatic conditions very similar to those encountered by the potential new grower. Furthermore, there are a few simple rules that might save the amateur apprentice quite some money: (1) start your collection with low-priced plants; (2) if you have found the conditions that give you good results (healthy, regularly blooming plants) stick to those conditions. Remember: never change a winning team; (3) if you wish to experiment, do so with a small group of plants before changing the conditions for your entire collection. – Dr. Guido J. Braem.

TEMPERATURE

Paphiopedilums generally thrive in temperature conditions that we growers also enjoy. Nighttime temperatures should be between 12.5 and 16 degrees Centigrade (55 to 60 degrees Fahrenheit), with daytime temperatures somewhere below 27 to 29 degrees Centigrade (80 to 85 degrees Fahrenheit). A rise in daytime temperatures of at least 5.5 degrees Centigrade (10 degrees Fahrenheit) seems to also mimic what the plants receive in nature, and in some cases helps to promote flowering. *Paphiopedilum armeniacum* is one of the exceptions, with requirements being in the cooler end of the range. *Paphiopedilum rothschildianum* also seems to flower better or more reliably with a cooler winter night temperature. Most species, however, will thrive in the intermediate growing range and will flower well if sufficient light and the temperature differential mentioned above are provided.

LIGHT

One of the simplest aspects of orchid culture to handle is light levels. Plants will tell the grower in a fairly rapid manner if they are getting the right amount of light for their needs. Paphiopedilums in general are happiest in good bright, but slightly shady, conditions. There are exceptions to this, as is the case with any larger genus of orchids. Many orchid growers like tools and toys as much as the orchids they grow. Some purchase expensive light meters to check light levels in their growing areas. The best light meter for determining proper light levels is the individual plant itself; no light meter will do a better job of communicating its needs. One hard and fast rule is that leaf surfaces should feel cool to the touch at all times, especially at the brightest times of the day. If a leaf surface starts to feel warm, it is getting too much light and is close to burning. Plants should be gradually provided higher light levels until a noticeable leaf color change begins to happen. Growers also should make mental notes of a plant's leaf color when it is first acquired. If the leaves begin to darken significantly, it is likely it needs more light; if the leaves begin to turn yellow, too much light is being provided. Plant leaves are great indicators of cultural conditions and growers are well advised to pay close attention to them. Paphiopedilums also seem to depend quite heavily on light levels for proper flowering. Generally, the higher the light (within the tolerance of the plant), the more flowers will be produced. However, this can be at the expense of the plant in terms of leaves that are less attractive and flower color that may not be quite as intense. There are those species that do require a rest or a slightly dormant period to bloom well, but most flowering problems seem to be related to light levels. If the plants are not blooming well, it is probable that higher light levels may be required. Growers are very successful with a wide variety of light including sunlight and artificial light fixtures. Sunlight, in most cases, is going to provide better results than artificial lights, with all other variables being equal. Artificial lights such as fluorescent, high intensity discharge (HID) and light emitting diode LED are all used regularly with great success by growers around the world. Mimicking the color spectrum of sunlight is critical, and is easily achieved with technology available on the market today.

WATER AND FERTILIZER

Water quantity and quality are two of the most important and difficult components that need to be mastered in respect to the culture of Paphiopedilums and other orchids.

Many of the other cultural variables are far less controllable by the grower, leaving watering to adjust for conditions that may fall outside of the ideal. Water can be used to help cool plants in times of excessive heat, but can also quickly kill a plant when temperatures are too cool. Knowing how much water to provide to our orchids is often difficult. Generally, *Paphiopedilums* grow in environments where there is plenty of water year round. *Paphiopedilums* have no pseudobulbs to store water and must be kept evenly moist all year. They also benefit from a short rest or drying out a bit during the winter to help initiate blooming. The proper method to allow plants to dry out is withholding water slightly without allowing the plants to dry completely, which can cause root desiccation and loss. Most *Paphiopedilums* grow in a layer of moss or leaf litter either at ground level or in some cases epiphytically in areas where branches protrude from trunks of trees which hold some level of constant moisture but also provide good air circulation around the roots. It is very difficult to instruct a grower on water frequency since so many variables will affect how much water a plant needs to grow and thrive. Picking plants up at various times of the year and sometimes carefully removing them from their pots is a good way to determine how well the roots are growing. Roots should always be firm and have a healthy growing tip. The mix should have good even moisture at all times, without being mushy or stale. When watering is done, copious amounts of water should be provided to allow the build-up of salts to be flushed out of the pot and also to be sure that the medium is evenly wetted. Many growers will water their entire collection and then follow immediately with a second full watering to ensure the medium and roots have received sufficient moisture. Water timing is also important. Watering in the morning to give the plants time to dry before dark is generally a good idea. This helps to prevent crown rot problems that can be common in the slipper orchids. However, switching to evening watering when temperatures are expected to reach above those ideal for *Paphiopedilums* can also help reduce the occurrence of crown rot problems. It also has been found that watering before periods of extreme temperatures can allow the water that collects in the crowns of the plants to overheat, causing cell damage that may encourage fungi and/or bacteria to enter the plant tissue. Water quality is equally important. Even the best growers, who are watering at the right frequency and quantity, will not be successful if their water is not of the right purity. Knowing the purity of the water available to you is critical for the long term success of growing *Paphiopedilums* or any other orchid. In the simplest terms, water is made up of hydrogen and oxygen. In its pure form, water has no salts or other impurities. In nature, plants are watered either by rainfall or runoff, neither of which results in pure water. Although rainfall is one of the cleanest water sources, it does have a certain level of impurities and must also run through the potting medium to reach the roots. Pure water also can be detrimental to roots: reverse osmosis water has the ability to actually draw nutrients back out of the plant's roots. Thus, distilled or reverse osmosis water should not be used without adding required nutrients to it prior to watering.

There are two main areas of concern regarding water quality. The first is the pH level [= negative logarithm of the hydrogen ion concentration] of the water. How basic or acidic the water is needs to be known. Water for orchids, and especially *Paphiopedilums*, should be slightly acidic to neutral (pH 5.5 to 7.0). If water is used that is too acidic (below pH 5.5) or too alkaline (above pH 7.0) the uptake of required nutrients

may be impaired. The grower should be aware that pH is also affected by whatever is added to the water, and by the medium in which the plant is growing. In most cases, fertilizer and medium will have an acidifying effect on the water (pH reduction). The second area is what is in the water. This is measured in terms of its conductivity, which is generally indicated in parts per million (PPM). *Paphiopedilums* should have water with levels not exceeding about 150 or 200 PPM. Reverse osmosis or rain water will start generally in the range of about 7 to 25 PPM. Tap water or well water differ greatly from various sources and must be measured. Tap water can be quite good and in the low 50s or can be very high in the multiple hundreds. A grower must know how pure (or impure) his water is before adding fertilizer or other nutrients. Testing is very simple and can be done with a fairly inexpensive test pen. The local municipality can generally provide this information as well, but the grower may be well-advised to verify such information. Collecting rainwater is also a great way to provide healthy water for your plants assuming there is no acid rain in your area. Rainwater with a conductivity level of only 20 PPM allows quite a bit of flexibility for adding the right nutrients to the water for plant health and growth. Tap water with a conductivity of 300 PPM is already above the recommended levels for *Paphiopedilums*. Adding fertilizer to such tap water will augment the conductivity even further, possibly causing damage to the roots and other parts of the plant. In other words, light levels of fertilizer should be applied on a regular basis. In their natural habitats, *Paphiopedilums*, generally growing in leaf humus, obtain their nutrients gradually, not in large amounts, with periods of "famine" in between. The type of fertilizer used has an effect on the long term outcome of the plant. As a well-trained athlete pays very close attention to his diet, so must the grower know the details of the feeding of his plants if high levels of flowering are to be achieved. Selecting a well-balanced fertilizer that includes the basic three macronutrients nitrogen [N], phosphorus [P] and potassium [K], as well as calcium [Ca], magnesium [Mg] and other micronutrients will provide a good, healthy food source for your plants. Some growers modify their fertilizer based on the time of the year. This may have some benefit, but using a high quality fertilizer is most important.

AIR MOVEMENT

In the wild, air is always moving to some extent. If a collection is small and on a windowsill, for example, the normal air movement in the home is generally adequate for good plant growth. As collections increase in size and plants are pushed closer together, additional air movement must be provided to prevent problems. Air movement should be constant. Many growers feel the need to turn off a fan for a certain period of time to save electricity or for some other reason. However, experience has shown that fans last much longer if they are not turned off. If this must happen, turn it off during the day. As temperatures decrease at night, less air movement can cause fungal and bacterial infections to occur as humidity increases with a drop in temperature. In general, air movement should provide a good buoyant feel in the growing area. Inflorescences should have a bit of movement and thinner orchid leaves may also move in the breeze. If air feels stagnant or stuffy, more air should be moved by adding fans or increasing fan speeds. Ceiling fans, for example, are great for air movement in growing areas. It may also be necessary to pull outside air into a growing environment. In tight or small greenhouses or in basement growing rooms, humidity levels may become too high,

thus promoting the occurrence of diseases. By adding fresh air from outside, a better overall growing environment can be achieved. Slightly opening a window or adding a ventilation fan pulling from the outside is an easy way to add fresh outdoor air.

HUMIDITY

Paphiopedilums typically enjoy high levels of humidity in their native habitats. Relative humidity over 50 % should be provided at all times; Paphiopedilums will tolerate lower levels but flower size and overall health can be affected. Humidity levels between 65 and 75 % are ideal. Maintaining these levels in an enclosed growing room in a basement or greenhouse, for example, is relatively easy, but in some cases, outside air must be introduced to keep levels from being constantly too high. Misting plantings, floors and walls can also help increase humidity levels when the air outside is very dry. Care must be taken to keep water from collecting for long periods of time in the crowns of Paphiopedilums, otherwise rot may result. Humidity levels must also be increased when air temperatures reach the higher levels of the natural ranges to help prevent plants from losing too much moisture while trying to keep cool. Evaporative cooling in drier parts of the world is also effective for decreasing temperatures and increasing humidity. Humidity levels will also affect required watering frequency. As humidity levels increase, watering frequency should decrease. For those growing their orchids indoors, high levels of humidity may not be practical due to potential damage to windows and walls. When humidity levels drop in these growing areas, placing plants closer together will help to increase levels and provide a good excuse to buy more plants! Wrapping a small growing area with plastic can help increase humidity during dry parts of the year.

GROWING MEDIA AND REPOTTING

Paphiopedilums, like most other orchids, are grown in a wide variety of media and containers. It is rare, however, that they are grown mounted, so most if not all Paphiopedilums will be found growing in some sort of container. There are many discussions related to the type and shape of the container: tall or flat, plastic or clay. Many Paphiopedilums grow well in a variety of pot types. In general, most Paphiopedilums seem to grow best in containers that provide good air movement at the roots and tend to be a bit taller than they are wide. Exceptions to the tall pot rule are those species of the *Parvisepalum* group that produce stolons between growths. These species often require a wider pot. In general, however, the selection of the container is more dependent on the comfort level of the grower.

The potting medium used is often as widely varied as are the growers of this genus. The mix must provide even moisture, good air circulation and should not have the tendency to break down rapidly. Paphiopedilums do not like to be repotted as much as their cousins of the genus *Phragmipedium*. Therefore, a medium that will last 18-24 months should be selected. The most commonly used media contain fir bark mixed with charcoal, perlite and/or sponge rock. Some growers prefer to grow their plants in long-fibred sphagnum moss, but this will break down more rapidly, and therefore requires more attention. Many growers also report having good success using hydroponic-type expanded clay and containers that hold a small reservoir of water. These clay pellets do not break down and provide good air circulation and allow for long intervals

between repotting. Growers are advised to try different media and container options to see what works best.

Repotting should be done when flowering is completed. Repotting plants in the heat of the summer or during a rest period in the winter is not a good idea. Roots and plants should be in an active state of growth to allow the plant to recover from repotting quickly. *Paphiopedilums* should not be over-potted. Select the smallest container that the plant will comfortably fit into with room for a year or two of growth. Dividing *Paphiopedilums* is not recommended as larger clumps will have more energy to produce more growths and more flowers. Also keep in mind that some *Paphiopedilums* do not flower until growths are 3 to 4 years old.

INSECT AND DISEASE ISSUES

Paphiopedilums are susceptible to a variety of insects and diseases. Good cultural conditions that are as close as possible to those encountered in the natural habitats will help to reduce the occurrence of these problems. Removing dead leaves and keeping the growing areas clean will also guard your plants from disease. Furthermore, using clean and sterile tools for each plant will eliminate the possibility of transferring diseases between plants. Keeping newly-acquired plants in a quarantine area will also help to avoid introducing something undesirable to your growing area.

Commonly, *Paphiopedilums* will be susceptible to most of the sucking-type insects including mites, scale and mealy bugs. These insects typically will be found on the undersides of the leaves and at the base of the growth fans and magically on the flowers and buds. Regular inspection of your collection will allow for early detection of any possible infestation. Catching problems when they are small often facilitates pest control without the need for harsh chemicals. Most of these insects have about a 7 to 10 day life cycle. Understanding the life cycle of pests allows for more effective pest control. Three consecutive treatments spaced 7 to 10 days apart will generally eliminate the problem because all stages of the insect's lifespan will be interrupted. Also, most insecticides treat only the adults, so the multiple treatments are required to kill all the insects in their adult stage. If one treatment is missed, it is recommended to start the series over to ensure that three consecutive treatments are performed. For small collections, simple mechanical control using cotton swabs and rubbing alcohol is very effective. If harsher chemicals are required, be sure to follow all warning labels and wear protective clothing.

Paphiopedilums are also susceptible to attack by a wide variety of fungi and bacteria. These generally occur when there are cultural problems. This condition is easily prevented by supplying good air circulation and by following good cultural practices. However, good practices do not prevent all of the fungal and bacterial problems from happening. When these infections do occur, they spread easily and rapidly, so getting them under control quickly is critical. Commercial growers use chemicals as a preventive measure, but such chemicals are expensive and not very human-friendly. Several favorite home treatments that are very effective include the use of powdered cinnamon, which is simply sprinkled on the infected location. As a side-effect, this home remedy produces a pleasant aroma! Products designed to prevent infections of cuts and scratch-

es on humans are also safe and very effective. Just spread the gel on the infected spot and the infection should dry up and stop spreading. Alternatively, the leaves that have the spots can also be just cut or pulled off to eliminate the problem. Paying attention to temperature, light, water quality and quantity, air movement and humidity, as well as fertilizer, proper potting media, insects and diseases, will assure the aspiring *Paphiopedilum* grower success with the intriguing slipper orchids!

THE GENUS PAPHIOPEDILUM

DESCRIPTIVE SECTION

INTRODUCTION AND CONVENTIONS USED

All hitherto known taxa are discussed in detail. As we have seen in the chapter on taxonomy, no universally recognised criteria exist to delimit species, subspecies, varieties, and forms. Very often one author will consider the differences between two plants important enough to consider them to be two separate, autonomous species, whereas others may feel that those differences are within the scope of natural variation of a single species. When looking over the synonymy of certain taxa, one will sometimes find the same plant having been described as a species, a subspecies, a variety, and/or a form. We will, therefore, list all taxa that have been described at the species level as such, with the exception of those that are generally accepted to be synonymous with another species.

Until recently, albinos usually have been described as varieties. Now they are generally considered to be forms, and they are described here in that manner. We realise that the treatment of the different taxa by various groups of people is governed by diverse criteria and needs. Commercial growers generally prefer to keep as many taxa as possible at the species level. The views of horticulture do not always coincide with those of the professional botanist. Orchid judging communities may have still different criteria, and those criteria may change among communities from various geographical areas. Furthermore, there is the registration unit for orchid hybrids, maintained by the Royal Horticultural Society in Britain, which again has its own views on what to accept as a species when registering the parents of hybrids. Unfortunately, the Orchid Hybrid Registrar of that institution has not always shown signs of great intelligence.

Wherever a number of taxa are very closely related we have treated them in the context of a complex. Although we have in each case expressed our opinion about the correct status of each member within the complex, we feel that we should leave it to the reader to decide for him- or herself what taxonomic level is acceptable for any specific taxon.

FORMAT OF SPECIES DESCRIPTION

CORRECT ORTHOGRAPHY OF THE TAXA

Example: *Paphiopedilum roebbelenii*

The names of the plants are written as spelled in the original publication, except for those cases where a correction according to the rules of taxonomy is warranted. *Paphiopedilum roebbelenii* was spelled *röbbelenii* in the original publication rendered by H.G. Reichenbach. Language-specific orthographic specialities are not allowed in scientific names of plants. Therefore, the ö, which originated from German, is changed in accordance to the rules of German orthography to oe. In other cases the German ß is changed to ss. This usually occurs when the plant is dedicated to a person. When, however, that person's name is cited in the text, it is spelled in its original, specific language form (for example Röbbelen). When questions arise about the correct spelling of the person's name that cannot be conclusively solved, the spelling from the original

publication of the plant dedicated to that person is used. All the names of botanical taxa are printed in italics, even within citations in which they were originally typeset in normal characters.

SPELLING OF THE NAMES OF AUTHORS

Authors' names are not abbreviated. In the case where father and son were both botanists, the abbreviation fil. for the Latin term *filius* is added to the name of the son. Thus, the elder Reichenbach is cited as Reichenbach, the younger Reichenbach as Reichenbach fil. For further understanding, cases known in the context of work with slipper orchids are listed below:

Ernst Hans [Johannes] Hallier (1831-1904) = Hallier
Hans [Johannes] Gottfried Hallier (1868-1932) = Hallier fil.

William Jackson Hooker (1785-1865) = Hooker
Joseph Dalton Hooker (1817-1911) = Hooker fil.

Heinrich Gottlieb Ludwig Reichenbach (1793-1879) = Reichenbach
Heinrich Gustav Reichenbach (1824-1889) = Reichenbach fil.

Jean Jules Linden (1817-1898) = Linden
Charles Lucien Linden (1853-1940) = Linden fil.

Author names are cited without indication of first and middle names, except where this may cause confusion, hence Fowlie for Jack A. Fowlie but J. E. Smith for James Edward Smith as there are a number of other authors by the name of "Smith" (Henry George Smith, Herbert Huntington Smith, Johannes Jacobus Smith, etc.) that have published botanical works.

Author names containing characters that do not belong to the Roman alphabet are written in their specific language form when part of the general text: Gruß, Röth, Löb, etc. As mentioned above, whenever such names are part of the plant name, the language-specific characters are transformed to the internationally accepted form: Gruss, Roeth, Loeb, etc.

DESIGNATION WITH FULL CITATION OF THE PERTINENT LITERATURE

Example 1.

Paphiopedilum sandermanum (Reichenbach fil.) Stein in STEIN'S ORCHIDEENBUCH, 482 (1892)

In this instance, the plant name *Paphiopedilum sandermanum* is followed by a string of information, including the reference to the authors, (Reichenbach fil.) Stein, and the full reference to the publication.

The publication in this example refers to a single volume book, STEIN'S ORCHIDEEN-
BUCH. The name of the publication is followed by the page number(s) relating to the
species being discussed, and this is followed by the year of publication. The names
of the books are cited as in the original edition of the book and are not abbreviated.
For example, it is shown as STEIN'S ORCHIDEENBUCH and not abbreviated as
ORCHIDEENBUCH. If the actual book was not physically available, the names are giv-
en as cited in TAXONOMIC LITERATURE, 2nd Edition (Stafleu & Cowan 1976-1988;
Stafleu & Mennega 1992-1997).

In some cases, the author citation may be a bit complex and/or confusing to readers
who are not very familiar with taxonomic conventions. For that reason, we include
some examples with their explanations. The examples given certainly do not cover all
possibilities.

Paphiopedilum randsii Fowlie

The taxon was originally described as *Paphiopedilum randsii* by the author Fowlie.

Paphiopedilum supardii Braem & Löb

The taxon was originally described as *Paphiopedilum supardii* by the authors
Braem and Löb.

Paphiopedilum praestans (Reichenbach fil.) Pfitzer

The taxon was originally described by the author Reichenbach fil. under a differ-
ent name, in this case *Cypripedium praestans*, and was transferred to its present
status and designation by the author Pfitzer.

Cypripedium papuanum Ridley ex Rendle

The taxon was published by Rendle on the basis of notes or a manuscript sup-
plied by Ridley.

Cypripedium wardii (Summerhayes) Curtis non Rolfe

This implies that two different taxa have been described by two different authors
or groups of authors (Summerhayes) Curtis and Rolfe using the same plant
name. The example means that the plant described by Curtis on the basis of
an earlier description by Summerhayes is meant, and not the one described by
Rolfe. This phenomenon has occurred many times (not only in orchids) and is
by no means restricted to two authors for any one given plant. (The name *Tulipa
oculus-solis* [Liliaceae] was applied to no less than eight different plants by eight
different authors.)

Paphiopedilum glanduliferum auct. non Blume

Paphiopedilum glanduliferum as understood by various authors but not as under-
stood by Blume. The designation "auct." is the abbreviation of "Auctores", which
is the Latin word for "Authors".

Example 2.

Paphiopedilum praestans (Reichenbach fil.) Pfitzer in Engler, BOTANISCHE JAHRBÜCHER, 19:41 (1894)

This is the same as Example 1, except that the work was published as part of a book or a series of books. Therefore, the author citation, (Reichenbach fil.) Pfitzer, is followed by the name(s) of the editor(s) of the book or book series, Engler, and the book title BOTANISCHE JAHRBÜCHER is followed by the indication of the pertinent volume (19), which is followed by a colon and the page number (41) on which the description appears. As in the previous example, the year of publication is included at the end in parentheses (1894).

Example 3.

Paphiopedilum wilhelminiae L.O. Williams in AMERICAN ORCHID SOCIETY BULLETIN, 10: 373-375 (1942)

This example refers to a taxon which was described in a periodical. Everything is as in Example 2, with the exception that the editor of the journal is not named. If several series of the journal have been published, the pertinent series is indicated. Wherever possible, the page numbers of the entire article are cited, not only the page where the actual description appears. The name of the periodical is given as in the periodical (for example THE GARDENERS' CHRONICLE and not GARDENERS' CHRONICLE; THE ORCHID REVIEW and not ORCHID REVIEW, etc.). Where copies of the journal were not physically available, the names are given as cited in BOTANICO-PERIODICUM-HUNTIANUM (1968) or its supplement (1991). The titles of the periodicals are printed in small caps and not abbreviated

For the publications cited from THE GARDENERS' CHRONICLE some changes have been made to clarify the citations and to allow this periodical to be cited in the same way as all other journals. The original journals indicate no series number and no volume number for the period 1841 through 1873; new series with volume number for the period 1874 through 1886; and third series with volume number from 1887 onward.

1st Series: 1841 through 1873. One volume per year.

Thus page 71 in THE GARDENERS' CHRONICLE for 1854 is cited as: THE GARDENERS' CHRONICLE, 1st series, 14: 71 (1854). [Instead of "GC 1854: 71" as often found in the literature.]

2nd Series: 1874 through 1886. Two volumes per year, one volume covering the period January through June, the other covering the period July through December.

Thus page 147 in THE GARDENERS' CHRONICLE for the first half of 1882 is cited as: THE GARDENERS' CHRONICLE, 2nd series, 17: 147 (1882). [Instead of "GC 1882, I : 147."]

3rd Series: 1887 onward. Two volumes per year, one volume covering the period

January through June, the other covering the period July through December. Thus page 322 in THE GARDENERS' CHRONICLE for the second half of 1888 is cited as: THE GARDENERS' CHRONICLE, 3rd series, 4: 322 (1888). [Instead of "GC 1888, II : 322."]

BASIONYM

The basionym is the plant name used in the original publication of the taxon. This applies wherever the taxon was originally described in a genus other than the one to which it is now considered to belong. For example, *Cypripedium sanderianum* Reichenbach fil., THE GARDENERS' CHRONICLE, 2nd series, 25: 554 (1886). Everything said in Example 3 applies.

SYNONYM(S)

The synonyms are all the names under which the taxon is also known. This list is not limited to names that are validly and effectively published but also includes not validly published designations (*nomina illegitima*) and names that have been included in publications without a description or that have simply been mentioned in lectures, (*nomina nuda*). A vernacular designation for the contents of synonym paragraphs would be "also known as" (aka or AKA). The rules given in Example 3 apply.

DISCUSSION

The discussion is a treatise of interesting aspects regarding the taxon. This section includes information about the plant's discovery, its relation to other plants of the group, the history of its description, and anything that may be of interest.

ETYMOLOGY

The etymology of a plant name is its origin and meaning.

DESCRIPTION

This is a complete description of the plant including its vegetative and floral characteristics, sizes, shapes and colours. Wherever possible, the data for this description is taken from the original publication and/or deduced from living plant materials. Where this was not possible, for example when the description in the original publication is not explicit enough (which is very often the case with descriptions rendered by Reichenbach fil.), pertinent secondary literature has been consulted. For plants considered varieties or forms of a species, the differences between the variety or form and the nominal species are included.

DISTRIBUTION AND HABITAT

This section covers the geographical distribution and habitat conditions of the species.

FLOWERING

Wherever possible, the flowering periods in the natural habitats as well as in cultivation are indicated. Most of the data available to us in respect to cultivated plants is from Europe. That data may not necessarily be fully valid for other regions.

MISCELLANEOUS NOTES

This section contains supplementary information such as the mitotic chromosome count ($2n$), etc.



A WELL-KNOWN ALBINO FORM: *PAPHIOPEDILUM FAIRRIEANUM* VAR. *BOHLMANNIANUM*
WATERCOLOUR PAINTING BY HENNY HERAWATI
COURTESY OF HENNY HERAWATI

NOTES ON ALBINISM

Albinos are “en vogue”. This is true in respect to all orchid genera and especially for the slipper orchids, including the species that make up the genus *Paphiopedilum*. Whereas the general interest in the genus is not new, and was really established as early as the first half of the 19th century with the introduction of the first species into western Europe, notably Belgium and England, the special interest in albinistic forms (whether true albinos or not) is of a more recent nature.

Today, nearly all species can be obtained, either as products of artificial propagation or as wild-collected plants. The hunt for more “special” or more “rare” objects is on-going. And this is the point where the colour varieties and albinistic forms enter the scene. Praised as especially valuable, and rated to be of “award quality” by members of the judging committees of the various orchid societies around the world, these colour varieties fetch much higher prices than do the “normal” specimens of the respective species. Although the true scientific value of these variants may well be a matter for further discussion, the commercial value is a fact that cannot be ignored. One should, however, keep in mind that only the first few plants really fetch the big money. In many cases these plants are propagated within a relatively short period of time, and seedlings (that sell for a much lower price) become quite abundant, usually within two to three years.

Since about 1970, quite a number of these colour variants have been discovered, but some have been known for a much longer time. The intensified search for new species, prompted by the augmented demand, did the rest. The overall result, as seen through the eyes of a botanist, is that a multitude of albinistic forms of *Paphiopedilum* species have become known and have been described. It may be wise to delineate the necessary definitions here. Indeed, the terms “albino,” “albus” and/or “albinistic” are not always used with the proper meaning.

ALBINO: by botanical definition, is a plant that lacks the possibility to produce anthocyanin pigments. It should be noted that plants have 3 groups of pigments, being:

- (a) anthocyanins, responsible for the red and brown shades,
- (b) carotenes, responsible for the yellow colours, and
- (c) chlorophylls, responsible for the “greens”.

Therefore, a plant correctly designated as an albino will not show any red or brown colour but can very well be green, yellow, white, or any combination thereof. As soon as any shade of red occurs anywhere in any part of the plant, the specimen is not an albino.

ALBA, ALBUM or ALBUS (depending on the gender of the genus): a Latin word that simply means “white”. This term, as far as orchids are concerned, is used in connection with the colour of the flower. Only flowers that are pure white should be designated as *alba/album*. “Alba/album” plants are albinos, but we have already established that albinos are not necessarily “alba/album”. A quick browse through their combined awards

index for 1932-1997 revealed that the judges of the American Orchid Society have awarded plants as variety *album* or forma *album* for 13 *Paphiopedilum* species. Of those 13, only three (*P. bellatulum*, *P. concolor*, and *P. niveum*) can have pure white flowers.

ALBINISTIC: a term that is used in various ways. The correct usage is for the designation of an albino or "alba/*album*". This term can, therefore, be used for a yellow/green/white plant or an all-white plant. Unfortunately, the term "albinistic" is often erroneously used to designate a plant that is faintly but normally coloured.

The rules of taxonomy also lack proper safety mechanisms against the misuse of the designation "alba/*album*/albus". A designation of a species or an infraspecific taxon, as long as it is part of a validly and effectively published concept, is to be followed, no matter how erroneous or ludicrous the designation may be. Because of this, for example, *Paphiopedilum haynaldianum* forma (or variety) *album* is the valid designation of a plant with mainly green flowers. The taxonomic status of albino or albinistic forms is another source of disagreement and confusion. Most of these variants have been described at the level of a botanical variety. In the meantime, however, the great majority of those involved in orchid taxonomy consider colour variants - and albinos are simply colour variants - not to be worthy of the variety status. For that reason, the albinistic taxa are now generally reduced from varieties, abbreviation "var.", to forms, and designated as forma, abbreviated as "fma."

INFRAGENERIC TAXONOMY

PRELIMINARY NOTES

Since the publication of Braem's first book on slipper orchids, *Paphiopedilum* (Braem, 1988), discussions have been ongoing about the reasons behind his decision to follow a certain path in respect to the infrageneric structure of the genus. Indeed, Cribb (1987, 1998) has, in certain respects, chosen to proceed in another direction, although he has changed his approach regarding one subgenus (*Parvisepalum*) since the publication of his 1987 book. Cribb accepts but three subgenera: *Parvisepalum*, *Brachypetalum*, and *Paphiopedilum*, thus putting plants with multifloral inflorescences (some opening their blooms simultaneously, others opening their blooms in sequence), single-flowered inflorescences, plain leaves, tessellated leaves, and different structure of the lip (pouch) into a single entity (subgenus *Paphiopedilum*). Such an interpretation is impossible to follow.

Braem also accepts *Parvisepalum* and *Brachypetalum*, and divides subgenus *Paphiopedilum sensu* Cribb into four entities: *Paphiopedilum*, *Sigmatopetalum*, *Polyantha*, and *Cochlopetalum*. These four entities are clearly delineated by their well-defined differences both in vegetative (leaves) and floral morphology (inflorescence structure and flower structure). Furthermore, they are distinct in respect to their number of chromosomes. It is obvious, therefore, that these groups referred to as subgenera *Polyantha*, *Paphiopedilum sensu* Karasawa & Saito and *sensu* Braem, *non sensu* Cribb), *Sigmatopetalum* and *Cochlopetalum* have different genetic identities. Thus, it seems more logical that they should be separated from each other and be considered autonomous subgenera.

If, on the other hand, one decides to accommodate such different plants as, for example, *P. sanderianum*, *P. charlesworthii*, *P. venustum* and *P. glaucophyllum* into a single subgenus, there is not much reason not to include *P. niveum* and *P. micranthum*.

Cribb (1998, page 51) states his position as follows: "Cox, Pridgeon & Chase (1997) have analyzed ITS sequences⁸ from nearly all the species in the genus. Their cladistic analysis of the resulting sequences suggests that the recognition of six subgenera is not necessary and not a true reflection of phylogeny."

Cribb's statement appears to misinterpret this study, in view of the fact that the cladistic analysis in the study cited fully agrees with the division of the genus into six subgenera as well as with the major sections used by Braem.

A more recent study by Chochai *et al.* (2012) clearly supports Braem's interpretation.

Braem & Gruss established *Paphiopedilum* subgenus *Megastaminodium* to accommodate *Paphiopedilum canhi* in 2011.

⁸ Not every reader will be familiar with the terminology used by molecular biologists. Simply stated: "ITS" stands for "Internal Transcribed Spacer" which in turn relates to the sequence of the ribosomal nucleic acid.

Key to the Subgenera of the Genus *Paphiopedilum*

1. Inflorescence generally bearing maximum 2 flowers
(including buds) 3
- 1a. Inflorescence generally bearing at least three flowers
(including buds) 2
2. Flowers all or nearly all open simultaneously Subgenus *Polyantha*
- 2a. Flowers open in sequence Subgenus *Cochlopetalum*
3. Leaves mottled 4
- 3a. Leaves not mottled Subgenus *Paphiopedilum*
4. Tepals similar in colour and/or shape Subgenus *Brachypetalum*
- 4a. Tepals not similar in colour and/or shape 5
5. Dorsal sepal smaller than petals, pollen granular
[except in *P. malipoense*] Subgenus *Parvisepalum*
- 5a. Dorsal sepal not smaller than petals 2
6. Staminode semi-lunate Subgenus *Sigmatopetalum*
- 6a. Staminode ovate, large Subgenus *Megastaminodium* (*P. canhii*)

SUBGENUS PARVISEPALUM

KARASAWA & SAITO (1982)

SUBGENERIC CHARACTERISTICS

Leaves tessellated (only indistinctly tessellated in *P. hangianum* and mature *P. emersonii*). Inflorescence with a single flower, rarely two. Pouch distinctly calceolate, thin, plicate. Dorsal sepal smaller than petals. Pollen granular (exception: *P. malipoense*). Mitotic chromosome count $2n = 26$. Type: *P. delenatii* Guillaumin

DISCUSSION

When revising the genus *Paphiopedilum*, Karasawa & Saito (1982) founded subgenus *Parvisepalum* in order to be able to accommodate *P. armeniacum*, *P. delenatii*, and *P. micranthum*, the three species of the group which were known at the time. Since then, a number of additional taxa belonging in this group have been described, all at the species level (*P. malipoense* [Chen & Tsi, 1984], *P. emersonii* [Koopowitz & Cribb, 1986], *P. jackii* [Hua, 1995], *P. hiepii* [Averyanov, 1998], *P. vietnamense* [Gruß & Perner, 1999], and *P. hangianum* [Perner & Gruß, 1999]).

There is no doubt that these nine plants form a distinct and autonomous entity within the genus, and their combination into the subgenus *Parvisepalum* stands without question. The morphology of their flowers is unique within the genus. Thus the subgenus *Parvisepalum* is now generally accepted and was confirmed by the molecular data as published by Cox *et al.* (1997).

Paphiopedilum hiepii and *P. jackii* are variants of the earlier described *P. malipoense*. Indeed, the differences between these two taxa and *P. malipoense* can be explained by geographic habitat variation and/or natural variation within a given species. Cribb, in his earliest treatment of the genus (Cribb, 1983), considered *P. armeniacum* to be a variety of *P. delenatii*. However, he has since corrected this erroneous interpretation.

We agree with the original authors (Perner & Gruß, 1999) that it cannot be ruled out that *P. hangianum* is a natural hybrid with *P. emersonii* as one of its parents, and this theory is supported by the fact that at least one population of *P. emersonii* with flowers that are “larger than usual” has been reported. If this were correct, however, there must be an unknown species yet to be discovered.

Averyanov & Cribb (in Averyanov *et al.*, 2003) have created a separate section (*Emersonianum*) for *Paphiopedilum emersonii* and *P. hangianum*. They based this decision on the argument that these two entities do not produce stolons and have leaves that show but faint or no tessellation. Obviously, they have overlooked the fact that *P. delenatii* and *P. vietnamense* do not produce any stolons either. Furthermore, juvenile plants of *P. em-*

ersonii do have distinctly tessellated leaves, and there are many examples in the genus that show that this characteristic can be variable within a species. We agree that there are considerable differences between *P. emersonii* and *P. hangianum* and the rest of the subgenus. On the other hand, it is by no means difficult to argue an equally distinct difference between *P. malipoense* and the rest of the group or between *P. micranthum* and all other taxa of the subgenus. Furthermore, one should note that notwithstanding the fact that *P. emersonii* and *P. hangianum* share important vegetative characteristics, the differences in respect to their flower morphology are striking. If one uses staminodal morphology as a major marker, *P. hangianum* is much closer to *P. malipoense* than to *P. emersonii*, which, in turn, on the basis of that same characteristic, would have to be closely linked to *P. micranthum*. All plants belonging to subgenus *Parvisepalum* originate from the southern parts of China and/or Indochina. It must, however, be stated that some researchers (for various reasons) withhold data about the correct distribution of these plants.

The presence of the mottled (tessellate) leaves, the generally single-flowered (rarely two-flowered) inflorescence and the mitotic chromosome count of $2n = 26$ (hitherto reported for *P. armeniacum*, *P. delenatii*, *P. emersonii*, *P. malipoense* and *P. micranthum*) indicate a close relationship to the species belonging to subgenus *Brachypetalum*. This again is confirmed by molecular biology. Notwithstanding their close relationship, the *Parvisepalums* differ from the *Brachypetalums* by their granular pollen (except for *P. malipoense* and its variants which have waxy pollen), their much-elongated and long-stalked stigma, the presence of stolons in some species, a dorsal sepal which is distinctly smaller than the petals, and a strongly calceolate, thin, and faintly plicate pouch. The latter characteristics have resulted in some discussion about the relationship of the *Parvisepalums* to the genus *Cypripedium*. It has even been suggested that the *Parvisepalums* are to be seen as a link between *Cypripedium* and *Paphiopedilum*. Such considerations, however, are purely speculative.

PAPHIOPEDILUM ARMENIACUM

S.C.CHEN & LIU

ACTA BOTANICA YUNNANICA, 4(2): 163 (1982)

ETYMOLOGY

Named *armeniicum* for its "apricot flower colour". This designation in the original description of the species is quite interesting in view of the fact that all plants hitherto examined have shown sulphur-yellow blooms.

DISCUSSION

Little is known about the discovery of *Paphiopedilum armeniacum*. It was first described by Chen & Liu based on plants collected by A. L. Zhang in 1979. At first, the relationship of this taxon was rather confused. Chen & Liu compared it with *P. niveum*, and Cribb (1983) considered it to be a colour variant of *P. delenatii*, notwithstanding the extreme differences between the taxa:

- (1) *P. armeniacum* has rather long stolons, while *P. delenatii* has no stolons;
- (2) the staminodal plate of *P. delenatii* is rhomboid and completely visible in a frontal view of the flower, whereas the staminodal plate of *P. armeniacum* is an elongated triangle and directed downward so that the bottom part, or the tip of the triangle, is covered by the labellum;
- (3) the flowers of *P. delenatii* are smaller than those of *P. armeniacum*; and
- (4) the overall flower colour of *P. armeniacum* is yellow, whereas the *P. delenatii* flowers are generally white with pink and never yellow.

There can thus be no longer any doubt that the two entities represent different autonomous species.

DESCRIPTION

Paphiopedilum armeniacum has an elongated rhizome which is about 2 to 3 mm thick. The distance between the shoots is 15 cm on average. Each growth bears five to seven leaves which are 6 to 12 cm long by 1.8 to 2.3 cm wide and more or less acute. Their upper surface is greenish-white and distinctly tessellated with dark green. The underside is prominently keeled and covered with dark, irregular, purple-red spots. The inflorescence is erect, green, up to 25 cm long, spotted with purple throughout, and covered with reddish-brown hairs. The green bract is up to 1.8 cm long with purple-red spotting. The ovary is 3.0 to 3.5 cm long, green, spotted with brown on the ridges, and is completely covered by white hairs. The usually single flower is bright sulphur-yellow and 6.5 to 8.0 cm in diameter when fully open. The dorsal sepal is ovate to elliptic, 2.2 to 3.8 cm long by 1.4 to 2.2 cm wide, more or less acute, and glabrous on the inside. The upper part of the margin is curved inward, giving the impression of acuteness. The synsepal resembles the dorsal sepal, but it is somewhat smaller with two keels



PAPHIOPEDILUM ARMENIACUM IN SITU
COURTESY OF PROF. DR. ZHONG JIAN LIU

on the back, a single rounded apex, and a glabrous inner surface. The sulphur-yellow petals, which have reddish spots at the base and ten to twenty veins, are broadly ovate to sub-orbicular, more or less rounded at the apex, and measure 2.8 to 5.3 cm long by 2.5 to 3.0 cm wide. The basal part of the inner surface is covered with white hairs, and the outer surface is glabrous. The petal margins are finely ciliate. The lip is elliptic to ovate, distinctly calceolate, 4 to 5 cm long by 3.2 to 4.0 cm wide, and has a short unguiculate base and margins that are folded inward. Inside the pouch, the surface is covered with short white hairs and the back part is spotted reddish. The elongated, triangular staminodal plate is 1 to 2 cm long by 1.0 to 1.5 cm wide. The apex, which is sometimes curved slightly backward, is yellow with a red pattern in the middle. The red pattern and red spots inside the pouch are missing in the albino form, which is often erroneously referred to as var. *album*.

DISTRIBUTION AND HABITAT

Paphiopedilum armeniacum grows in humus in a remote area of southwestern China near Bijiang in the western part of Yunnan Province. Plants are found on limestone hills and cliffs in the forests above the Salween (Nujiang) River in the area bordering northeastern Myanmar at about 26.5° north latitude. There, the plants grow at an altitude of about 2,000 m among rocks in semi-shaded conditions.



PAPHIOPEDILUM ARMENIACUM IN SITU
COURTESY OF PROF. DR. ZHONG JIAN LIU



PAPHIOPEDILUM ARMENIACUM
COURTESY OF DOROTHY POTTER BARNETT

FLOWERING

Paphiopedilum armeniacum flowers from November through March, and occasionally also in summer.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Chen & Liu, 1982; Karasawa, 1982).

VARIETIES AND FORMS

Paphiopedilum armeniacum shows little variation in flower colour. In fact, the only variant worth mentioning is the albino. It differs from the normal form in that the usual reddish pattern on the staminodal shield and the reddish dots on the inside of the pouch are lacking. As with most albinistic forms, the plant is often referred to as *P. armeniacum* var. *album*. This designation, however, is erroneous and very misleading. This flower is by no means white, as would be expected when the term *album* is used. Flowers of this albinistic form are pure yellow.

PAPHIOPEDILUM ARMENIACUM FORMA MARKII

(GRUSS) BRAEM IN BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
1: 69 (1998)

BASIONYM

Paphiopedilum armeniacum var. *markii* Gruss

DIE ORCHIDEE, 48(5): 215-216 (1997)

SYNONYM

Paphiopedilum armeniacum var. *album* hort., *nomen nudum*



PAPHIOPEDILUM DEKENATII
 WATERCOLOUR PAINTING BY KARYONO APIC
 COURTESY OF KARYONO APIC

PAPHIOPEDILUM DELENATII

GUILLAUMIN

BULLETIN DE LA SOCIÉTÉ BOTANIQUE DE FRANCE, 71: 554, 558 (1924); and in JOURNAL DE LA SOCIÉTÉ NATIONALE D'HORTICOLE DE FRANCE, 4TH SERIES, 26: 127 (1924)

SYNONYM

Cypripedium delenatii (Guillaumin) C. H. Curtis
THE GARDENERS' CHRONICLE, 3rd series, 89: 208 (1931).

ETYMOLOGY

Paphiopedilum delenatii was named in honour of Mr. Delenat, at the time director of the Botanical Gardens of Saint-Germain-en-Laye near Saint-Cloud, France.

DISCUSSION

Paphiopedilum delenatii is one of the most beautiful orchids within the genus. It was discovered by a French army officer in Vietnam (Tonkin) around 1913. Plants were sent to Mr. Delenat, who was, at that time, the director of the Botanical Gardens of Saint-Germain-en-Laye near Saint-Cloud, France. This species was rediscovered in 1922 by the collector Poilane near Nha Trang in the Vietnamese province of Annam. In 1924, plants were exhibited in Paris and became the basis for Guillaumin's description. Most of the plants from the original collection perished shortly after they were imported for cultivation in Europe. A plant in the collection of the eminent French horticulturist Lecoufle was successfully selfed and seedlings were obtained. Several additional generations were propagated, and the species became relatively common in cultivation. As a result, for many decades, all cultivated plants originated from a single clone and were very similar in appearance. In the nineteen-nineties, *P. delenatii* was rediscovered in Vietnam, and there was some expectation that the new populations would show a normal range of colour variations. However, the newly found plants show very little difference in flower colour from those of the original collection, except for some specimens that have a much darker pink colouration of the pouch. Evidently the flower colour of *P. delenatii* does not vary to any significant extent, with the exception of the pure albino. The rediscovery of *P. delenatii* has demonstrated that it is a more common species with a much wider range of distribution than was originally thought. Furthermore, *P. delenatii* has been propagated artificially in several laboratories in Europe and the U.S.A.

DESCRIPTION

Paphiopedilum delenatii is an herbaceous plant that grows in humus. The stem is short, erect, generally up to 3 cm, but sometimes up to about 4.5 cm long, and bears up to seven closely spaced leaves. The distichous leaves are oblong-lanceolate, obtuse, up to 10 cm long by about 3 cm wide, and slightly fleshy. They are pale green, marked with numerous fine red spots beneath. The mottled upper surface is darker green on a pale

green background. The terete peduncle is erect and up to 15 cm long by about 4 mm in diameter. It is reddish, covered with spreading red hairs, and carries one or two flowers apically. The bract is broadly ovate, about 12 mm long, and pale green with fine red spots. Flowers are up to 8 cm across. The ovary is about 5 cm long, deep reddish- to brownish-green, and covered with stiff, spreading hairs. The dorsal sepal is ovate, acute and apiculate, about 3 cm long, and up to 2.5 cm wide. The synsepal is orbicular-ovate, apiculate, and about 3 cm long and equally wide. Both the dorsal sepal and synsepal are white inside and pink with dark reddish spots on the outside. The petals are obovate-orbicular, obtuse to rounded at the apex, about 4 cm long, and up to 3.5 cm wide. Petals are almost the same colour as the sepals, but the spots on the external surface are less distinct. Petals and sepals are covered with short, spreading hairs. The main lobe of the lip forms a pouch which is obovoid and distinctly rounded in front. Overall, the lip is about 3.5 cm long by 3 cm wide. It is white beneath, pink above, and shortly pubescent, especially in front, with very inflexed margins at the mouth. The staminodal plate is broadly orbicular-ovate, short-stalked, more or less cordate at the base, and about 1.5 cm wide. It is deep pink with a yellow centre and a yellow spot at the base.

DISTRIBUTION AND HABITAT

Although most authors consider *Paphiopedilum delenatii* to be endemic to Vietnam, there is a possibility that this species has a larger distribution within Indochina. This hypothesis is somewhat supported by the appearance of the related species *P. armeniacum* and *P. emersonii* in China. Unfortunately, very little information about the distribution of these plants is found in the literature.

Plants were originally found in an unspecified location in Tonkin, a region covering most of northern Vietnam. Populations of this species were also discovered in the mountains of southern Vietnam in the region from near Dalat to the west of Nha Trang. Plants usually grow on eastern and southeastern slopes at 1,100 to 1,200 m, but collections are reported from as low as 800 m to as high as 1,500 m.

Averyanov (1996) reports that he collected *P. delenatii* on east- or south-facing slopes west of Nha Trang. Until his collection, Vietnamese collectors reported that *P. delenatii* could be found only on east and southeast slopes in the Bi Dup Mountains in Lam Dong and Thanh Hoa Provinces, which is further east and in part somewhat further north than Nha Trang. It is, however, well known that unverified reports from native collectors are to be considered with great caution.

Averyanov further reports that climatic conditions in the habitat are closer to those found along the coast than those in the interior mountain region around Dalat. He indicates that plants grow in acid soils that have developed from an acidic granite substrate. Plants normally grow in rock hollows or on small shelves on steep granite slopes, but they are occasionally found in crevices in nearly vertical granite cliffs where mosses and accumulations of leaf litter are sometimes present.

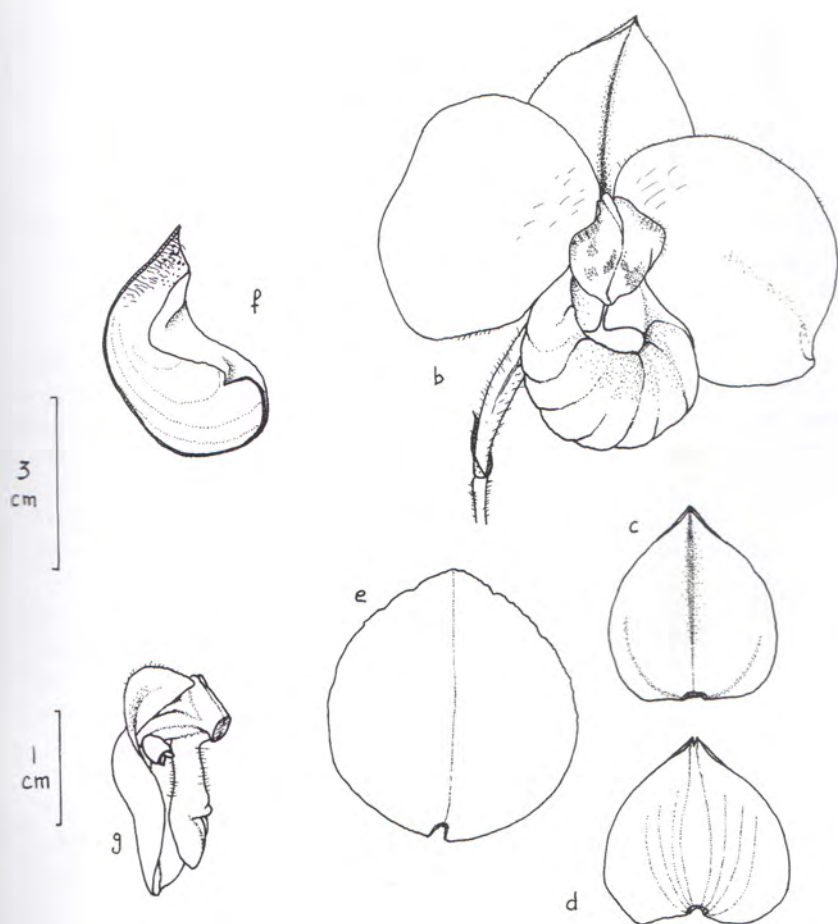


PAPHIOPEDILUM DEKENATII

COURTESY OF DOROTHY POTTER BARNETT



PAPHIOPEDILUM DEKENATII FMA. *ALBIDUM*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM DEKENATII

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON

FLOWERING

Paphiopedilum delenatii has been reported to flower between November and June with a peak period from November through January. In their natural habitat, the plants flower from December through January.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Mehlquist, 1947; Duncan, 1947; Duncan & MacLeod, 1948; Karasawa, 1979). The flowers are mildly fragrant.

VARIETIES AND FORMS

PAPHIOPEDILUM DELENATII FORMA ALBIDUM

(BRAEM) BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
1: 23 (1998)

This variety of *P. delenatii* differs from the typical form by the lack of any red pigmentation. The undersides of the leaves and the shaft of the inflorescence are immaculate green; the flowers are uniformly white with the exception of a yellow staminodal shield.

PAPHIOPEDILUM EMERSONII

KOPOWITZ & CRIBB

THE ORCHID ADVOCATE, 12 (3): 84-86 (1986)

SYNONYMS

Paphiopedilum huonglanae N.T. Tich

HOA CANH, 3: 10-11 (1998)

Paphiopedilum emersonii var. *huonglanae* N.T. Tich

HOA CANH, 4: 12 (1998)

ETYMOLOGY

Named *emersonii* in honour of Emerson "Doc" Charles, a renowned orchid collector from California, U. S. A., who flowered the type specimen in April 1986.

DISCUSSION

Paphiopedilum emersonii may be considered one of the most striking species within the subgenus. Little is known about the history of the discovery of this plant, and its point of origin is still unconfirmed. The type, however, was imported from China via Hong Kong. It has been suggested that the plants were collected near Hai Num in Guizhou Province of southwestern China. Plants were first brought to continental Europe by Henry Azadehdel. He gave at least one flowering specimen to Gustav Schoser, at that time the director of the "Palmengarten", the Frankfurt Municipal Botanic Gardens. Schoser, however, failed to recognise that it was a species new to science. Shortly thereafter, a plant flowered in California in the collection of Emerson "Doc" Charles, who made it available to Koopowitz and Cribb for description.

Although there is no doubt that *P. emersonii* belongs in the subgenus *Parvisepalum*, it differs in some aspects from all other taxa of this group. Indeed, the pouch, when compared to the overall size of the flower, is not as large as those found in the other taxa belonging to the subgenus. The shape and size of the flower of *P. emersonii* calls to mind the flowers of *P. bellatulum*, but the plants resemble more the seedlings of *Polyantha* species. There are also some differences in vegetative characteristics. Whereas the leaves of all but one of the other taxa within *Parvisepalum* [the exception is *P. hangianum*] show bold tessellation, those of *P. emersonii* are only faintly tessellate. These differences have led to the suggestion by Cribb (1987) that *P. emersonii* may be an intermediate form between the groups of plants now generally accepted as subgenera *Parvisepalum* and *Brachypetalum*. Koopowitz & Cribb, in their original description, reported that the leaves of *P. emersonii* lacked any purple markings on the underside. However, purple markings have been observed by others on at least some of the plants.



PAPHIOPEDILUM EMERSONII
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC

DESCRIPTION

Paphiopedilum emersonii is an herbaceous plant which grows in leaf-mould. Plants can attain an overall height of 18 cm. The leaves are coriaceous and ligulate. The upper leaf surface, which is faintly but distinctly tessellate, appears uniformly green only at first glance. The prominently keeled underside is bright grass-green with the basal portions more or less spotted with purple. The erect inflorescence is one-flowered. The scape is cream-coloured, velvety, white pilose, and up to 12 cm long by about 5 mm in diameter. The white bract is elliptic, acute, conduplicate, papery, and up to 2.8 cm long by about 2 cm wide. The flower, which is very large for the size of the plant, is 8.5 to 9.5 cm across. The fleshy sepals and petals are white with a faint pink flush at the base of the petals. The distinctly calceolate lip is cream-coloured to yellow with a pink flush around the rim and deep purple spotting on the inside. The staminodal plate is bright yellow with reddish markings. The pedicel and ovary, which are up to 3 cm long, are pale yellowish-white and velvety-pilose. The dorsal sepal is somewhat hooded, curving forward over the lip, and 4 to 4.5 cm long by about 3.3 cm wide. It is elliptic-ovate, obtuse, pubescent on both surfaces, and keeled on the outer side. The synsepal is elliptic to suborbicular, obtuse, about 3.5 cm long, and equally broad. It is pubescent on both surfaces and has two keels on the backside. Petals are curved inward, broadly elliptic to sub-circular, obtuse to round at the apex, up to 4.5 cm long and wide, finely pubescent on both sides, and villose at the base. The lip is deeply saccate and up to 3.5 cm long by about 3.0 cm wide. The apical margins are curved inward and grooved along the veins. The column is short. The staminodal shield is convex, trullate, truncate, and about 2 cm long by 1 cm wide. It is deeply sulcate with a longitudinal groove that dilates toward the apex. The stigma is spatulate and shortly papillose.

DISTRIBUTION AND HABITAT

Paphiopedilum emersonii is found in southwest China along the eastern edge of the Guizhou Plateau in Yunnan and Guangxi Provinces at 460 to 700 m. Plants usually grow on northeast-facing rock surfaces where concretions have formed. These concretions occur when limestone, dissolved by rain and mist, hardens in cracks and fissures with impurities of sand, clay, and humus. The concretions, which resemble a mud-wasp's nest in texture, are almost continually moist from water seepage and are often covered with a carpet of moss. *P. emersonii* grows on the moss with roots penetrating into the moist concretion below.

FLOWERING

Paphiopedilum emersonii flowers between March and June. In the natural habitats, plants flower from May through June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa, 1986).



PAPHIOPEDILUM EMERSONII

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

VARIETIES AND FORMS

Fowlie (1990) divided the species into what he called varieties based on three geographical races. None of these geographical races differs enough, however, to warrant giving it any taxonomic status. Furthermore, the descriptions of these so-called varieties are invalid according to the rules of taxonomy. The taxa thus created are included here for the sake of completeness only, and their descriptions are included as written by Fowlie.

***PAPHIOPEDILUM EMERSONII* VAR. *KWANG-NANENSIS* FOWLIE**

"This race from Kwang Nan in extreme south-western Yunnan has the beautiful deep marks of red-purple at the base of the petals and large, round flowers which mark it well. It lacks the deep yellow colored bowl of the type species from southeast of Wan Shan, Yunnan." [Fowlie may have erred here. We do not find any "Wan Shan" in Yunnan. We do find "Wenshan" which is the most easterly prefecture of Yunnan.]

***PAPHIOPEDILUM EMERSONII* VAR. *GUANGXIENSIS* FOWLIE**

"This is the race of north-western Guangxi as it approaches the Guizhou Plateau foothills. It has a fair shape but lightly coloured pouch and staminode."

***PAPHIOPEDILUM EMERSONII* VAR. *ANGUSTIPETALUM* FOWLIE**

"This rather ugly race of the species has elongated, floppy petals which produce an ungainly appearance. It occurs just west of the Yun Kai Dah San (Cloud Opening Big Mountains) just west of Canton near Yang Chun (Sunny Spring) a long time tourist resort, now being used as a cement factory. It is almost extinct in nature."



PAPHIOPEDILUM HANGIANUM
COURTESY OF DOROTHY POTTER BARNETT

PAPHIOPEDILUM HANGIANUM

PERNER & GRUSS

DIE ORCHIDEEN, 50, BEIHEFT 6: 3-7 (1999)

SYNONYM

Paphiopedilum singchii Z.J. Liu & J.Y. Zang

ACTA TAXONOMICA SINICA, 38(5): 468 (2000)

ETYMOLOGY

Paphiopedilum hangianum was named in honour of Tong Ngoc Hang who is said to have made a significant contribution to the discovery of the species.

DISCUSSION

Paphiopedilum hangianum is unique because of the size of its enormous flower in relation to the overall plant size. It has been described as a species, but Perner & Gruss did not exclude the possibility "that the new species is a natural hybrid". As putative parents, they suggest *P. emersonii* and *P. vietnamense* or *P. malipoense*. The second suggested combination, however, can be ruled out as *P. hangianum*, although showing some affinities, is by no means identical with *P. Memoria Larry Heuer*, the man-made hybrid between *P. emersonii* and *P. malipoense*, originally made by Mr. Fumisama Sugiyama of Yamato-Noen Orchids and registered in 1991 by Paphanatics. As the cross has been remade several times (Koopowitz, pers. communication), there is no reason to doubt the authenticity of this hybrid.

Whatever the final taxonomic status of *P. hangianum* may be, the plant undoubtedly is a great addition to the genus and it can hardly be mistaken for any other known species. Although its colour is rather dull, *P. hangianum* will definitely become a favourite breeding parent for its enormous flower on a relatively small plant.

DESCRIPTION

Paphiopedilum hangianum is an herbaceous plant of medium size, measuring 22.5 to 45 cm from leaf tip to leaf tip. Each of the tightly clustered growths produces 3 to 5 distichous, obliquely upright-growing leaves which are imbricate at their base. The leaves are 12.0 to 25.0 cm long by 3.2 to 5.0 cm wide. They are ligulate, sub-acute, coriaceous, their upper surface glossy dark green, diffusely marbled, their base shortly ciliate, their under surface distinctly paler green and keeled. The inflorescence is upright or slightly arching, 15.0 to 25.0 cm tall, about 5 mm in diameter, terete, bright green, covered by short bristles. It generally carries a single flower. The floral bract is 2.8 to 3.0 cm long by about 1.2 cm wide, ovate, obtuse, the base sheathing the pedicel, and the rest tightly folded around the lower half of the ovary. The bract is keeled, bright green, covered by fine white bristles and ciliate. The ovary is 3.8 to 4.2 cm long by about 1 cm in diameter. It is cylindrical, bright green and covered by short pubescence. The flower is 10.0 to

12.5 cm tall by 11.0 to 14.0 cm wide as measured on a flower of a live plant in its natural position. The flower has an intense sweet odour in daylight. The dorsal sepal is 5.3 to 5.6 cm long by 3.5 to 4.0 cm wide, yellow to yellowish-green, oval, obtuse, bent to the inside, keeled on the outside. The lateral sepals are united into a synsepal which is 5.4 to 6.0 cm long by 4.2 to 4.7 cm wide, ovate, obtuse, yellow to yellowish-green, with two keels on the outer surface. The petals are 6.5 to 7.2 cm long by 4.3 to 5.0 cm wide, oval, rounded, nearly translucent, yellow to yellowish-green, the outer surface more brightly coloured than the inside, the inner surface with maroon spots and fairly long hairs near the base, indistinctly veined, the margins shortly ciliate. The sepals as well as the petals are pubescent on both the inner and the outer surface. The lip is distinctly three-lobed. The side lobes are folded inward to form a tube. The main lobe is deeply saccate, rounded, the margins at the orifice bent toward the inside. The pouch is about 3.3 cm long and indistinctly wider. The orifice is about 2.2 cm long and 1.7 cm wide. The pouch is yellowish to cream-coloured with translucent spots in the basal third only, inside intensely spotted with maroon, the surface velvety. The staminodal shield is about 1.7 cm high by 1.9 to 2.1 cm wide. It is rhombic, obtuse, horizontally conduplicate, and whitish in ground colour, with red venation and a green tip.

DISTRIBUTION AND HABITAT

Northern Vietnam. This orchid grows on limestone rocks in pockets of humus covered with moss in open shade at elevations of 800 to 1,000 m. The exact location of the habitat is uncertain. Gruss & Perner (*loc. cit.*) have published the type location as "Vietnam, Province Bac Thai", and in the introduction to their publication they say that the plant originates "from the border region between China and Vietnam." In 1997, the Province "Bac Thai" was split into two provinces; Thair Nguyen and Bac Kan. Reliable reports from other sources, however, indicate that the plants may have originated from Cao Bang Province.

FLOWERING

In the original publication it is stated that the bloom season in the habitat is from March through April. The flowering season of this species, however, is definitely not that limited. Plants in cultivation in northern Germany have been in flower between October and April.

VARIETIES AND FORMS

PAPHIOPEDILUM HANGIANUM FORMA ALBUM

GRUSS & PETCHLEUNG

DIE ORCHIDEE, 53(3): 383-385 (2002)

The flower of this variant shows no red pigmentation. The petals, the sepals, and the lip are uniformly pale yellow, in some clones near white. The staminodal shield is whitish near the base, otherwise coloured as the other flower parts.

PAPHIOPEDILUM MALIPOENSE

S.C. CHEN & TSI

ACTA PHYTOTAXONOMICA SINICA, 22(2): 119-124 (1984)

ETYMOLOGY

Paphiopedilum malipoense was named for the prefecture of Malipo, Wenshan, Yunnan, China, the area where the type specimen was collected.

DISCUSSION

The Chinese botanist K. M. Feng collected plants of this species in Yunnan Province of southwestern China as early as November 11, 1947. Although at least one specimen found its way into the herbarium of the University of Beijing (Peking), *P. malipoense* was not officially described until 1984. In their original publication, Chen & Tsi suggested that *P. malipoense* is intermediate between the genera *Paphiopedilum* and *Cypripedium*. Until flowering plants of this species were available, *P. malipoense* was often considered a Chinese variant of *P. wardii*, a misinterpretation based primarily on vegetative similarity.

DESCRIPTION

Paphiopedilum malipoense is an herbaceous plant which grows in leaf-mould. The species has an elongated, more or less repent, nodose rhizome that is about 2.0 to 3.5 mm in diameter. Each growth carries seven or eight oblong to elliptic-oblong leaves. They are leathery, semi-erect, and measure up to 23 cm long by 2.5 to 4.0 cm wide. Leaves are dark green, the upper surface is distinctly mottled, the under surface is spotted purple and distinctly keeled, and the apex is more or less acute and asymmetric. The inflorescence is up to 80 cm long, reddish-brown, and villose. The bract is folded, up to 4.5 cm long, greenish, spotted purple, and pilose on the outer surface with distinctly ciliate margins. The inflorescence usually bears a single flower up to 13 cm across. The dorsal sepal is elliptic-lanceolate, about 4.5 cm long by up to 1 cm wide, and has a long-acuminate apex. The synsepal, which is about the same size as the dorsal sepal, is ovate-lanceolate with a double fold at the apex and two indistinct keels on the outside. Sepals have ciliate margins, a villose outer surface, and a sparsely pilose inner surface. Petals, which are about the same size as the dorsal sepal, are obovate, subacute, and villose on both surfaces. The petal margins are as ciliate as those of the sepals. The lip is distinctly calceolate. It is villose at the base on the inside, about 4.0 to 4.5 cm long, and has distinctly inflexed margins at the mouth. The rim at the front of the pouch is indented. The staminodal plate is oblong-ovate, nearly rhomboid, and about 1.3 cm long by up to 1.1 cm wide. It has a sub-sessile base and ciliate margins, a keel on the outside, and four protrusions on the inside, two near the apex and two near the base. Petals and sepals are greenish with purple veins and deep red to purple spots near the base. The calceolate lip is greenish with darker veins. It has intense dark red to purple spotting on the inside, and the spots become smaller toward the base. The staminodal plate is white at the base and deep reddish-brown near the apex.



PAPHIOPEDILUM MALIPOENSE
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC



PAPHIOPEDILUM MALIPOENSE

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON

DISTRIBUTION AND HABITAT

Paphiopedilum malipoense grows in southwest China and northern Vietnam. It was originally found near Malipo, just north of the Vietnamese border, at 1,300 to 1,600 m. Fowlie subsequently reported finding plants as low as 670 to 790 m. The habitat is located along the southeastern edge of the Guizhou Plateau in southeastern Yunnan Province, northwestern Guangxi Province, and northern Vietnam along the common border with these regions. Plants grow on benchlike rock formations on the vertical sides of limestone mesas in broken shade from bamboo. They are usually found in east-facing locations near rivulets that drain down the rock faces from the relatively flat mesa tops. These rivulets carry off both rainfall and the runoff from accumulated condensation and serve to keep the plants moist most of the year as heavy dew occurs most nights, even during the dry season. *P. malipoense* grows on moss and composted leaves near these rivulets with its roots attached to the underlying rock or extended into nearby solution pits.

FLOWERING

In its natural habitat, *P. malipoense* flowers from March through May. In cultivation, plants have been reported to flower from autumn through summer.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa, 1986).

VARIETIES AND FORMS

PAPHIOPEDILUM MALIPOENSE* VAR. *HIEPII

(AVERYANOV) CRIBB

THE GENUS *PAPHIOPEDILUM*: 88 (1998)

SYNONYMS

Paphiopedilum hiepii Averyanov

ORCHIDS, 67(3): 260-263 (1998)

Paphiopedilum angustatum Z.J. Liu & S.C.Chen

ACTA PHYTOTAXONOMICA SINICA, 38(5): 464 (2000)

Paphiopedilum jackii var. *hiepii* (Averyanov) Koopowitz

ORCHID DIGEST, 64(4):168 (2000)

DISCUSSION

Paphiopedilum malipoense var. *hiepii* was originally described by Averyanov (*loc. cit.*) as an autonomous species on the basis of a plant said to have been collected in the Tuyen Quang Province of northern Vietnam. Serious doubts regarding the existence of this



PAPHIOPEDILUM MALIPOENSE
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM MALIPOENSE FMA. CONCOLOR
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM MALIPOENSE VAR. *JACKII*
COURTESY OF MYORCHIDS.RU

taxon have been expressed since the original description, and today it has been generally accepted that the plant on which Averyanov based his description was a deformed specimen of *P. malipoense* var. *jackii*. The plant was named in honour of Nguyen Tien Hiep, a Vietnamese botanist.

PAPHIOPEDILUM MALIPOENSE VAR. JACKII

(HUA) AVERYANOV

ORCHIDS, 66(2): 150-155 (1997)

SYNONYM

Paphiopedilum jackii Hua

DIE ORCHIDEE, 46(3): U4 [back cover] (1995)

DISCUSSION

Although *Paphiopedilum jackii* was described as an autonomous species on the basis of plants found in Yunnan and Wenshan in southern China, there is no doubt that this taxon is to be regarded as a variant of *P. malipoense*. *P. malipoense* var. *jackii* differs from *P. malipoense* mainly by the uniformly grass-green flowers, its white staminode with a grass-green patch on its apical part, the maroon spots on the staminode and the inside of the pouch, and the coloration of its leaves. These characteristics, however, also vary extensively in the natural populations of the nominal form of *P. malipoense*. The variety was named in honour of Dr. Jack Fowlie. Averyanov (*loc. cit.*) reports that he and his colleagues found *P. jackii* in the Tuyen Quang Province of Vietnam at elevations of 500 to 600 m on limestone hills covered by dense, evergreen, primary forest. In this habitat, plants grow in rock hollows of limestone outcrops. The plants were growing under shady canopies on the middle part of northeast-facing slopes. According to Averyanov, no plants could be found at higher elevations. The distribution in Vietnam is delimited by the rivers Gam and Nang and by the high shale and sandstone mountain system of Pia Ouac, San Sao, and Lung Ni Ung. The mountains rise from 1,000 to 1,500 m. These natural barriers may explain why this taxon has an apparently limited distribution in northern Vietnam, although further habitats may be found.

PAPHIOPEDILUM MALIPOENSE FORMA CONCOLOR

(BRAEM) BRAEM, BAKER & BAKER

THE GENUS *PAPHIOPEDILUM* - NATURAL HISTORY AND CULTIVATION,
VOL. 1: 82 (1998)

This is the albino form of the species. Plants differ from the type only in coloration, lacking any red pigmentation in the flower, inflorescence, and leaves.

PAPHIOPEDILUM MICRANTHUM

T. TANG & WANG

ACTA PHYTOTAXONOMICA SINICA, 1: 56 ([1951]1952)

SYNONYMS

Paphiopedilum globulosum Z.J. Liu & S.C. Chen

ACTA PHYTOTAXONOMICA SINICA, 40(4): 365, fig. 1 (2002)

ETYMOLOGY

Named *micranthum*, which means small flower. This is a misinterpretation based on the type specimen (a dried herbarium specimen). The original descriptions states, "... bearing a single very small flower."

DISCUSSION

Paphiopedilum micranthum Tang & Wang was certainly one of the most exciting discoveries in respect to Chinese orchids. The concept was based on plants which Wang had collected between Malipo and Xichou in the southeastern part of Yunnan Province. Few species have received a more inappropriate name than *P. micranthum*. Indeed, the flower of *P. micranthum* is huge compared to the overall size of the plant. The description was made on the basis of a dried specimen, which was either a plant in bud or, less likely, a plant with an aberrantly small flower. Although it has been reported that some other *Paphiopedilum* species (such as *P. bougainvilleanum*, *P. javanicum*, and *P. armeniacum*) have supposedly produced an occasional minute flower, such occurrences have never been confirmed, and these reports are most likely the result of misinterpretations.

DESCRIPTION

Paphiopedilum micranthum is an herbaceous plant and grows in leafy debris. The plant has a distinctly elongated rhizome and fleshy roots. Each growth generates four to five leaves which are ligulate, obtuse, and leathery, and have glabrous upper and under surfaces. The upper surface of the leaf is mottled dark and pale green, and the underside has deep purple spots. The leaves are up to 14 cm long by about 2.5 cm wide. The inflorescence is erect, up to 26 cm long, densely pilose, and generally bears a single flower. The bract is folded, green, spotted purple, and up to 1.2 cm long by about 7 mm wide. The ovary, which is approximately 4 cm long, is bright green with deep purple spots on the ridges. The flower is large for the plant, primarily due to the enormously inflated pink to whitish-pink lip, and is up to 8.5 cm long by about 6.5 cm wide. Petals and sepals are small, relative to the lip. The dorsal sepal is broadly ovate, more or less acute, and up to 3 cm long by about 2.5 cm wide. It has a glabrous inside surface, and is shortly pilose outside. The inflexed margins are ciliate. The synsepal is ovate to sub-orbicular, more or less acute, and up to 3 cm long by about 2.8 cm wide. Petals are ovate, more or less obtuse, and up to 3 cm long by about 3.5 cm wide. Sepals and petals are white, somewhat greenish at the base, covered with a more or less intense pink flush,



PAPHIOPEDILUM MICRANTHUM IN SITU
COURTESY OF DR. SHUI-SONG MO



PAPHIOPEDILUM MICRANTHUM

COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

and marked with dark red-purple longitudinal stripes. The lip is clearly calceolate, glabrous on the outside, up to 6.5 cm long by about 5.5 cm wide, and has a characteristic triangular indentation on each side of the base. In front of these indentations is a folded staminodal plate which is up to 1.5 cm long by about 7 mm across. It is white to light pink with maroon spotting in front and a distinct, triangular yellow area at the top of the apical part.

DISTRIBUTION AND HABITAT

The type specimen of *Paphiopedilum micranthum* was, according to the notes on the herbarium sheet, collected in southeast Yunnan Province. Reliable sources report that plants are growing in southwestern Guizhou Province near the city of Xingyi, and Cribb (1998) states that his illustration of 'var. eburneum' was made in northwestern Guangxi. Plants are found in mixed forests at 1,000 to 1,500 m, according to Fred Mark and other Chinese sources. However, Jack Fowlie reported finding plants at 550 to 850 meter on eastward facing slopes in the saddles between steep-sided, round-topped mountains. Air movement is strong at the habitat. Even during the dry season, clouds form on the southeast slopes of the mountains and are forced through the saddles, which makes additional moisture available from mist and condensation. Plants grow in clay and deteriorated limestone which is packed into cracks and fissures in the rock.

FLOWERING

Paphiopedilum micranthum flowers between February and June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa, 1982).

VARIETIES AND FORMS

Paphiopedilum micranthum is variable where flower colour is concerned, and several varieties and forms have been designated in horticulture. The more recently described *Paphiopedilum micranthum* var. *oblatum* (Z.J. Liu & S.C. Chen in ACTA PHYTOTAXONOMICA SINICA, 40[4]: 366 [2002]), is nothing but such a horticultural variant.

The only genuine, genetically stable variation in this species, however, is the albino.

PAPHIOPEDILUM MICRANTHUM FORMA ALBO-FLAVUM

(BRAEM) BRAEM IN BRAEM, BAKER & BAKER

THE GENUS *PAPHIOPEDILUM* - NATURAL HISTORY AND CULTIVATION,
VOL. 1: 91 (1998)

SYNONYM

Paphiopedilum micranthum forma *glanzeanum* Gruß & Röth
CAESIANA, no. 12: 57-65 [60] (1999)

This albino was originally described in 1994 as a variety by Braem in the LEAFLETS OF THE SCHLECHTER INSTITUTE, No. 1: 3-4. The flowers of this plant are white with parts of the petals and sepals as well as part of the staminodal shield suffused with yellow and the dorsal sepal with green veins.

PAPHIOPEDILUM VIETNAMENSE

GRUSS & PERNER

DIE ORCHIDEE, 50, BEIHEFT 5: 3-8 (1999)

SYNONYMS

Paphiopedilum hilmari Senghas & Schettler

JOURNAL FÜR DEN ORCHIDEENFREUND, 6(1): 4 (1999)

Paphiopedilum mirabile Cavestro & Chiron

ORCHIDEES. CULTURE ET PROTECTION, No. 38: 31-34 (1999)

ETYMOLOGY

Named *vietnamense* as an indication of the country of origin of the type specimen. However, experience has shown that the distribution of the taxon must not necessarily be limited to that country.

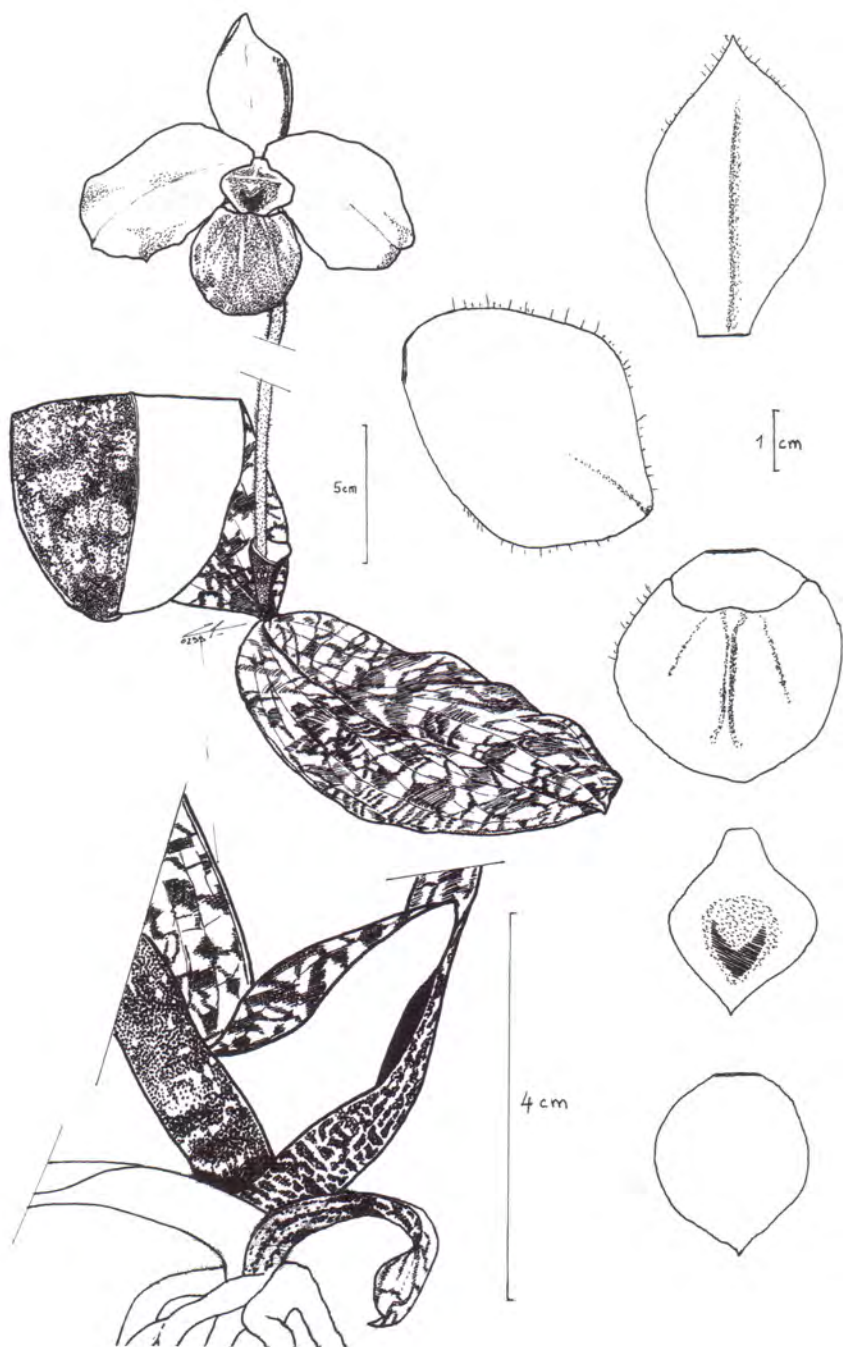
DISCUSSION

This fabulous species was published three times within six weeks. The publication of *Paphiopedilum vietnamense* by Gruß & Perner dates from January 11th, 1999. It was followed by the publication of the same concept as *P. hilmari* by Senghas & Schettler on January 19th, and the publication as *P. mirabile* was effected by Cavestro & Chiron on February 19th. Thus, according to the rule of priority, the name used in the publication of Gruß & Perner is to be accepted as the valid designation notwithstanding the fact that Senghas & Schettler argued (JOURNAL FÜR DEN ORCHIDEENFREUND, 6[3]: 156-161 [1999]) that the publication as *P. vietnamense* was not valid because the type specimen was not deposited at the time of the description. The rules of nomenclature, however, although stipulating that a type specimen must be indicated, and that the single herbarium or collection in which the type is conserved must be specified, do not stipulate any time frame for the deposition of the type in the collection or the herbarium.

On the basis of its flower colour and the country of origin, *P. vietnamense* has been described as closely related to *P. delenatii* by Gruß & Perner (*loc. cit.*) as well as by Senghas & Schettler (*loc. cit.*) and Cavestro & Chiron (*loc. cit.*). However, the size and shape of the flower as well as the leaf texture are totally different.

DESCRIPTION

Paphiopedilum vietnamense is, like all other species belonging to this genus, an herbaceous plant, generally growing in leafy humus. Plants are about 19 to 25 cm wide, measured from leaf tip to leaf tip in the natural position on live plants. Leaves are up to 15.0 cm long by 3.8 to 4.6 cm wide, ovate to elongated ovate, blunt, with a sharp keel on the underside. The upper surface is glossy, greyish green, mottled with dark green, and with a pronounced white margin. The underside is densely spotted with dark red. The inflorescence is upright, 15.0 to 30.0 cm long, green, intensely spotted with red and



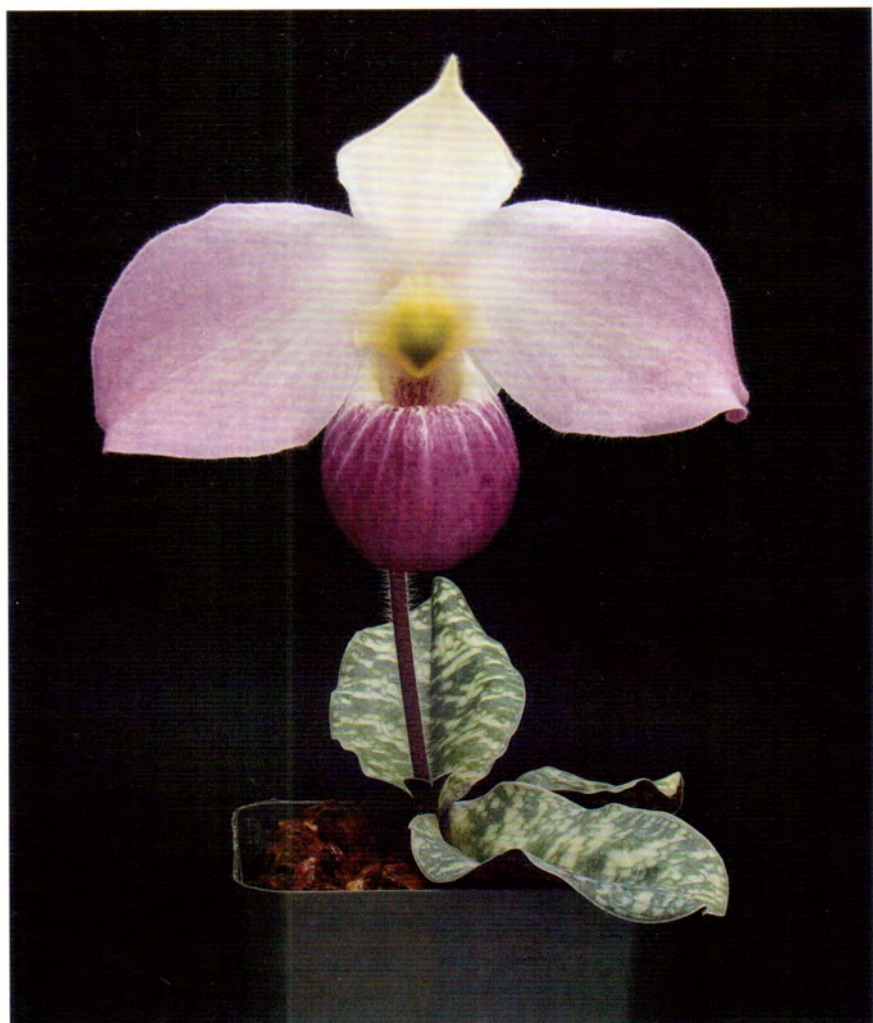
PAPHIOPEDILUM VIETNAMENSE
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON

covered with white hairs. It usually bears a single flower. The flower bract is 1.8 to 2.0 cm long by up to 1.6 cm wide. It is ovate, pointed, and folded around the inflorescence. The ovary is 2.5 to 2.8 cm long, yellowish-green, finely spotted with reddish purple, and densely covered with white hairs. The flower is 10.0 to 12.0 cm wide by 8.0 to 9.0 cm high. The dorsal sepal is 4.2 to 5.1 cm long by 2.5 to 3.0 cm wide. It is ovate, obtuse to sub-acute, white, the inside tinted pink, the outside tinted pink with some slight spotting and pink venation. The lateral sepals are united to form a synsepal which is 3.0 to 4.6 cm long by 3.0 to 3.3 cm wide. It is elliptical to sub-circular, the apex bidentate, and the margins covered with white hairs. Its colouration is similar to that of the dorsal sepal. The petals are 5.0 to 6.0 cm long by 3.0 to 4.5 cm wide. They are oblong-ovate to ovate, blunt. Their margins are slightly undulate and curved backward. They are white, at least partly suffused with pink to rose; the outside is also spotted and veined pink. Each petal is covered with long white hairs near the base. The margins are ciliate. The lip is three-lobed, whereby the side lobes are folded inward forming a tube. The main lobe is sub-globose, the margins folded inward. The lip is 3.5 to 4.0 cm long by 2.5 to 4.0 cm wide, quite variable in its colour pattern, white, suffused with shades of red, the inside spotted with dark red. The staminodal shield is rhomboid, obtuse, 1.5 to 3.0 cm long by 1.7 to 2.5 cm wide, white, largely covered with yellow and with a green spot in the centre.

DISTRIBUTION AND HABITAT

The publication of the synonym *P. hilmari* (Senghas & Schettler, *loc. cit.*) is the only one of the three different publications of *P. vietnamense* that includes more or less detailed information about the origin of this species. According to that publication, the plants can be found in northern Vietnam in "Ha Tuyen Province" at about 1,200 m. Cavestro & Chiron (*loc. cit.*) report that this orchid is found near the Chinese border at an elevation of about 700 m on calcareous hills in the Province of Tuyen Quang, which is northwest of Hanoi in northeastern Vietnam. The description as *P. vietnamense* (Gruß & Perner, *loc. cit.*) is, in this respect, the least detailed and simply reports that the plants grow at elevations of about 1,000 m in moss between ferns and grasses. Averyanov *et al.* (2001) report that participants of their study group could only locate *P. vietnamense* in the central part of the Thai Nguyen Province in "a very small area" restricted to only a few low limestone ridges in the Tan Long municipality in the Dong Hy District, near the village of Mo Ba in an area not exceeding 60 to 80 square kilometres. Such a restricted occurrence is extremely unlikely, and we do not hesitate to predict that a much more extensive distribution will eventually become documented.

As far as the habitat is concerned, Averyanov *et al.* (*loc. cit.*) report that *P. vietnamense* grows lithophytically "in crevices and holes on very steep shady humid slopes and cliffs mainly of north exposition on highly eroded limestone rocks" at elevations of 350 to 450 m. Obviously the plants root in the vegetable debris that accumulates in the cracks and holes.



PAPHIOPEDILUM VIETNAMENSE
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

FLOWERING

On the basis of information from Vietnam and Indonesia, and cultivation data from northern Germany, it may be assumed that *P. vietnamense* has two main flowering periods: January through April and September through October. Averyanov *et al.* (*loc. cit.*) report that in their native habitat, the plants of *P. vietnamense* flower in March and April.

MISCELLANEOUS NOTES

The mitotic chromosome count is unknown.

Averyanov *et al.* (2001) noted that *P. vietnamense* formed large colonies in its limited geographical distribution before being overcollected to near extinction and that plants fetch \$ 5,000 US per plant on the “international black market”. This does not seem to be the case, since plants have remained available at prices below \$100. Furthermore, the species has been artificially propagated.

NB : If it were true that plants of *P. vietnamense* (or any other orchid) would fetch 5,000 \$ US on the black market, the total market per year as estimated by experts would be less than 100 plants world wide, hardly a number that could endanger any habitat for reasons of trade. Local collectors, however, will strip habitats without having a specific reason or specific price offer.

VARIETIES AND FORMS

An albino of *Paphiopedilum vietnamense* was pictured as *P. vietnamense* forma *album* by Groß and Koopowitz (ORCHID DIGEST, 72: 128, 2008) but remains a *nomen nudum* due to the lack of a valid publication. The flower is pure white except for the staminode which is white with a yellow and green coloration, mainly in its lower half.

SUBGENUS BRACHYPETALUM

HALLIER FIL. (1897)

SUBGENERIC CHARACTERISTICS

Leaves tessellated. Inflorescence with a single flower, rarely two. Pouch deeply saccate, more or less distinctly pointed, shaped like an inverted helmet, fleshy, not plicate, margins infolded, pouch with poorly developed lateral “ears”. Dorsal not smaller than petals. Petals and sepals similar in shape as well as in colouration. Pollen viscous. Mitotic chromosome count $2n = 26$. Type: *P. concolor*

DISCUSSION

Subgenus *Brachypetalum* and subgenus *Parvisepalum* are considered to be primitive parts of the genus *Paphiopedilum*. The classification as ‘primitive,’ however, is purely arbitrary and speculative and by no means based on any scientific criterium.

Brachypetalums and *Parvisepalums* share a number of morphological characteristics such as margins that are distinctly folded inward on the main labellum lobe (pouch); poorly differentiated lateral ears of the pouch; close similarity of petals and sepals in shape as well as in colouration; similar colour patterns of the lip, the petals and the sepals; and a mitotic chromosome count of $2n = 26$.

Notwithstanding those similarities, the *Brachypetalums* differ clearly from the *Parvisepalums* by their thick-walled, ovoid pouch which has a plain surface, the viscous pollen, as well as by the lack of stolons.

The clear-cut autonomy of this group within the genus is readily established by simple visual comparison. The treatment of *Brachypetalum* and *Parvisepalum* as separate, though closely related, entities, as given by Karasawa & Saito (1982), Braem (1988, 1998), Braem & Chiron (2003) and Braem, Chiron & Öhlund (2016) has been clearly confirmed by the results of the molecular studies of Cox *et al.* (1997) and Chochai *et al.* (2012).

Although the taxa belonging to this subgenus are more or less genetically stable, some species do show distinct infraspecific morphological variation, especially in respect to floral characteristics. These considerable variations indicate that the phylogenetic development of this group of slipper orchids is ongoing.

Whereas Fowlie (1975) elevated *Paphiopedilum godefroyae* var. *leucochilum* to the species level, we think that the differences between the two taxa are too small to warrant that change in taxonomic status. *P. x ang-thong* has been proven to be a natural hybrid between *P. godefroyae* and *P. niveum*. The wild-collected plants cannot be differentiated from the artificial hybrid between these two species, *P. Greyi*.

We have also come to the conclusion that the taxon *Paphiopedilum concolor* var. *longipetalum* (Rolfe) Pfitzer deserves to be treated as an autonomous species (*Paphiopedilum josianae*).

Among the plants that were wild-collected in southern China and sold through nurseries in Hong Kong in the early nineteen-eighties, there was one that, because of its obvious affinities, was soon to be regarded and sold as being the natural hybrid between *P. concolor* and *P. bellatulum*. In the meantime this assumption has been shown to be correct through man-made hybridisation of the two supposed parental species. The man-made cross, however, was established and registered by Heath & Son as early as 1891. The correct designation of this garden (man-made) hybrid is *P. Conco-bellatulum*. Plants have been awarded by the American Orchid Society, the Japan Orchid Society, as well as by European orchid societies under that designation. The first awards coincide with the appearance of the natural hybrid from China. Those awards, although now listed under the hybrid designation, were obviously given to imported specimens. In fact, as insiders know, the great majority of the awarded plants originated from the wild, and it is doubtful whether any of the awarded clones are of garden origin. In a publication entitled 'Notes on *Paphiopedilum concolor* and Its Allies', Liu *et al.* (2000) have described *P. x wenshanense*. It is, in our opinion, obvious that the concept of *P. x wenshanense* corresponds to *P. Conco-bellatulum* as it occurs in the wild.

From a purely scientific point of view, one can very well argue in favour of validating this natural entity. Horticultural designations which are not scientifically validated (such as *P. Conco-bellatulum*) simply aren't to be taken into account as far as botany is concerned. Whether such an interpretation is helpful, although scientifically correct, is another question.

Answering an enquiry, a representative of the Royal Horticultural Society stated that *P. x wenshanense* is to be applied to the F₁ population (*bellatulum* x *concolor*) and *P. Conco-bellatulum* is the correct designation for all other generations. In that sense *P. x wenshanense* x *P. x wenshanense* would yield *P. Conco-bellatulum*. We fail to discover any logic behind that interpretation.

No one can decide whether plants presented as *P. x ang-thong* are wild-collected or the man-made hybrid *P. Greyi*, and no one will be able to judge whether adult flowering plants of *P. x wenshanense* are wild-collected or of garden origin (F₁ = *P. x wenshanense sensu* RHS) or F₂, F₃, ... F_n (*P. Conco-bellatulum sensu* RHS). As a result, a plant that is presented as *P. x wenshanense* 'Judges Delight' in Philadelphia and receives an AM/AOS there, may well be presented as *P. Conco-bellatulum* 'Cabaret' later in New York (or any other judging centre) and receive another AM/AOS under that latter name.

As if that were not enough to fulfill John Lindley's prophecy that the making of orchid hybrids would end up in the botanists becoming mad, another level of craziness has been added. The appearance of *Paphiopedilum* Sakaki as registered by T. Tanaka in 2002 will raise havoc among breeders, judges, and slipper amateurs alike. The hybrid is the result of the backcross of the natural hybrid *P. x wenshanense* onto *P. bellatulum*;

the newcomer is thus $\frac{3}{4}$ bellatulum. In addition to the fact that the logic behind this hybrid goes beyond our cerebral capacities, it is now possible to fool any orchid judge and obtain four awards on one single plant: (1) as *P. Sakaki*, (2) as *P. Conco-bellatulum*, (3) as *P. x wenshanense*, and (4) as *P. bellatulum*. From experience, we are convinced that before long hybrids will be made with *P. Sakaki* under these various names, making the true identity of any of the hybrid designations in this group questionable at best.

Unfortunately, plants of *P. Conco-bellatulum* have been awarded as exceptionally good clones of *P. concolor*. Whether the reasons for this lay in the ignorance of the plant owner and/or the judges involved, or whether these 'misidentifications' occurred purposely we cannot know. But the fact remains that the "identification" of a *P. Conco-bellatulum* as an exceptionally good specimen of the species (and this will of course also happen with '*P. x wenshanense*') results in the screening of 'normal' specimens of that species, at least in some of the judging centres. Furthermore, the thus awarded hybrid will nearly certainly be used as a parent for hybridisation. This in turn means that the progeny will be misidentified, and of course the following generations of hybrids as well.

Recently, a new taxon was described as *Paphiopedilum myanmaricum* by Koopowitz, Iamwiriyaikul & Laohapatcharin. Although we suspect this taxon to be a variant of *Paphiopedilum godefroyae* or a primary hybrid thereof, we have decided to treat it as an autonomous species until further information becomes available.



PAPHIOPEDILUM BELLATULUM
COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

PAPHIOPEDILUM BELLATULUM

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 456 (1892)

BASIONYM

Cypripedium bellatulum Reichenbach fil.

THE GARDENERS' CHRONICLE, 3rd series, 3: 648 (1888)

SYNONYM

Cordula bellatula (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Named *bellatulum* for the beauty of the flower.

DISCUSSION

Paphiopedilum bellatulum was originally imported into Europe in the spring of 1888 by the English orchid establishment of Stuart Low & Co. It originated east of Pyin-Oo-Lwin (then called Maymyo) in Myanmar (then called Burma). Mr. Low's nursery supplied materials to H. G. Reichenbach, who duly described the species as *Cypripedium bellatulum* in 1888 (*loc. cit.*). Over the last two decades, nearly all plants of this species brought into cultivation originated from habitats in Thailand. Only a single importation was recorded from the original Myanmar location. *Paphiopedilum bellatulum* is closely related to *P. godefroyae*. It is, however, characterised by a much shorter scape, a distinctly larger flower, a narrower and more conical pouch, and a less hairy staminode. The albino described as *P. bellatulum* var. *album* was collected in the Shan States of Myanmar by R. Moore and introduced into cultivation by the Charlesworth Nursery. It was awarded by the Royal Horticulture Society in June 1895. (See below).

In the mid 1980s, plants were imported into Europe which showed distinctly intermediate characteristics between *P. concolor* and *P. bellatulum*. They reached Europe via Hong Kong and were brought into cultivation as *P. concolor*-*bellatulum*. In spite of the fact that the wild-collected plants are identical with the garden hybrid between *P. concolor* and *P. bellatulum*, registered by Heath & Son as *P. Concolor*-*bellatulum* in 1891, the entity was published as a natural hybrid under the designation of *P. x wenshanense*. (Liu Zhong *et al.*, 2000). This of course causes a serious problem. The wild-collected plants are to be addressed as *P. x wenshanense*, whereas the garden hybrid is to be correctly addressed as *P. Concolor*-*bellatulum*. However, the differentiation between wild-collected plants and man-made hybrid plants will become increasingly problematic.



PAPHIOPEDILUM BELLATULUM IN SITU
COURTESY OF DR. ALEX SANCHEZ SANS

DESCRIPTION

Paphiopedilum bellatulum is a small plant that seldom exceeds a height of 10 cm. It is an herbaceous perennial with elliptic leaves that are 15 to 25 cm long by 6.0 to 8.5 cm wide, and obtuse with an asymmetrically split apex. Their upper surface is vivid green and tessellate, and the underside has deep purple spots. The inflorescence is villose, generally one-flowered, and so short that the flower frequently touches the leaves. The floral bract exceeds half the length of the ovary. The flower is up to 7 cm across, white, rarely with a yellow tinge, and irregularly spotted with deep purple. The dorsal sepal is about 2.5 cm long by up to 4 cm wide, elliptic to sub-orbicular, distinctly keeled on the outside, and shortly pilose. The synsepal is nearly as long as the dorsal sepal, but it is white, somewhat narrower, and shortly pilose. The petals are broadly ovate, up to 5 cm long by 2.8 to 3.5 cm wide, and slightly down-curved, with a somewhat acute and shortly ciliate apex. The lip is trilobed. The main lobe is saccate, narrowly ovoid to sub-ellipsoid and up to 3.5 cm long by about 2 cm across. It has fewer and smaller spots on the outer surface than do the other segments. The densely spotted lateral lobes are folded inward forming a tube. The staminodal plate is sub-rhomboidal to sub-orbicular with three teeth at the apex. It is white, spotted purple with a yellow middle part, and measures about 8 mm long by up to 11 mm across.

DISTRIBUTION AND HABITAT

Paphiopedilum bellatulum grows in northeastern Myanmar and adjacent areas in north-west Thailand. Plants often are found at 1,000 to 1,500 m above sea level in open areas or in the light shade of stunted, deciduous forest, but they occasionally grow as low as 340 m. They usually grow in cracks and crevices of limestone outcroppings. Plants are healthiest on cliff ledges near water seepages where their roots can extend into cracks and crevices filled with clay loam and a layer of leaf-mould and moss.

Paphiopedilum bellatulum has also been reported from China's Yunnan Province and from northeast India. Seidenfaden (1975) states that some of the records given for *P. godefroyae* in upper Laos may actually refer to *P. bellatulum*, but this distribution is not included in Seidenfaden's later work on the orchids of Indochina (1992).

FLOWERING

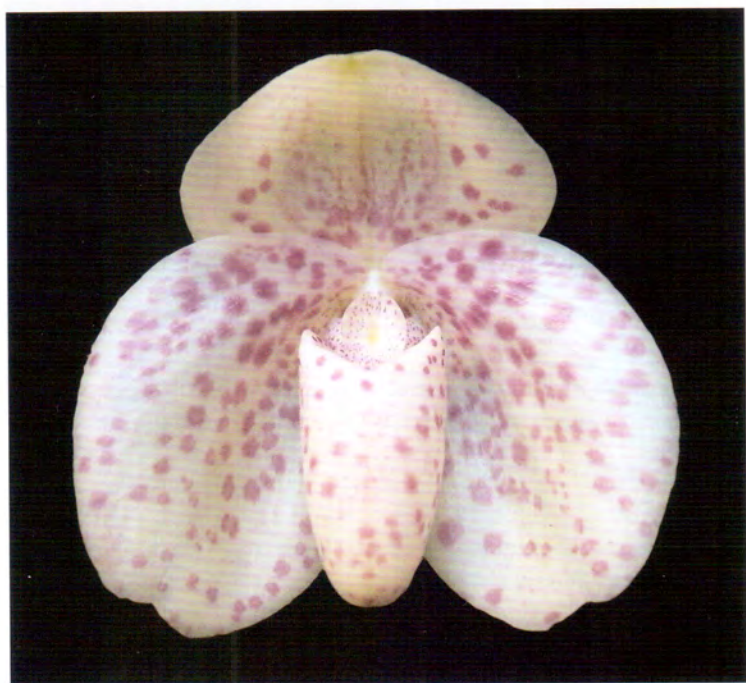
Plants of *Paphiopedilum bellatulum* have been recorded to bloom all year round in cultivation. The main bloom season, however, is from April through July.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Mehlquist, 1947; Duncan, 1947; Duncan & MacLeod, 1948; Kamemoto *et al.*, 1963).



PAPHIOPEDILUM BELLATULUM FMA. ALBUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM BELLATULUM FMA. CHOTEKAE
COURTESY OF MANOTE QUAPHANIT (TROPICAL EXOTIC ORCHIDS)

VARIETIES AND FORMS

A whole series of horticultural varieties of *P. bellatulum* has been reported. Most of these are within the natural variation of the species, and therefore do not warrant status as autonomous taxa. These varieties are often based on single specimens which differ more or less from the nominal form by the production of a two-flowered inflorescence, or by the shape, colour, or speckling of the flower. In some cases, merely 'very beautiful' specimens have been elevated to separate varieties and in at least one case, the description suggests that the plant referred to belonged to the natural hybrid complex between *P. concolor* and *P. bellatulum*.

PAPHIOPEDILUM BELLATULUM FORMA ALBUM

(O'BRIEN) BRAEM IN BRAEM, BAKER & BAKER,

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
1: 97 (1998)

BASIONYM

Paphiopedilum bellatulum album O'Brien

THE GARDENERS' CHRONICLE, 3rd series, 17(442): 748 (1895)

The flower of *P. bellatulum* forma *album* is uniformly white, without any spots. This variety is not particularly rare in nature, and it has been artificially propagated by several growers, so it is no longer a rarity in cultivation. In the March, 1932, issue of THE ORCHID REVIEW, the anonymous author of an article about *P. godefroyae* wrote, "*C. bellatulum album*, the pure white form of the species, and *C. bellatulum* 'Exhim's var.', the most richly spotted one, are both well known in gardens."

PAPHIOPEDILUM BELLATULUM FORMA CHOTEKAE

(L. LINDEN) BRAEM

BASIONYM

Cypripedium bellatulum var. *chotekae* L. Linden

LINDENIA, 14: 85-86, t. 665 (1899)

Paphiopedilum bellatulum forma *chotekae* differs from the nominal form by its clear red spotting of the flower. It is dedicated to Countess Chotek (probably Marie-Henriette Chotek [Mária Henrieta Choteková] 1863-1946) who was a keen gardener.



TOP:

PAPHIOPEDILUM CONCOLOR

COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

BOTTOM:

PAPHIOPEDILUM CONCOLOR

WATERCOLOUR PAINTING BY ELISABETH RACHEL SAETOPO

COURTESY OF ELISABETH RACHEL SAETOPO

PAPHIOPEDILUM CONCOLOR

(BATEMAN) PFITZER

ENGELER & PRANTL, DIE NATÜRLICHEN PFLANZENFAMILIEN, II, (6): 84 (1888)

BASIONYM

Cypripedium concolor Bateman

CURTIS'S BOTANICAL MAGAZINE, 91, t. 5513 (1865)

SYNONYMS

Cordula concolor (Bateman) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Cypripedium concolor Lindley

THE GARDENERS' CHRONICLE, 1st. series, 25: 318 (1865), *nomen nudum*

Cypripedium tonkinense Linden

LINDENIA, 2: 61-62, t. 77 (1886)

ETYMOLOGY

Named *concolor* referring to the uniform ground colour of the flower.

DISCUSSION

This unmistakable species is unique in flower shape and colour. It was discovered in 1859 by the Anglican minister Charles Samuel Pollock Parish (1822-1897) on limestone formations near Moulmein, Tenasserim Province, in Myanmar (formerly Burma). Parish, who was one of the most ardent and meticulous orchid collectors, sent a jotting of his discovery to William Jackson Hooker, who, at that time, was the director of the Royal Botanic Gardens at Kew, England.

Reverend Parish sent the first living plants to the nursery of Messrs. Low & Son in England. At about the same time, plants were sent to Kew by an English army officer named Benson, who collected them from the same site as the Parish specimens.

In the spring of 1865, a plant from Parish's original collection flowered in the famous Rucker collection. It was exhibited on April 4th of that year at the fortnightly meeting of the Royal Horticultural Society. A report of that meeting, probably prepared by John Lindley, was published April 8th in THE GARDENERS' CHRONICLE. The report noted (page 318):

"Mr. Bateman then directed attention to three kinds of *Cypripedium* exhibited. The word has been translated, he observed, by some gallant classic, Venus' Slipper. He hoped that Venus did not, slattern-like, wear her slipper down at the heels; but all the species he had seen seemed to indicate that she did. Thirty years ago he said there were only two *Cypripediums* in the country; now there

are at least 20 distinct species in cultivation, and, judging from specimens in Dr. Lindley's herbarium which he had lately had an opportunity of inspecting, there were many yet to introduce from South America, vieing in beauty with even the very handsomest of those we now possess. *C. hirsutissimum* from Mr. Veitch, and another Bornean species, *C. Lowii*, introduced by Messrs. Low, also shown by Mr. Veitch, came under review, as did also a cream-coloured kind never exhibited before, from Mr. Rucker. This was stated to differ from all tropical *Cypripediums* in colour and beauty of leaves, which are empurpled beneath and charmingly marbled above. The credit of discovering this fine species belongs to Mr. Parish, an Indian missionary, and it was stated that a figure of it would shortly be published in the "BOTANICAL MAGAZINE", under the name of *C. concolor*."

Cribb (1987) credits the description of *P. concolor* to this report by Lindley. However, he reconsidered and followed Braem's interpretation in his 1998 work. In fact, there is no description in Lindley's report except for the statement that the plant has cream-coloured flowers and beautiful leaves. Thus this is a mere mention of a plant by the secretary of the committee.

P. concolor is closely related to *P. bellatulum* and *P. godefroyae* but differs distinctly in the yellow ground colour of its flowers, which are generally covered by minute purple spots. It has relatively narrow petals, a longer and uniquely shaped pouch, and a rather narrow, deltoid, somewhat variable staminode which is usually longer than it is wide.

P. concolor is the second parent of *P. Conco-bellatulum*. For a detailed discussion see under *P. bellatulum*.

DESCRIPTION

Paphiopedilum concolor is an herbaceous plant that grows in leafy debris. Plants are up to 20 cm tall with about five leaves per growth. Leaves are 7 to 15 cm long by 3 to 5 cm wide. They are elliptic-oblong, cut at the apex, and deep green with silvery-green tessellation on the upper surface and more or less intense purple spotting on the underside. The inflorescence, which is up to 12 cm long, is dark brown, villose, and usually bears one or two flowers, rarely more. The ovate floral bracts are only 1 to 2 cm long, which is much shorter than the ovary. Flowers are 5 to 8 cm across, cream-yellow and more or less intensely speckled with purple. The spots are most numerous on the basal parts of the perianth. The ovate dorsal sepal is about 2.8 cm long by 2.0 to 2.4 cm wide and acute. The synsepal, which is similar to but narrower than the dorsal sepal, is only about 1.8 to 2.0 cm long. Petals are broadly elliptical to elongated-oval, subobtusely rounded at the apex, and about 3 cm long by 1.6 to 1.8 cm wide. The margins of the sepals and petals are finely pilose. The lip is about 2.5 cm long by approximately 1.5 cm wide. It is conical, sometimes laterally compressed, and has a rounded bottom. The shape of the staminodal plate is highly variable, usually rather heart-shaped. It is yellow with purple spots and has a darker yellow area in the middle.

DISTRIBUTION AND HABITAT

Paphiopedilum concolor grows in Myanmar, Thailand, Cambodia, Laos, Vietnam, and Yunnan, Guizhou and Guangxi in southern China. Plants are found at 90 to 1,000 m on limestone rocks near the ocean or along streams. They most often are found in clefts or fissures where water seeps. Plants normally grow in bright, indirect sunlight with their roots in moss or leafy humus. Fowlie (1977) reports that in southeast Thailand and Cambodia, *P. concolor* grows in low-nutrient sandy soil near sea level and may be flushed by calcareous water during the monsoon season.

FLOWERING

Plants of *Paphiopedilum concolor* have been reported to bloom all year round. The main flowering season, however, is from May through September.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan & MacLeod, 1948; Kamemoto *et al.*, 1963; Karasawa, 1979, Karasawa, 1986).

VARIETIES AND FORMS

Paphiopedilum concolor varies considerably, as do all members of the subgenus *Brachypetalum*. Throughout the years, numerous varieties have been described, usually under the old generic designation 'Cypripedium'. With the exception of the variety *longipetalum*, originally described by Rolfe, and the pure white form, however, none of these subspecies or varieties differs sufficiently from the nominal form to warrant autonomous status. The variety *longipetalum* was recently described as an autonomous species with the name *Paphiopedilum josianae*, and is treated as such.

Paphiopedilum concolor var. *trungkienii* Averyanov *et al.* (2017) was described on the basis of a single plant in cultivation in Vietnam and was said to differ from the nominal species by its irregular red spotting on the flower and a slight difference in staminode morphology. Beside the fact that form of staminode in *P. concolor* is known to be variable, there is reliable information that the "aberrant" red colouring is due to an unstable mutation, and that such forms have also occurred in at least two other collections. Notwithstanding the fact that the plant has recently been republished as an autonomous species (*Paphiopedilum trungkienii*) by Gruß *et al.* (2020), we do not wish to include it here until further data becomes available that may clarify the correct identity of this plant.

PAPHIOPEDILUM CONCOLOR FORMA ALBUM

(BRAEM) BRAEM IN BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
1: 101 (1998)

SYNONYM

Paphiopedilum concolor var. *album* Braem

PAPHIOPEDILUM, 51 (1988), *nomen nudum*

Flowers are uniformly yellow without any red pigmentation. In all other respects, the plants are identical with those of the normal (coloured) variety.



PAPHIOPEDILUM CONCOLOR FMA. ALBUM

COURTESY OF JERRY LEE FISHER (ORCHIDS LIMITED)

PAPHIOPEDILUM JOSIANAE

BRAEM & NIMPOONSRI

RICHARDIANA, 14: 185-190 (MAY 2014)

BASIONYM

Cypripedium concolor var. *longipetalum* Rolfe

THE ORCHID REVIEW, 4: 54 (1896)

SYNONYMS

Paphiopedilum concolor var. *longipetalum* (Rolfe) Pfitzer

A. Engler, DAS PFLANZENREICH, IV, 50, Heft 12: 57 (1903)

Paphiopedilum concolor var. *longipetalum* Gräß & Iamwiriakul

DIE ORCHIDEEN, 57(1): 70-72 (2006) [*nomen superfluum*]

ETYMOLOGY

Named *josianae* in honour of Mrs. Josiane Guiard of Voreppe, France.

DISCUSSION

In 1896, the famous Robert Alan Rolfe (1855-1921) described a new plant as *Cypripedium concolor* var. *longipetalum* in volume 4 of THE ORCHID REVIEW (Rolfe 1896). Rolfe recognised that the plant, collected in 1894, was related to *Paphiopedilum concolor*, but reported that it was “remarkably distinct in shape”. Whereas the variety was included in F. Desbois’s monograph of all slipper orchids (Desbois 1898), two years later little was heard of this member of the genus for more than a century.

A few years ago, the plant appeared again on the markets of Asia, and the plants available at this time were collected near the border of Myanmar and Thailand in the area referred to as the Tanintharyi Division (formerly Tenasserim). Olaf Gräß and Prapanth Iamwiriakul transferred the taxon to the genus *Paphiopedilum* (Gräß & Iamwiriakul 2006), overlooking the fact that this had already been done by the German botanist Ernst Pfitzer in A. Engler, DAS PFLANZENREICH (*loc. cit.*).

Recently, enough information was made available for a critical review of the taxon, and the conclusion was reached that the population of this taxon in the wild is quite variable in respect to flower morphology. Although it is evident that the plant is closely related to *Paphiopedilum concolor* (Bateman) Pfitzer, the differences between *P. concolor* and its ‘variety *longipetalum*’ are at least as distinct as those between the generally recognised species pairs *P. anitum* / *P. adductum*, *P. lynnianae* / *P. lowii*, *P. parishii* / *P. dianthum*, *P. philippinense* / *P. roebbelianii*, *P. godefroyae* / *P. leucochilum*, and others. For that reason *P. concolor* var. *longipetalum* was elevated to the species level by Braem & Nimpoonsri (*loc. cit.*).



PAPHIOPEDILUM JOSIANAE

COURTESY OF DR. KAMPANART NIMPOONSRI

DESCRIPTION

Paphiopedilum josianae is an herbaceous plant, generally growing in pockets of decaying vegetable matter on calcareous rock. Its leaves are elliptic to narrowly elliptic, up to 15 cm long by 2.5 to 3.5 cm wide. They are tessellated dark and whitish green, obtuse and bifid at the apex, densely spotted purple on the underside, giving that surface an almost uniformly purple appearance. The inflorescence is up to 8 cm high and generally carries a single flower. Pedicel, flower bract, and ovary are green, spotted purple, and hirsute. The pedicel is 2.5 to 4.5 cm long, the flower bract is approximately 2 cm long, and the ovary is about 3.2 cm long. Overall, the flower is 6 to 7.3 cm across, dark cream, spotted purple on petals, sepals and pouch. On the inner surface of the dorsal sepal and petals there is a distinct, dense midline formed by the purple spotting. The spotting on the flower varies greatly, but the dense midline is always present. The dorsal sepal is up to 4 cm long by 1.5 to 2.3 cm wide, oval. The synsepal is up to 3.7 cm long and equally oval. The petals are narrowly elliptic to elliptic, 4 to 5 cm long by 1 to 1.7 cm wide, pendulous to nearly spreading horizontally, but in most specimens hitherto seen, the petals are spreading at an angle of about 45 degrees to the vertical axis of the flower. The labellum is conical, shaped like an elongated slipper, deeply saccate, more or less pointed, overall to 3.5 cm long by 1.3 to 1.6 cm wide. The staminode is heart-shaped with a pointed apex, and the bilobed upper part thickened with a distinct center cleavage, 8 to 9 mm long by 7.5 to 8.5 mm wide, light ochre.

DISTRIBUTION AND HABITAT

Hitherto known from the border region between Myanmar and Thailand. Plants normally grow in bright, indirect sunlight with their roots in moss or leafy humus.

FLOWERING

Plants of *Paphiopedilum josianae* are known to flower from April through September.



PAPHIOPEDILUM MYANMARICUM
COURTESY OF PER KRAUSE HANSEN

PAPHIOPEDILUM MYANMARICUM

KOPOWITZ, IAWIRIYAKUL & LAOHAPATCHARIN

PHYTOTAXA: 324(1): 97-100 (2017)

ETYMOLOGY

The name *myanmaricum* refers to the country of origin of the holotype.

DISCUSSION

Paphiopedilum myanmaricum belongs to subgenus *Brachypetalum* and is obviously closely related to *Paphiopedilum concolor* and *P. godefroyae*. Although we do not wish to exclude the possibility of *P. myanmaricum* being a variety or a hybrid of *P. godefroyae*, we have chosen to treat this entity as an autonomous species until further data becomes available.

DESCRIPTION

Paphiopedilum myanmaricum is an herbaceous plant growing on the forest floor with its roots embedded in leafy humus and mosses. The stems are short and compressed, and the growths are clustered. Each growth has 4 to 6 leaves that are short, smooth and linear to oblong. They are up to 12.5 cm long by up to 3 cm wide with a rounded apex. Their upper side is variously tessellated, and the underside is spotted purple, and distinctly keeled along the mid-line. The basal margins are ciliate. The inflorescence is pendent and usually generates a single flower. The peduncle is up to about 4 cm tall by 4 mm wide, covered by whitish or purple soft hairs. The bract is 1.6 to 2.3 cm long by 0.8 to 1 cm wide. The hairy ovary is 3 cm long by 5 to 5.5 mm wide. The flower is up to 8 cm wide and 6.3 to 9.2 cm from the tip of the dorsal to the apex of the pouch. The dorsal sepal is broadly elliptical, 3.3 to 4.2 cm tall by 3.7 to 4.2 cm wide, yellow with 10 to 12 narrow maroon stripes starting at the base and extending toward the apex with some maroon spots dispersed on the background. The synsepal is ovate to broadly transverse ovate, pale yellow, longitudinally striped with maroon spots. It is 3 to 4.3 cm long by about 3.5 cm wide. The lateral petals are elliptic to obovate, 5.1 to 6.8 cm long by about 2.9 cm wide. They are pale yellow, densely overlaid by small irregularly-shaped maroon spots forming 6 to 8 longitudinal rows with additional spots in between. The petal tips are broadly rounded, retuse and sometimes reflexed. The ovoid labellum is 3.5 to 3.8 cm tall by 2.7 to 2.9 cm wide. Its margins are incurved. The labellum is narrow with a rounded apex, yellow, uniformly covered with small, round, maroon spots on the inside as well as on the outside. The staminode is about 1 cm tall long by 0.8 to 1 cm wide, rhombic with an acute apex. It is yellowish-white, heavily spotted in maroon, with a shallow, white central furrow.

DISTRIBUTION AND HABITAT

Hitherto known from Myanmar only. The holotype was collected east of Myeik City, in the Tanintharyi Division of southern Myanmar. The plants grow in primary evergreen forest and scrub on very steep slopes on a limestone substrate.

FLOWERING

In its natural habitat, *Paphiopedilum myanmaricum* flowers in March and April.

PAPHIOPEDILUM GODEFROYAE

(GODEFROY-LEBEUF) STEIN

STEIN'S ORCHIDEENBUCH, 468 (1892)

BASIONYM

Cypripedium godefroyae Godefroy-Lebeuf

L'ORCHIDOPHILE, 830 (1883)

SYNONYMS

Cordula godefroyae (Godefroy-Lebeuf) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Cypripedium concolor var. *godefroyae* (Godefroy-Lebeuf) Collett & Hemsley

JOURNAL OF THE LINNEAN SOCIETY, 28: 135 (1891)

ETYMOLOGY

Named *godefroyae* in honour of Mrs. Godefroy-Lebeuf.

DISCUSSION

Paphiopedilum godefroyae was introduced into European cultivation by the French nurseryman Godefroy-Lebeuf. According to his own account, Godefroy-Lebeuf (1883) expected to receive plants from his collector Murton, who had brought them from Thailand to Singapore. Before the transaction was completed, however, Murton passed away and the plants ended up in the care of Mr. Alabaster, who was in charge of the Bangkok public gardens. Mr. Alabaster was instructed to forward the plants to France, but he also fell ill, and the plants, thus without care, perished. Upon recovering, Alabaster left for Thailand to make a new collection. The majority of plants from this collection, after an odyssey of six months, reached Godefroy-Lebeuf in 'satisfactory' condition.

Godefroy-Lebeuf named the taxon in honour of his wife and sent material to H. G. Reichenbach in Hamburg. Alabaster also sent materials to the Royal Botanic Gardens at Kew, and a plant from this shipment was used for the illustration in CURTIS'S BOTANICAL MAGAZINE (t. 6876) in 1885.

The stock obtained by Godefroy-Lebeuf was subsequently sold to Messrs. Veitch & Sons of Chelsea, England.

Veitch (1889) reported that plants had been collected "on the cliff of a limestone island near the Birds-Nest Islands of Champon" [meaning the Birdsnest Islands near Chumphon] where they grew "facing the mainland west, and none on the east side of the island."

In 1898 and 1903, Rolfe suggested that *P. godefroyae* represents a hybrid of *P. bellatulum* with *P. concolor* or with *P. niveum*. It is now known that this is not the case. The artificial hybrids made by crossing *P. niveum* with *P. bellatulum* (registered as *P. Psyche* by



TOP:
PAPHIOPEDILUM GODEFROYAE
 COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

BOTTOM:
PAPHIOPEDILUM GODEFROYAE
 WATERCOLOUR PAINTING BY KARYONO APIC
 COURTESY OF KARYONO APIC

C. Winn in 1893) as well as the cross between *P. concolor* and *P. bellatulum* (registered as *P. Conco-bellatulum* by Heath & Son in 1891) are now well-known and they most definitely are not identical with *P. godefroyae* (Godefroy-Lebeuf) Stein or the plant described as *C. godefroyae* var. *leucochilum* by Rolfe in 1894.

It has also been suggested (Seidenfaden, 1972), that *P. godefroyae* could be a hybrid between *P. concolor* and *P. niveum*. Such a hybrid was registered as *P. Doctor Jack* by R. W. Cryder in 1975. Different hybrids are illustrated under that designation on various websites, but none of the plants depicted can be considered identical to *P. godefroyae*.

P. godefroyae is extremely variable in flower colour, flower size, as well as in other aspects. It remains, therefore, a taxonomically difficult entity.

PAPHIOPEDILUM LEUCOCHILUM

All authors, with the exception of Fowlie, consider *P. leucochilum* to be a variety of *P. godefroyae* and we see no reason to treat the plant in any other way. Unfortunately, Cribb (1987: 81; 1998: 117) added considerably to the taxonomic confusion by erroneously stating: "furthermore, the type of *C. godefroyae* was described as having a pure white lip". De facto, the lip of the type of *P. godefroyae* was described by Godefroy as follows (our translation from the French original):

"On the inside, the pouch is covered with nice chocolate-brown dots, on the outside with brighter spots, whereby their number diminishes near the top."

PAPHIOPEDILUM 'X ANG THONG'

Fowlie considered *P. x ang-thong* to be identical with *P. godefroyae* in 1975, but described the taxon as a natural hybrid between *P. godefroyae* and *P. niveum* two years later. This latter view is also taken by the Orchid Registrar of the British Royal Horticultural Society who considers *Paphiopedilum x ang-thong* to be identical with the artificial hybrid between the two species named. This artificial hybrid is known as *P. Greyi* and was registered by Corning in 1888.

Cribb (1987, 1998) rejects the idea that the plants from the Ang Thong Islands are natural hybrids and considers them identical with *P. godefroyae*.

DESCRIPTION

Paphiopedilum godefroyae is a small plant, about 15 cm tall. It is an herbaceous perennial that usually grows in leafy debris on the top of limestone rocks. The leaves are linear-oblong and measure up to 18 cm long by about 4 cm wide. They are deep green, more or less tessellate with pale green above, and densely spotted with deep purple on the underside. The inflorescence is 3 to 10 cm long, pale green spotted with purple, thickly and evenly covered with short, more or less appressed, matted hairs. It carries one or two flowers. The bract is about 1/3 the length of the ovary. Flowers are 5 to 7 cm across, white to pale yellow, spotted with magenta-purple, and obscurely pubescent.

The dorsal sepal is broadly ovate to sub-orbicular, up to 2.5 cm long by about 3 cm across, and keeled on the back. The much smaller synsepal is elliptic-oblong and about 2 cm long. Petals are elliptic-oblong, broad and reflexed as in *P. concolor*, and are up to 3.5 cm long by about 3 cm wide. The lip is sub-cylindrical, up to 3 cm long by about 1.5 cm across, and often minutely spotted with magenta-purple. The variety *leucochilum* is characterised by an unspotted pouch. The staminodal plate is highly variable, and more or less round-oblong, with one to three small teeth at the lower part. It is minutely spotted like the lip and has a yellow stain in the centre.

DISTRIBUTION AND HABITAT

Paphiopedilum godefroyae is found on islands in the Gulf of Krabi-Phuket on the west coast of peninsular Thailand and on the Birdsnest Islands in the Gulf of Thailand off the peninsula's east coast. Plants grow on limestone cliffs, usually less than 15 m above sea level. They are most often found in hollows and crevices in the limestone which are filled with humus and leaf litter, but some plants grow on ledges with their roots embedded in deep humus. Plants occasionally grow in moss on tree roots. On the Birdsnest Islands, this orchid grows only on the west side of the islands, while plants on islands in the Gulf of Krabi-Phuket are usually found on the north side of the islands (Fowlie, personal communication). In both instances, plants grow where they are shaded from direct sunlight for most of the day.



PAPHIOPEDILUM GODEFROYAE VAR. *LEUCOCHILUM*

COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

FLOWERING

Plants of *Paphiopedilum godefroyae* have been reported to bloom nearly all year round. The main flowering season, however, is from June through September.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ as published by Kamemoto *et al.* in 1963.

VARIETIES AND FORMS

PAPHIOPEDILUM GODEFROYAE VAR. LEUCOCHILUM

(ROLFE) HALLIER FIL.

ANNALES DU JARDIN BOTANIQUE DE BUITENZORG, 14: 18-52 (1897)

SYNONYMS

Cypripedium godefroyae var. *leucochilum* Rolfe

THE ORCHID REVIEW, 2: 145-146 (1894 [May issue]); and Masters

THE GARDENERS' CHRONICLE, 3rd series, 15(389): 717 (1894 [June 9th])

Paphiopedilum leucochilum (Rolfe) Fowlie

ORCHID DIGEST, 39(3): 110-118 (1975)

ETYMOLOGY

Named *leucochilum* for the white, unspotted pouch.

This variety is probably best understood with the help of text from the Masters publication (*loc. cit.*):

"A flower of this handsome and distinct variety is sent by R. I. Measures, Esq., of Camberwell, with the remark that its sepals and petals, in their broadly ovate form and rich maroon-purple markings, resemble more nearly *C. bellatulum*. It indeed goes to prove that it is a very fine line of demarcation which separates some extreme forms of these species. But in the present case the clear creamy-white unspotted face of the labellum is a characteristic feature of this variety. The staminode and the interior of the pouch are profusely spotted with purple, but the prominent part of the lip is altogether unspotted."

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa, 1979).



PAPHIOPEDILUM NIVEUM
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC

PAPHIOPEDILUM NIVEUM

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 478 (1892)

BASIONYM

Cypripedium niveum Reichenbach fil.

THE GARDENERS' CHRONICLE, 1st series, 29(40): 1038 (1869)

SYNONYMS

Cordula nivea (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Cypripedium concolor var. *niveum* Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 19(471): 16 (1883)

ETYMOLOGY

Named *niveum* for the snow-white flower colour.

DISCUSSION

The first plants of this species that reached Europe were erroneously thought to have been collected near Moulmein in southern Myanmar (formerly Burma). Adolphus Kent (in Veitch, 1889) writes:

"The first appearance of *Cypripedium niveum* in this country was an agreeable surprise. In 1868 we received from Moulmein a consignment of plants of a *Cypripedium* supposed to be *C. concolor*, but which, on flowering in the spring of the following year, proved to be the beautiful species described above."

Kent (*loc. cit.*) also realised that the plants could not have originated from the Moulmein District and assumed that they were collected in the Langkawi (Langkavi) Islands and states that the species had also been collected there by Förstermann for Veitch's competitor, the orchid nursery Sander & Co.

Hooker fil. (1871), in his description of the species for CURTIS'S BOTANICAL MAGAZINE, writes:

"*C. niveum* is a native of the Tambelan Islands, a small group midway between Singapore and the coast of Borneo; whence, Mr. Bull informs me, he first imported it in 1870; adding, that he had since received it from the West Coast of Siam."

Seidenfaden (1972) reported finding *P. niveum* in peninsular Thailand near Satun, which is across the strait from Langkawi Island, as well as near Trang, which is further north. From the latter location, he also reports finding a plant "without any trace of dots".



PAPHIOPEDILUM NIVEUM

COURTESY OF DOROTHY POTTER BARNETT

DESCRIPTION

Paphiopedilum niveum is a small herbaceous plant that rarely grows much taller than 25 cm. It grows as a humus epiphyte in leaf-mould. Leaves are elliptic and up to 15 cm long by 2.7 to 3.5 cm wide. They are dark green, mottled with greyish green on the upper surface, and the under surface is spotted with purple. The erect inflorescence is up to 17 cm tall and bears one or two flowers which are about 8 cm across. The white flowers almost always have small purple spots on the basal parts of the petals and dorsal sepal, but flowers without the spots have been reported. The dorsal sepal, which is up to 2.6 to 4.2 cm long by 3 to 5 cm wide, is very broadly ovate, spreading, and concave. The backside is keeled and stained with reddish purple. The synsepal is ovate, concave, 2 to 3 cm long by 1.5 to 3 cm wide. Petals are spreading, slightly deflexed, and obtuse. They are elliptic, rounded, 3.3 to 4.4 cm long by 2.2 to 4 cm wide. The lip is rather small and its main lobe is formed into an ovoid pouch with a contracted mouth, which is nearly



PAPHIOPEDILUM NIVEUM AS *CYPRIPEDIUM NIVEUM*

PLATE 28 OF S. JENNINGS'S ORCHIDS AND HOW TO GROW THEM IN INDIA AND OTHER TROPICAL CLIMATES (1875)

PAINTING BY FREDERICK WILLIAM THOMAS BURBIDGE

covered by the column and staminode, and margins that are curved to the inside. Overall, the lip is 2.2 to 3.8 cm long by 1.5 to 1.8 cm wide. The highly variable staminodal plate is yellow with a white border, keeled in the middle, and more or less elliptic to nearly kidney-shaped. It is always broader than long and has one to three teeth at the apex. It is 6 to 9 mm long by 10 to 12 mm wide.

DISTRIBUTION AND HABITAT

Paphiopedilum niveum is found in a narrow zone on the Malayan Peninsula near the border between Malaysia and Thailand. Plants also grow on the small limestone islands south of the main island in the Langkawi group, which is just off the west coast of the peninsula habitat, and have been reported from the Tambelan Islands and mainland Thailand. *P. niveum* grows at 10 to 60 metres above sea level on north or northwest-facing cliffs in locations where it is protected from direct sun but receives bright, reflected light from the sea. Plants are found on limestone rocks in moss, in humus-filled cracks, or on moss-covered tree roots.

FLOWERING

Just as all other species of subgenus *Brachypetalum*, *P. niveum* is reported to have bloomed all year round. The main flowering season is from April through July.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Mehlquist, 1947; Duncan, 1947; Duncan & MacLeod, 1948; Kamemoto *et al.*, 1963, Karasawa, 1979).

VARIETIES AND FORMS

PAPHIOPEDILUM NIVEUM FORMA ALBUM

(BALLIF) GRUSS

CAESIANA, NO.14: 57-65 (1999)

BASIONYM

Cypripedium niveum var. *album* Ballif

LINDENIA, 3: 90 (1888 [not 1887 as generally indicated])

This is the only variety of *P. niveum* deserving separate status. The first mention of an albino of *P. niveum* appeared in the 3rd volume of the LINDENIA. The plants of this colour variant differ from the nominal form in that their flowers are devoid of any spots and thus are pure white, except for a yellow spot on the upper part of the staminodal shield. *Paphiopedilum niveum* forma *album* is a very common albino.

PAPHIOPEDILUM THAIANUM

IAMWIRIAKUL

THE ORCHID REVIEW, 114(1271): 278-281 (2006)

ETYMOLOGY

Paphiopedilum thaianum was named for its country of origin.

DISCUSSION

Paphiopedilum thaianum was discovered in cultivation by the orchid grower and amateur botanist Prapanth Iamwiriakul. At first sight, the plants look very much like a miniature edition of the well-known *P. niveum*, and indeed, the environmental conditions in which the new taxon has been found in the wild do indicate that *P. thaianum* has arisen as a variety of *P. niveum*. However, population ecology shows that the two entities can be well separated from each other. Nevertheless, we are aware that other interpretations are possible.

The main distinguishing difference between *P. thaianum* and *P. niveum* is size, the former being smaller in all dimensions. Furthermore, the staminode of *P. thaianum* is very broadly or transversely obovate, and has a green centre, and the inflated, globose, thin-textured lip has small green spots on the inside at the back. This smaller flower obviously has smaller passages between the pouch and the column, indicating that the pollinator must be a small insect. This does, however, not prove that the pollinator is different from the insect that pollinates *P. niveum*, as an insect that passed through a tube of 1.5 mm diameter will obviously also pass through a tube of 2.4 mm. In this respect we will have to wait until the pollinator(s) of *P. thaianum* and *P. niveum* become known.

DESCRIPTION

Paphiopedilum thaianum is an herbaceous plant which grows in leaf-mould. The plant produces three to five distichous, narrowly elliptic to strap-shaped leaves that are rounded and minutely tridentate at the apex. They are 3.5 to 9.5 cm long by 1 to 2.5 cm wide. The upper surface is pale green tessellated with very dark green. The underside is heavily spotted purple. The basal margin is ciliate. The inflorescence generally bears a single flower, rarely two, and is 6 to 23 cm long. The peduncle is 4 to 15 cm long, 1.5 to 1.8 mm in diameter, purple, densely covered with short white hairs. The floral bract is conduplicate, ovate, obtuse, and about 7 to 8 mm long by 3.5 to 4 mm wide, pale green, spotted with purple. The ovary is 3.5 to 6.5 cm long, green flushed with purple, and densely covered with short hairs. The flowers are 3.3 to 4.2 cm in diameter, pubescent on the entire outside and on the base of the petals within. The flowers are white, somewhat spotted with purple near the base of the petals and sepals and on the front of the pouch. The inner side of the pouch is, at the back, covered with small purple spots and short hairs. The dorsal sepal is very broadly ovate to nearly round, obtuse, 1.7 to 2.1 cm tall by 1.8 to 2.2 cm wide. The concave synsepal is ovate and obtuse, 1.3 to 1.8 cm long



PAPHIOPEDILUM THAIANUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

by 0.8 to 1.6 cm wide. The petals are elliptic, rounded, 2.2 to 2.6 cm long by about 1.5 cm wide, shortly ciliate at the margins. The lip is trilobed, with the side-lobes incurved to form narrow tubes between pouch and staminode. The main lobe is calceolate and incurved around the aperture, membranous, about 2 cm long by 1 to 1.4 cm wide. The staminode is broadly to transversely obovate, white, with a green to yellowish-green centre, 1 to 3-toothed at the apex, 5.5 to 7.7 mm high by 7.2 to 8.7 mm wide. The pollen masses are viscid.

DISTRIBUTION AND HABITAT

Paphiopedilum thaianum grows in a 2 cm thick layer of humus, in primary tropical rain forest between scrubs on very steep northeast- to northwest-facing slopes and eroded limestone cliffs at elevations of 350 to 450 metres at the south end of the Phuket mountain range. The plants are exposed to partial sunlight during the morning.

The mean annual rainfall in the habitats is 260 to 300 cm. The mean humidity is 81%. The maximum temperature is about 31 degrees centigrade and the minimum temperature is about 21 degrees centigrade. Over the entire day, wind blows and thus assures very good ventilation.

Paphiopedilum thaianum grows in the near vicinity (about 10 metres apart) of *P. exul* and *P. godefroyae* var. *leucochilum* but no natural hybrids have been reported.

FLOWERING

In the wild, *Paphiopedilum thaianum* flowers in April and May.



AN EXTRAORDINARY CLONE OF *PAPHIOPEDILUM CHARLESWORTHII* FROM THE COLLECTION OF DOI TUNG DEVELOPMENT PROJECT OF THE MAE FAH LUANG FOUNDATION.

PHOTOGRAPH COURTESY OF TEERAPHAN TOTERAKUN (NOI DOITUNG) OF PLANTS R & D.

SUBGENUS PAPHIOPEDILUM

SUBGENERIC CHARACTERISTICS

Leaves plain (non-tessellated). Inflorescence with a single flower, rarely two. Pouch ovoid, distinctly pointed (shaped like an inverted helmet), fleshy, with well-developed lateral “ears”. Pollen viscous. Mitotic chromosome count $2n = 26, 30$. Type: *P. insigne*

DISCUSSION

The concept of the subgenus *Paphiopedilum*, as understood in this book, is based on the treatment of Karasawa & Saito (1982). Subgenus *Paphiopedilum*, in accordance with the rules of nomenclature, is an autonym which includes the type species of the genus (*Paphiopedilum insigne*).

Subgenus *Paphiopedilum* is easily recognised and simply comprises the plants of the genus that are characterised by the combination of uniformly coloured, plain green leaves without any tessellation and inflorescences that generally bear a single flower showing well-developed auricles on the upper margin of the lip.

In the treatment of this subgenus, we differ from that of Cribb (1987, 1998). In his subgenus *Paphiopedilum*, Cribb includes the entire genus with the exception of the subgenera *Parvisepalum* and *Brachypetalum*. Thus Cribb's vision of the subgenus *Paphiopedilum* comprises at the same time plants that generate leaves that are uniformly coloured as well as mottled-leaved species; plants that produce single-flowered inflorescences as well as those that are multifloral, no matter whether they generate and open their flowers simultaneously or in a distinct sequence. But as if the obvious and clear-cut differences as shown by morphology and anatomy (that in turn reflect differences at the genetic level) were not enough to prove that such an ‘entity’ is nothing but unnatural chaos, Cribb and his followers combine plants with mitotic chromosome counts anywhere between 26 and 44. And looking at the results of the studies of Cox *et al.* (1997) and Chochai *et al.* (2012), one can - without any difficulty - recognise that the data as presented by said authors does not suggest that the subgenus *Paphiopedilum sensu* Cribb is a natural clade. To the contrary, it shows very clearly that the group of plants forming subgenus *Paphiopedilum sensu* Karasawa & Saito is distinctly different from all other groups within the genus.

As far as the geographic distribution is concerned, this group of taxa is ‘continental.’ None of the species of subgenus *Paphiopedilum* as defined here has been discovered in Borneo, Java, Sumatra, the Philippines, or nearby islands; but they are abundant on the Indo-Malayan continent, India, and adjacent areas.

Within the subgenus *Paphiopedilum*, there are a number of different phyletic lines, which are treated as sections. These sections are distinct from each other by differences in flower morphology.



PAPHIOPEDILUM CHARLESWORTHII
PHOTOGRAPH COURTESY OF PAUL UPWARD

PAPHIOPEDILUM CHARLESWORTHII

(ROLFE) PFITZER

ENGLER, *BOTANISCHE JAHRBÜCHER*, 19: 40 (1894)

BASIONYM

Cypripedium charlesworthii Rolfe

THE ORCHID REVIEW, 1(10): 303 (1893)

SYNONYM

Cordula charlesworthii (Rolfe) Rolfe

THE ORCHID REVIEW, 20(1) (1912)

ETYMOLOGY

Paphiopedilum charlesworthii was named in honour of Joseph Charlesworth (1851-1920), a well-known British nurseryman.

DISCUSSION

Paphiopedilum charlesworthii was discovered in 1893 by R. Moore, a British official and Assistant Superintendent in the Southern Shan States of Burma (now Myanmar), stationed at Fort Steadman on the shores of Lake Inle. He found the plants about 40 km southwest of Lake Inle growing on limestone rock. On one occasion, Moore recorded *Paphiopedilum charlesworthii* growing with *Paphiopedilum bellatulum*.

The species was introduced to Europe by the English nursery Charlesworth, Shuttleworth and Co. and described by Rolfe (*loc. cit.*).

Paphiopedilum charlesworthii is a unique species that cannot be confused with any other taxon: in addition to the fact that its overall flower morphology is quite distinct, it is the only species that has a white, shiny, porcelain-like staminodal shield with a bright yellow umbo in the centre. It is closely related to the plants of the *P. insigne* and *P. villosum* complexes, but the floral morphology and flower colour are quite distinct.

DESCRIPTION

Paphiopedilum charlesworthii is an herbaceous plant that grows in decaying vegetative debris on limestone rock. The leaves are strap-shaped (linear-oblong) with an acute and three-toothed apex, and up to 25 cm long by 2.5 to 3 cm wide. The upper surface is bright shiny green, but the basal portion of the upper surface and the entire under surface are marked with irregular purple-brown blotches and streaks. The inflorescence is up to 15 cm long, covered with reddish spots, downy, and generally bears a single flower. The floral bract is ovate, very obtuse, 2.5 to 3.3 cm long by 1.4 to 2 cm wide, pale green, spotted with chestnut brown. The pedicel and ovary are 2.8 to 4 cm long, pale green, covered with chestnut brown hairs and spotted dark maroon. The flower is up to 8.5 cm across. It is mainly characterised by an enormous dorsal sepal, which is 4.5 to 5.8 cm



PAPHIOPEDILUM CHARLESWORTHII

PHOTOGRAPH COURTESY OF PER KRAUSE HANSEN

long and 4.7 to 6.7 cm wide, broadly ovate to nearly round, the margins spreading or reflexed, white suffused with light, soft rose-purple with more or less distinct crimson-red streaks, the outer surface finely pubescent. The synsepal is much smaller than the dorsal. It is elliptic, sub-acute, 3.8 to 4 cm long by 2 to 3 cm wide, pale yellow, spotted and veined with pale purple, the outside finely pubescent. The petals are spreading, more or less horizontal, somewhat curved to the inside, narrowly spatulate and obtuse, 4 to 5 cm long by 1 to 1.8 cm wide, with ciliate margins. They are coloured maroon-brown. The lip is three-lobed, the lateral lobes curved to the inside. The main lobe is deeply saccate, shaped like an inverted helmet, 3.5 to 4.3 cm long by 2.5 to 3 cm across at the mouth, chestnut brown, very hairy within. The staminodal shield is more or less ovate, somewhat concave at the margins, about 1 cm long and wide, ivory-white to nearly porcelain-white with a curved, pale yellow, hornlike tooth near the middle, glabrous.

DISTRIBUTION AND HABITAT

Paphiopedilum charlesworthii has been collected in the Shan states in Myanmar near the borders with Thailand and China. Moore, the original collector, reported finding plants 40 km southwest and 64 km northeast of Lake Inle. Plants grow on high, steep, isolated peaks, usually on west- or northwest-facing slopes at 1,200 to 1,600 m. They commonly grow in the shade with their roots clinging tenaciously to the rocks, but some are found in more exposed locations with their roots in the crevices of bare rock. Plants are also reported from southwest China.

FLOWERING

Paphiopedilum charlesworthii has been reported to flower all year round with a peak season from August through January. In the natural habitats, the plants flower in autumn.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan, 1947; Duncan & MacLeod, 1949; Karasawa, 1979).

VARIETIES AND FORMS

Paphiopedilum charlesworthii is extremely variable, especially in respect to its overall flower colour and size. Plants from Myanmar generally have much brighter colours than those originating from China. The only variant worthy of a separate taxonomic status is the albino.

PAPHIOPEDILUM CHARLESWORTHII FORMA SANDOWIAE BRAEM

ORCHIDÉES. CULTURE ET PROTECTION, NO. 36: 35-38 (1998)

The albino form of *Paphiopedilum charlesworthii* has been known for quite some time. A plant designated as *Cypripedium* Fred Hardy, and given an Award of Merit by the

Royal Horticultural Society in 1896, was considered a possible albino of *P. charlesworthii* by the unidentified author (probably Rolfe) in THE ORCHID REVIEW for 1897. The description, however, states that the flower has a "little purple stain" at the base of the dorsal, a feature ruling out albino status.

O'Brien's 1898 description of *Cypripedium crawshawiae* seems to match the albino form of *P. charlesworthii*, but his description is not complete in many respects and therefore cannot be evaluated conclusively. The same must be said about *C. charlesworthii* Bromilowianum which received a First Class Certificate at the Royal Horticultural Society in October of 1908.

Paphiopedilum charlesworthii forma *sadowiae* was named for Mrs. Helen Sadow of Miami, Florida. The plant corresponds to the 'normal' *Paphiopedilum charlesworthii* in its overall appearance. Some characteristics, however, make it quite distinct. The leaves are bright green above and entirely greyish-green beneath without any purple markings. The flower stalk is pale green and hairy. The flower is variable in size, sometimes larger than in the type. The dorsal sepal is pure white, sometimes with a pale greenish blotch at the base. The synsepal, petals, and lip are uniformly bright yellowish-green. The staminode is pure white with a small yellowish umbo in the middle of the plate.

PAPHIOPEDILUM HENRYANUM

BRAEM

SCHLECHTERIANA, FASCICLE 1: 3-6 (1987)

SYNONYMS

Paphiopedilum dollii Lückel

DIE ORCHIDEE, 33(5): 266-268 (1987)

Paphiopedilum chaoi Hua

DIE ORCHIDEE, 50(5): 495 (1999)

Paphiopedilum notatisepalum Z.J. Liu, M. Wang & S.R. Lan

PHYTOTAYA, 302 (2): 156-164 (2017)

Paphiopedilum erythroanthum X.Y. Liao, D-Y Zhang, S.R. Lan & Z.J. Liu

PHYTOTAYA, 406(5): 271-278 (2019)

ETYMOLOGY

Paphiopedilum henryanum was named in honour of Mr. Henry Azadehdel, who introduced the species to cultivation and made the plants available for scientific study.

DISCUSSION

Paphiopedilum henryanum is one of those rare cases where taxonomy is no problem. The species is so distinct from everything else that it cannot be confused. At the time of its description, it was the only *Paphiopedilum* species with a deep rose to pink pouch within the single-flowered groups of the genus. The overall flower morphology and the distinct shape of the staminodal shield add to its uniqueness.

P. henryanum is closely related to *P. insigne* as shown by the very similar karyotypes (Karasawa & Aoyama, 1988).

Paphiopedilum dollii, *P. chaoi*, as well as *P. notatisepalum* and *P. erythroanthum* are later descriptions of the same species.

DESCRIPTION

Paphiopedilum henryanum is an herbaceous humus epiphyte forming small colonies. The plants attain an overall width of about 35 cm when measured from leaf tip to leaf tip. The overall height, including the inflorescence, can be up to 20 cm. Each growth carries up to five leaves. The leaves are 1.2 to 1.6 cm wide and up to 17 cm long. The upper surface is uniformly dark green. The underside is usually bright green, but it sometimes has a light purple hue at the base. The leaves are linear ligulate, more or less rounded at the apex, and distinctly keeled underneath. The inflorescence is up to 16 cm high, erect, terete, green, thickly covered by brown to purple hairs, and generally bears a single flower. The bright green floral bract is 2 to 3.6 cm long by 0.6 to 2 cm wide, acuminate. Its base is covered with purple. The ovary is up to 4 cm long and



PAPHIOPEDILUM HENRYANUM
WATERCOLOUR PAINTING BY HERVINA APRILIA
COURTESY OF HERVINA APRILIA



PAPHIOPEDILUM HENRYANUM

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON

approximately 8 mm wide, yellowish-green, and also densely covered with hairs. Generally, the flower is up to about 4.5 cm long by 5 cm wide when measured across the petals on a live blossom in its natural state. Exceptionally well-cultivated specimens can produce larger flowers. The dorsal sepal is about 3.4 cm long and almost as wide. It is sub-orbicular when spread, has at the top a small acute tip, and bends over the opening of the labellum. The centre part is concave and prominently keeled on the back. It is whitish to cream-yellow and covered with large, irregular, brown-purple spots. The margins are slightly undulate, and the basal parts very often bent backward. The inside is glabrous, the outside is densely hairy, and the margins are ciliate. The lateral sepals are (as is typical for the genus *Paphiopedilum*) united into a synsepal. This is about 2.7 cm long by about 1.6 cm wide, smooth on the inside and densely pilose on the outside. The margins are ciliate. The synsepal is whitish to yellowish and sometimes indistinctly spotted. The petals are about 3.6 cm long by approximately 1.6 cm wide, narrowly ovate to broadly elliptic, more or less rounded at the apex, and the margins are distinctly undulate and ciliate. Their internal as well as their external surfaces are glabrous. The petals, which are more or less horizontally spreading and somewhat bent toward the inside, are deep rose with a narrow cream-coloured margin. Their basal parts are spotted with brown-purple. The labellum is trilobate and overall is up to 4.2 cm long by about 2 cm wide by up to 2.5 cm deep. The lateral lobes are folded inward, forming a nearly closed tube. The main lobe is shaped like an inverted helmet with well-developed lateral ears at the aperture. It is about 3 cm long by 2 cm wide. The apex is rounded. The aperture is about 2 cm wide with borders that are distinctly directed outward. The main lobe (pouch) is deep rose with a yellow-brown rim around the aperture. The labellum is glabrous on the outside, but the rear and bottom parts of the inside wall of the main lobe are densely covered with stiff bristles. The staminodal shield is obcordate, about 7 mm high, and slightly wider at the lower margin. It is bright yellowish-green with a prominent, blunt, sulphureous tooth at the centre.

DISTRIBUTION AND HABITAT

Southwest China. Plants are found near the village of Napo in western Guangxi Province, not far from the borders with Yunnan Province and northern Vietnam. Plants usually grow at 600 to 900 m. Emerson Charles (personal communication) reported that *Paphiopedilum henryanum* grew on the opposite creek bank from a colony of *Paphiopedilum emersonii*.

FLOWERING

Paphiopedilum henryanum generally flowers between November and the end of April. The dates are taken from reports from the natural habitat as well as from information about the flowering of the species in cultivation.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa & Aoyama, 1988).



PAPHIOPEDILUM HENRYANUM – STUDY OF A FLOWER
 WATERCOLOUR PAINTING BY HERVINA APRILIA
 COURTESY OF HERVINA APRILIA



PAPHIOPEDILUM HENRYANUM
COURTESY OF DOROTHY POTTER BARNETT



PAPHIOPEDILUM HENRYANUM AS *PAPHIOPEDILUM NOTATISEPALUM*
COURTESY OF MEINA WANG

VARIETIES AND FORMS

Paphiopedilum henryanum is extremely variable in flower colour.

PAPHIOPEDILUM HENRYANUM FORMA ALBUM

GRUSS

CAESIANA, 18: 41 (2002)

The flower shows no anthocyanin pigmentation, but is by no means pure white as the naming would suggest. The petals and dorsal are yellowish-green, the pouch is white with some yellow at the sides, and the staminode is yellow.

PAPHIOPEDILUM HENRYANUM FORMA CHRISTAE

(BRAEM) BRAEM IN BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
2: 206 (1999)

This variant, named in honour of Mrs. Christa Sang, of Essen, Germany, was originally described as *Paphiopedilum henryanum* var. *christae* in SCHLECHTERIANA, 2(4): 157-162 (1991). Several clones of this form have hitherto been found. The first clone came from the original collection of Henry Azadehdel, and the second one was discovered among a later importation of the species.

Paphiopedilum henryanum forma *christae* does not differ from the type in any of its vegetative parts or in the form of any of the flower segments. However, the flower colour is completely different. The dorsal sepal is light apple-green. Its basal area is slightly and irregularly covered with small, deep purple-violet spots. The ground colour of the synsepal and the petals is the same as that of the dorsal sepal. The inner surface of the petals is sparsely covered with small, deep purple-violet spots. The labellum is light purple-violet with a few widely scattered darker spots or streaks. This variant has been referred to as an albino. In view of the purple spots all over the flower, such interpretation seems rather strange.

PAPHIOPEDILUM HERRMANNII

FUCHS & REISINGER

LINZER BIOLOGISCHE BEITRÄGE, 27(2): 1213-1215 (1995)

ETYMOLOGY

Paphiopedilum herrmannii was named in honour of the late Mr. Rolf Herrmann, an amateur orchid grower in Neuss, Germany.

DISCUSSION

This taxon is based on a plant that was found among a batch of plants labelled as *Paphiopedilum esquirolei* at the Municipal Botanic Gardens of Linz, Austria. The plants were reportedly collected in Vietnam by Czech botanists in 1985. This new species certainly belongs in section *Paphiopedilum* (single-flowered inflorescence, plain, unmottled leaves) and, although the original authors place it next to *P. henryanum*, the affinity with *P. insigne* seems to be even more evident. In fact, the overall flower form and the staminodal plate are very similar to the analogous characters found in *P. insigne*, whereas the affinity to *P. henryanum* is merely indicated by the colour of the lip. In the past, there was a tendency to consider *P. herrmannii* as a hybrid between *P. henryanum* and a member of the *P. insigne* complex. We have studied a considerable number of wild-collected plants of *P. herrmannii*. The results of this study do indeed indicate that *P. herrmannii* has fairly recently developed as a natural hybrid. Although there is little or no variation in the leaf morphology, the flowers differ to a large extent with variation in nearly all flower parts. Most distinct are the colour variation on the marginal area of the dorsal sepal, the difference in staminodal shape, and the colour of the protuberance on the shield. Obviously, the population of *P. herrmannii* has stabilised; the best indication of this is the relatively large numbers available on the markets of Vietnam. Cribb (1998) considers *P. herrmannii* to be a hybrid between *P. barbigerum* and *P. hirsutissimum* var. *esquirolei* (*P. esquirolei*) without giving any evidence. Averyanov *et al.* (2003) consider *P. herrmannii* to be “a natural hybrid of *P. hirsutissimum* and another slipper species of the *P. insigne* complex, most probably *P. helenae*”. This guess is again based on nothing but the circumstantial evidence that plants of *P. herrmannii* were found “growing between colonies of *P. hirsutissimum* var. *esquirolei* and *P. helenae*”. The claim that the plants illustrated as *P. herrmannii* in Braem, Baker and Baker represent hybrids between *P. henryanum* and *P. hirsutissimum* or *P. barbigerum* is nothing but nonsense; all photographs are of plants collected in the wild.

DESCRIPTION

Paphiopedilum herrmannii is an herbaceous humus epiphyte. Plants produce three to five leaves per growth which are uniformly dark green on the upper surface and somewhat lighter green below. The basal portion of the underside is suffused with reddish-brown. The plants are very similar to those of *P. henryanum* in their vegetative characteristics. Leaves are up to 22 cm long by 1.4 to 2.0 cm wide, ligulate, and ciliate

at the basal margins. The inflorescence, which is 13 to 18 cm long and densely covered with hairs, generally carries a single flower. The ovary is 4 to 5 cm long, which is about twice as long as the flower bract. The flower is 6.0 to 6.5 cm wide in natural spread by 6.3 cm high. The dorsal sepal is strongly curved backward at the base, a characteristic cited in the original publication by Fuchs & Reisinger as a factor in differentiating this species from *P. henryanum*. However, this same feature has also been observed in the latter species. The dorsal sepal has a green to white ground colour with a purple suffusion at the base and up the middle. This leaves a margin of variable width which may be green, greenish-yellow, or white, depending on the ground colour. The petals, which have strongly undulate margins, are the same base colour as the dorsal sepal, with a purplish-brown suffusion. The upper half is more darkly coloured than the lower half, with a much darker line along the middle vein. Depending on the degree of suffusion, the flower has a more or less dark appearance. The reddish-brown to pink pouch is shaped like a distinctly pointed inverted helmet. The staminodal shield is yellow, rhomboid, and very similar in shape to the staminodal shield found in the *P. insigne* complex, but smaller. It is about 7 mm across at the bottom, 3 to 4 mm across at the top, and about 6 mm high. The shield is ornamented with a distinct tooth in the middle. This tooth is sometimes yellow, sometimes green.



PAPHIOPEDILUM HERRMANNII

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM HERRMANNII
COURTESY OF PAUL UPWARD

DISTRIBUTION AND HABITAT

Vietnam. *Paphiopedilum herrmannii* grows in the humus-filled cracks and crevices of steep, eroded crystalline limestone rock formations at elevations of 600 to 1,000 m along the Vietnam-China border.

FLOWERING

Paphiopedilum herrmannii flowers between July and September.

VARIETIES AND FORMS

Hitherto none published. *Paphiopedilum herrmannii*, however, is an extremely variable species, and colour variants will most certainly be described.

THE PAPHIOPEDILUM INSIGNE COMPLEX

In this group seven taxa have been described at the species level – *Paphiopedilum insigne*, *P. barbigerum*, *P. helenae*, *P. coccineum*, *P. exul*, *P. vejvarutianum*, and *P. delicatum*.

Paphiopedilum barbigerum is reminiscent of a small *P. insigne*, but it differs from the latter in its very narrow leaves, its very short inflorescence, and a different morphology of the staminodal shield.

Paphiopedilum coccineum is considered a colour variant of *P. barbigerum* by Averyanov *et al.* (2002), but is considered as a valid, autonomous species by others. As the differences between *P. coccineum* and *P. barbigerum* are at least as important as the differences between *P. barbigerum* and *P. helenae*, we have decided to retain it as an independent species in this work.

Paphiopedilum vejvarutianum is a later synonym for *P. barbigerum* and *P. delicatum* is a later synonym for *P. helenae*.

Paphiopedilum exul was originally described as a variety of *P. insigne*. In the meantime, however, there is general agreement that *P. exul* is to be treated as a good autonomous species, and the two taxa are well-differentiated by the relative size of the synsepal and the arching of the leaves, paired with obvious differences in flower colour.

Paphiopedilum helenae has been called “the yellow *barbigerum*”. In fact, *P. helenae* differs from *P. barbigerum* by non-undulate petals and the morphology of the staminodal shield.

Key to the Taxa Belonging to the *Paphiopedilum insigne* Complex

- 1. Dorsal sepal unspotted 2
- 1a. Dorsal sepal spotted 4
- 2. Petals undulate (waved). Staminodal shield obtusely triangular to obcordate 3
- 2a. Petals not undulate. Staminodal shield subcircular *P. helenae*
- 3. Dorsal sepal with a distinct margin *P. coccineum*
- 3a. Dorsal sepal without a distinct margin *P. barbigerum*
- 4. Synsepal distinctly smaller than the dorsal sepal. Leaves of adult plants arching (suberect when juvenile) *P. insigne*
- 4a. Synsepal as large as the dorsal sepal. Leaves suberect *P. exul*



PAPHIOPEDILUM INSIGNE
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM INSIGNE

(WALLICH EX LINDLEY) PFITZER

MORPHOLOGISCHE STUDIEN ÜBER DIE ORCHIDEENBLÜTHE, 11 (1886)

BASIONYM

Cypripedium insigne Wallich ex Lindley

COLLECTANEA BOTANICA, t. 32 (1822)

SYNONYM

Cordula insignis Rafinesque

FLORA TELLURIANA, 4: 46 (1838)

ETYMOLOGY

Named *insigne* to indicate that it is splendid, remarkable, decorative, outstanding, striking (depending on which dictionary of plant names one uses).

DISCUSSION

Paphiopedilum insigne was discovered in Sylhet, a northeastern Indian province by the Danish physician and botanist Nathan Wulff, alias Nathaniel Wallich (1786-1854), who was assistant superintendent (1815-1816) and superintendent (1817-1846) of the Calcutta Botanic Garden. Wallich sent materials to the Liverpool Botanic Garden from where they reached John Lindley via William Cattley. Lindley published the plant in the COLLECTANEA BOTANICA (tab. 32), using a manuscript from Dr. Wallich. Therefore the correct citation for this plant is *C. insigne* Wallich ex Lindley. It is one of the earliest known species of the group "... thus adding a third at least to the curious section of *Cypripedium*" (Lindley, *loc. cit.*). Therefore, it is not surprising that this species is found in the parentage of a multitude of *Paphiopedilum* hybrids, the first of which was described in 1871 as *Cypripedium Ashburtoniae* (*barbatum* x *insigne*). Adolphus H. Kent (in Veitch, 1889) wrote:

"*C. insigne* was the second species of coriaceous *Cypripedium* introduced into European gardens, it having been preceded, by a few months only, by *C. venustum*, and it is a curious fact in the horticultural history of the genus that these two remained the only species of their section known to cultivation for twenty years following their introduction."

And further in his treatment of the species, the same author wrote:

"*Cypripedium insigne* is one of the most useful horticultural plants ever introduced, and at the same time one of the easiest to cultivate."



FLOWER OF *PAPHIOPEDILUM INSIGNE*
COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

DESCRIPTION

Paphiopedilum insigne is an herbaceous plant which grows in decaying vegetable debris. The robust plants generate growths with five or six leaves. The leaves are linear ligulate, obtuse, more or less distinctly notched at the apex, 15 to 40 cm long, uniformly pallid green, suffused brownish-violet near the base on the underside. Leaves are sub-erect in the juvenile state, later becoming somewhat arching. The inflorescence is erect, up to 30 cm long, terete, deep green, and completely covered with short reddish-brown bristles. It generally bears a single flower, rarely two. The laterally compressed bract is about 5.2 cm long, which is somewhat longer than the ovary. The glossy green, varnished-looking flowers are 7 to 12 cm across. The dorsal sepal is broadly ovate, ovate-elliptic or obovate-elliptic, obtuse, and 4.0 to 6.5 cm long by 3.0 to 4.0 cm wide. The margins of the dorsal sepal are slightly revolute and bent forward at the apex. The back is keeled. Its ground colour varies from yellow to yellowish-green to distinctly apple green with white margins. The centre and base are marked with numerous brownish-purple spots, which are more or less regularly arranged along longitudinal green veins. The synsepal is smaller than the dorsal sepal, ovate to elliptic, sub-acute or obtuse, 4.0 to 5.0 cm long by 2.0 to 2.5 cm wide, curved inward toward the apex, less spotted and more brightly coloured than the upper sepal. The petals are spreading, only slightly curved inward, linear-oblong to spatulate, obtuse, distinctly undulate at the margins, pale yellowish-green with brownish-purple longitudinal veins, and about 5.0 to 6.3 cm long by 1.0 to 2.0 cm wide. The lip is shaped like an inverted helmet, about 4.5 to 5.0 cm long by up to 3 cm wide, yellowish-green, and shaded with brown. The lateral lobes are deep tawny-yellow with paler margins, folded inward to form a tube. The staminodal shield is obovate to obcordate, about 1.0 cm long, dull yellow with purple hairs on the surface, and a bright orange-yellow tubercle about one third of the way from the top. The shield has a small, blunt protuberance at the lower end.

DISTRIBUTION AND HABITAT

Northeast India and Bangladesh. *Paphiopedilum insigne* grows in the Khasia Hills of Meghalaya State in India and the Sylhet region of Bangladesh.

Plants usually grow at 1,000 to 1,500 m in the dappled shade of shrubby vegetation. They are often found in the humus-filled crevices and cracks of dolomite limestone outcrops overhanging streams and rivers, frequently near waterfalls.

FLOWERING

Paphiopedilum insigne has been reported to flower all year round. The peak season, however, is from November through February.



PAPHIOPEDILUM INSIGNE F.M.A. SANDERAE
COURTESY OF PAUL UPWARD

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Mehlquist, 1947; Duncan, 1947; Duncan & MacLeod, 1948; Tanaka, 1965; Sasa & Torigata, 1967; Tanaka & Aoyama, 1974; Karasawa, 1979).

The cultivar “Harefield Hall” has a mitotic chromosome count of $2n = 39$ (Karasawa, 1978) indicating that it is a triploid or a hybrid.

VARIETIES AND FORMS

Paphiopedilum insigne is an extremely variable species, and a score of variants have been described, all as members of the genus *Cypripedium*. Desbois (1898) lists 83 “varieties” and omits several more that had been included in Pucci’s work (1891). Each of these “varieties” was based on a single plant of “special value”, meaning that their owner considered them to be special in some way or another.

Most of these “varieties” are based on very minor differences, generally in respect to the coloration and/or size of the flower. Their descriptions (if any) are often confusing and incomplete, and frequently contradictory between authors. In most cases, the designations originated from reports after the exhibition of a specific plant or the showing of an inflorescence at an orchid meeting. Thus the “*insigne*” belonging to Mr. Fraser became “*insigne* var. *Fraseri*”, etc. With the exceptions of “*sanderæ*” and “*sanderianum*”, these so-called varieties cannot be upheld as autonomous taxonomic entities, and it is questionable whether any plant currently being cultivated under any of these designations actually corresponds to any of the original descriptions. In fact, it is probable that all these plants have long since passed into orchid heaven, including the original clones of “*sanderæ*” and “*sanderianum*”.

As we have mentioned above, the two variants worth dealing with in any detail are *P. insigne* forma *sanderæ* and *P. insigne* forma *sanderianum*. Under both names, plants have been awarded by the American Orchid Society. Both taxa, however, leave ample room for discussion, and their interpretation in the horticultural literature does not always conform to reality. The discussion of the two taxa below is based on the original literature.

PAPHIOPEDILUM INSIGNE FORMA SANDERÆ

(REICHENBACH FIL.) BRAEM IN BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
2: 233 (1999)

BASIONYM

Cypripedium insigne var. *sanderæ* Reichenbach fil.

THE GARDENERS' CHRONICLE, 3rd. series, 4: 692-693 (1888)



PAPHIOPEDILUM INSIGNE FMA. *SANDERIANUM*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

H.G. Reichenbach (*loc. cit.*) wrote:

“... the odd sepal [dorsal] has the upper part white, the white colour descending on both sides onto the margin. The lower part is light yellowish-green, with a few small brown spots on each side of moderately dark tint. The broad connate sepal [synsepal] is of a light yellow, with two very small brown spots at the base. Petals nearly undulate, rather broad and blunt, sulphur-coloured. Lip darker sulphur-coloured. Staminode bright yellow, with the knob of an orange colour. Peduncle and bract light green. ...”

Because of the dark spots on the sepals, this form cannot be considered an albino as mistakenly indicated in the THE MANUAL OF CULTIVATED ORCHID SPECIES by Bechtel, Cribb, and Launert (1981, 1986, 1992).

This taxon was based on a single plant, “discovered” at the Sander nursery in 1888. The plant was initially divided into two halves, one of which was purchased by Baron Schröder, and the other by R. H. Measures. This latter half was afterwards divided into four, one piece passing to the collection of R. I. Measures, a second was purchased by F. L. Ames, and a third was bought back by Sander for the (at the time) enormous sum of 250 pounds sterling. The fate of the fourth division remains unknown.

PAPHIOPEDILUM INSIGNE FORMA SANDERIANUM

(ROLFE) BRAEM IN BRAEM, BAKER & BAKER

THE GENUS *PAPHIOPEDILUM* - NATURAL HISTORY AND CULTIVATION,
2: 233 (1999)

BASIONYM

Cypripedium insigne var. *sanderianum* Rolfe

THE ORCHID REVIEW, 1(5): 145 (1893)

Rolfe (*loc. cit.*) wrote:

“... First they [Sander & Co.] introduced that most charming yellow variety *Sanderæ*, named after Mrs. Sander, now the most valuable *Cypripedium* known. Then came *Macfarlanei*, nearly similar in colour but different in shape, and now comes another unspotted form, quite different in colour. It is of a light yellowish-green, with darker reticulated nerves, and a broad white border to the dorsal sepal, as shown in our illustration. ...”

Unfortunately, the photograph in THE ORCHID REVIEW is not in colour, and it cannot be ascertained whether the flower on which the original description was based was devoid of any reddish or brownish colour.



PAPHIOPEDILUM BARBIGERUM
COURTESY OF DOROTHY POTTER BARNETT

PAPHIOPEDILUM BARBIGERUM

TANG & WANG

BULLETIN OF THE FAN MEMORIAL INSTITUTE OF BIOLOGY, PEIPING, BOTANY,
10: 24 (1940)

SYNONYMS

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

PAPHIOPEDILUM, 113 (1988)

Paphiopedilum vejvarutianum Gräß & Röhlke

DIE ORCHIDEE, 54(1): 56-59 (1988)

Paphiopedilum areeanum Gräß

DIE ORCHIDEE, 52: 845 (2001)

Paphiopedilum rhizomatosum S.C. Chen & Z.J. Liu

J. WUHAN BOT. RES., 20(1): 12 (2002)

ETYMOLOGY

Paphiopedilum barbigerum was named for the tuft of hairs (beard) on the base of each petal.

DISCUSSION

Paphiopedilum barbigerum was described by Tang & Wang (*loc. cit.*) on the basis of dried herbarium materials collected by the French botanists Cavalerie & Fortunat in Guizhou Province of southwestern China. Tang & Wang, not being versed in Orchidaceae, confused the issue by writing that *P. barbigerum* is "closely related to *P. esquirolei* Schlechter." Their type specimen of *P. barbigerum*, however, shows clearly that the differences between the two taxa are enormous. Compared to *P. esquirolei*, *P. barbigerum* is a dwarf in all respects. The plant is obviously a close relative to *P. insigne*, and it is not surprising that the karyotype of the two species is "very similar" (Karasawa & Aoyama, 1988). Accordingly, the taxon has not been accepted as an autonomous entity at the species level by all authors. Braem (1988), for example, considered *P. barbigerum* a variety of *P. insigne*, and Cribb (1987), although listing the taxon as an autonomous species, wrote:

"In particular, its umbonate staminode, and general floral morphology are distinctly reminiscent of a small *P. insigne*."

Although named for the tuft of hairs on the base of each petal, this feature has been observed in other taxa of this subgenus such as *P. charlesworthii*, *P. coccineum*, *P. helenae*, *P. herrmannii*, *P. insigne*, *P. villosum*, etc. Since 1988 a fair number of wild-collected plants in agreement with the description of *P. barbigerum* have become available, and among them, a true albino form has appeared.

Paphiopedilum barbigerum can be differentiated from all other taxa in the *P. insigne* complex, with the exception of *P. coccineum* and *P. helenae*, by its very small size, very narrow leaves, its very short inflorescence, and its small flowers which have a distinct, obtusely triangular to obcordate staminode and an unspotted dorsal sepal. From *P. helenae*, it can be differentiated by its undulate petals, from *P. coccineum* by the form of the staminodal shield and colour of the dorsal. Whether those differences are enough to warrant retention of both taxa as autonomous species is a matter of opinion.

Paphiopedilum vejvarutianum is said to have been collected in Thailand at an elevation of 500 to 750 meters on moss-covered rocks and allegedly imported into Europe together with *P. gratixianum*. The description by Gräß and Röllke is inconclusive, and the photographic materials show a variety of plants that give us reason to question the validity of this taxon as a species. As some of the plants show a distinct similarity with *P. barbigerum*, we consider *P. vejvarutianum* here as a synonym to *P. barbigerum*.

DESCRIPTION

Paphiopedilum barbigerum is an herbaceous humus epiphyte. Each growth produces 4 to 6 leaves that are sub-erect, linear, obtuse, and minutely three-toothed at the apex. They are 8 to 20 cm long by 0.8 to 1.8 cm wide, uniformly green. The inflorescence is erect, up to about 16 cm long, terete, and generally bears a single flower. The bract is elliptic, sub-acute to obtuse, and 1.6 to 2 cm long. The flower is up to 6.0 cm long by about 7.5 cm wide. The dorsal sepal is white with a green basal area, prominently keeled on the back, with apical margins that fold backward, obtuse. It is about 3.2 cm wide, up to 3.6 cm high and sub-orbicular when spread. The synsepal is elliptic, obtuse, about 3.0 cm long by up to 1.9 cm wide, ovate, and whitish-green with more or less distinct longitudinal veins. The petals are more or less ligulate, blunt, nearly quadrangular, up to 4.4 cm long by about 1.2 cm wide, greenish-brown with regular venation and narrow green margins, and undulate along the entire length, sparsely ciliate. The lip is three-lobed, glabrous on the outside. The side lobes are folded inward. The main lobe is deeply saccate, about 4.0 cm long by up to 2.4 cm wide, brown with darker venation. The lip stands at nearly a 90° angle to the axis of the inflorescence. The staminodal shield is obtusely triangular to obcordate and 6 to 9 mm long by 8 to 11 mm wide at the lower margin. It is pubescent and light yellow with a sulphur-yellow or green tooth somewhat below the centre.

DISTRIBUTION AND HABITAT

Southwest China. Plants were first found in Guizhou Province along the eastern edge of the Guizhou Plateau. No additional habitat information was available when the plant was originally collected. More recent collections, however, are reported from along the border between Guizhou and Guangxi Provinces, and habitat elevations are reported at 700 to 900 m.

FLOWERING

In cultivation, *Paphiopedilum barbigerum* generally flowers from October through December.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa & Aoyama 1988).

VARIETIES AND FORMS

Paphiopedilum barbigerum seems to be relatively stable in flower size and colour. The only variant deserving autonomous taxonomic status is the albino. (But see also *P. coccineum*).

PAPHIOPEDILUM BARBIGERUM FORMA AUREUM

(HUA) BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
2: 217

BASIONYM

Paphiopedilum barbigerum var. *aureum* Hua
ORCHIDS, 68 (3): 242-243 (1999)

Paphiopedilum barbigerum forma *aureum* differs from the typical form by its pure yellow flowers. It should not, however, be confused with *P. helenae*, another taxon in this same group. The two taxa can easily be differentiated as *P. barbigerum* has undulate petals while *P. helenae* does not.



PAPHIOPEDILUM COCCINEUM
PHOTOGRAPH COURTESY OF OLAF GRUSS

PAPHIOPEDILUM COCCINEUM

PERNER & HERRMANN

DIE ORCHIDEE, 51(5): 622-624 (2000)

SYNONYM

Paphiopedilum barbigerum var. *lockianum* Averyanov

KOMAROVA, 2: 11 (2002)

ETYMOLOGY

Paphiopedilum coccineum was named for the red suffusion of the central area of the dorsal sepal.

DISCUSSION

We include *Paphiopedilum coccineum* in this treatment with a fair amount of skepticism in respect to its correct taxonomic status. The plant was described on the basis of a specimen seen in culture belonging to a Vietnamese orchid amateur who claimed to have collected the plants in the Cao Bang District of northern Vietnam. The plants were being cultivated under the designation of “red *Paph. helenae*”, a designation that clearly illustrates the affinity to *P. barbigerum* and *P. helenae*. Perner & Herrmann maintain that *P. coccineum* is by no means a link between the two species mentioned. We tend to agree with them. If it were not for the difference in staminodal shield morphology, we would not hesitate to agree with those who consider it a simple colour variant of *P. barbigerum*.

The shape of the staminodal shield, however, corresponds with that of *P. herrmannii*. Also the distinctly margined dorsal sepal and petals are reminiscent of the same morphological characteristics in that species.

DESCRIPTION

Paphiopedilum coccineum is a dwarf herb, growing in leafy humus. Each growth produces four to five leaves. They are straight or slightly bent, rigid, sometimes thick, sub-succulent, deep green above, paler green underneath, lanceolate, acute, and 9 to 13 cm long by 1 to 1.4 cm wide, the underside distinctly keeled, and suffused with red at the base. The inflorescence is generally one-flowered, sub-erect, about 12 cm long and about 3 mm in diameter, densely covered with short hairs, and spotted dark brown. The bract is 2.5 cm long by 9 mm wide, ovate to elliptic, folded, and covers the lower part of the ovary which is about 3 cm long by 2.5 mm in diameter. Bract and ovary are covered with short dark hairs and are spotted dark brown. The flower is about 6 cm across. The dorsal sepal is 3 cm long by 2.6 cm wide, obovate, distinctly keeled, the outside and the margins covered with short hairs, the centre area carmine red with darker veins, and this area surrounded by a very wide, pure white margin. The synsepal

is 2.4 cm long by 1.3 cm wide, lanceolate, slightly bent, bright green. The petals are brownish-orange with a few longitudinal reddish-brown stripes and a clear marginal band. The petals are more or less ligulate, blunt, nearly quadrangular, about 3.6 cm long by about 1 cm wide, chestnut-brown, except for the clear green margin on the inside, green suffused with brown toward the base on the outside. They are undulate, and just as in the related species, there is a tuft of long, dark brown hairs at their base, and their margins are somewhat ciliate. The lip is three-lobed, 3.7 cm long by 2.6 cm wide at the aperture, much narrower near the apex, glabrous on the outside. The side lobes are folded inward. The main lobe is deeply saccate, bright reddish-brown with a narrow yellow-ochre margin around the aperture. The staminodal shield is obcordate, 1.4 cm long by 1.2 cm wide, concave, the apical margin with a wide incision, thus leaving two distinct protrusions on either side. Somewhat below the centre of the shield, there is a sulphur-yellow umbo.

DISTRIBUTION AND HABITAT

Vietnam. *Paphiopedilum coccineum* is said to have been collected in the Cao Bang District in the extreme northeastern part of Vietnam. This data has not been confirmed, and no information about the actual habitat is available.

FLOWERING

In cultivation, *Paphiopedilum coccineum* blooms from October through December.

PAPHIOPEDILUM EXUL (RIDLEY) KERCHOVE

LE LIVRE DES ORCHIDEES, 478 (1894) (AS PAPHIOPEDIUM EXUL)

BASIONYM

Cypripedium insigne var. *exul* Ridley

THE GARDENERS' CHRONICLE, 3rd series, 10: 94 (1891)

SYNONYMS

Cypripedium exul (Ridley) Rolfe

THE JOURNAL OF HORTICULTURE, 3rd series, 22: 302 (1892)

Cordula exul (Ridley) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

ETYMOLOGY

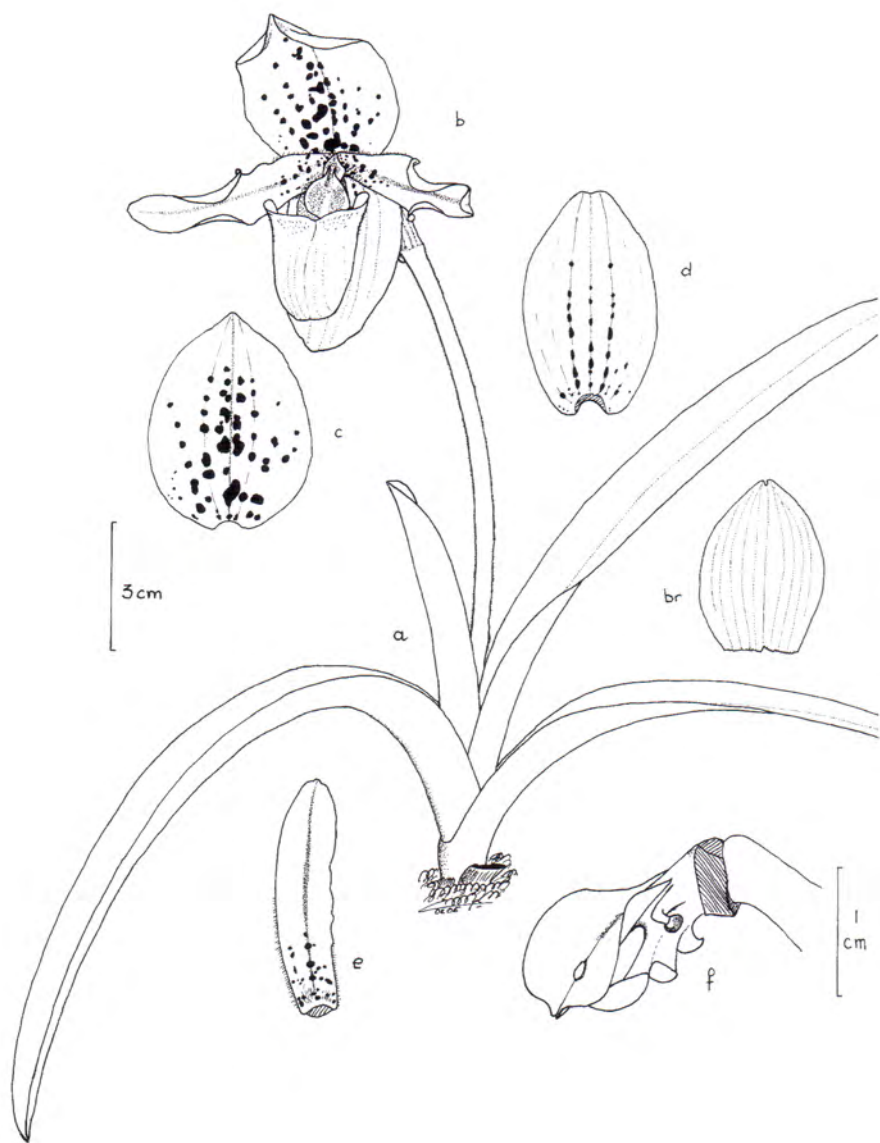
Named *exul*, referring to its discovery far away, or exiled, from the habitats of the typical *P. insigne* of which Ridley considered it to be a variety.

DISCUSSION

This taxon was originally described as a variety of *Cypripedium insigne* by the British botanist Henry Nicholas Ridley (1855-1956) who was the director of the Botanic Gardens of Singapore from 1888 through 1912. Although the English text of Ridley's original article in THE GARDENERS' CHRONICLE (*loc. cit.*) is entitled '*Cypripedium insigne*', the Latin diagnosis at the bottom of the same page clearly indicates that he is describing '*Cypripedium insigne* var. *exul*, Ridley nov. var.' Its elevation to species rank as *Cypripedium exul* must be credited to Rolfe (*loc. cit.*), whose publication predated by two days an article with the same intention written by O'Brien for THE GARDENERS' CHRONICLE (O'Brien, 1892). The taxon was transferred to the genus *Paphiopedilum* (as *Paphiopedium*) by Kerchove de Denterghem (*loc. cit.*). Kerchove thought that this taxon might be a natural hybrid between *P. villosum* and *P. hirsutissimum*, but his intention to consider the plant as an autonomous entity is clear. The fact that Kerchove lists the taxon under the spelling '*Paphiopedium*' does not make his publication invalid, nor does it lose its priority to Rolfe's publication of 1896 in which the plant is listed as '*Paphiopedilum exul*'. Neither is there a plausible reason to cite the basionym as Ridley ex O'Brien (Fowlie, 1976) since both the English text and the Latin diagnosis are indicated as originating from Ridley alone.

Paphiopedilum exul, very obviously, is closely related to *P. insigne*, a native of the Himalayas, and to *P. gratrixianum* from Indo-China. Joseph Dalton Hooker wrote in 1896:

"*C. exul* so closely resembles *C. insigne*, Wall., ... that it may, I think, well be doubted, whether Mr. Ridley was not right in referring to it as a variety of that plant."



PAPHIOPEDILUM EXUL

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON



PAPHIOPEDILUM EXUL

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

And Cribb (1987) wrote:

“It is debatable whether *P. exul* should not be considered a variety or subspecies of *P. insigne*.”

Paphiopedilum exul differs from *P. insigne* by its sub-erect, narrower leaves, shorter inflorescence, shorter glossy petals and smaller flower. The synsepal is as large as the dorsal sepal and extends beyond the apex of the lip. The lip is shorter with a narrower orifice and a smaller, obovate, more or less obtuse staminodal shield and a very much smaller stigma.

DESCRIPTION

Paphiopedilum exul is an herbaceous plant growing in leafy humus. Each growth produces up to five sub-erect leaves, which are 15 to 35 cm long, 1.8 to 3.8 cm broad, strap-shaped, unequally two-toothed at the tip, bright green to yellowish-green, and prominently keeled on the back. The inflorescence is 13 to 30 cm long, slender to stout, one-flowered, green, and covered with a dark red-purple furfuraceous pubescence, which extends to the ovary and the dorsal bases of the sepals and petals. The bract is 4.0 to 4.4 cm long by 2.0 to 2.4 cm wide, elliptic to narrowly elliptic, cymbiform (boat-shaped), shortly beaked, more or less glabrous, and green to yellowish-green. The flower generally is about 6.5 cm across, but some clones have larger blossoms. The dorsal sepal is white with raised maroon spots on a yellow-green centre, arched, sub-undulate, ovate-elliptic, obtuse, 3.0 to 4.8 cm long, 2.5 to 3.0 cm wide, and the outer surface is pubescent. The lateral sepals are united into a synsepal. This is pale green, with darker green veins and margins that are curved backward, oblong-elliptic, obtuse, and 3.3 to 4.8 cm long by 1.5 to 2.5 cm wide. The petals are curved to the inside, more or less horizontally spreading, oblanceolate to strap-shaped, obtuse, waved, ciliate, purple-pubescent at their base, yellowish with red-purple median veins and a few spots of the same colour at the base. Petals are 4.3 to 5.0 cm long by 1.4 to 1.7 cm wide. The lip is oblong, shaped like an inverted helmet, dull yellow, smooth, shiny, and 3.0 to 3.5 cm long by about 1.9 cm wide. The margins of the mouth are inflexed. The yellow staminodal plate is obovate, generally obtuse to retuse, posteriorly two-lobed, pubescent, and has a smooth central umbo. It is 6 to 8 mm long and slightly wider. The stigma is broad, circular, peltate.

DISTRIBUTION AND HABITAT

Peninsular Thailand. Plants are found on limestone islands on the east side of the Phuket-Krabi Gulf near the mainland. They grow on northeast- and eastfacing cliffs from sea level to about 50 m. The roots may be attached directly to the steep cliffs or buried in humus-filled pockets in the rock. Plants usually grow in bright places, often where they are exposed to full sun, but summer days are rarely clear.

FLOWERING

October through June, main season April-May.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan 1947, Duncan & MacLeod 1949a, Kamemoto *et al.* 1963, Tanaka & Aoyama 1974, Karasawa 1979).

New growths produce flowers when mature, but it may be two or three years before a new growth matures. Time to maturity may be a function of average temperatures in the growth area.

VARIETIES AND FORMS

As with most *Paphiopedilum* species, *P. exul* is quite variable in its flower colour. Accordingly, several horticultural variants have been described. Besides the fact that most, if not all, have since disappeared, none ever merited any real scientific status.



PAPHIOPEDILUM HELENAE
COURTESY OF PAUL UPWARD

PAPHIOPEDILUM HELENAE

AVERYANOV

BOTANICAL JOURNAL (ST. PETERSBURG, RUSSIA), 81(9): 108 (1996)

SYNONYM

Paphiopedilum delicatum Z.J. Liu & J.Y. Zhang

ACTA PHYTOTAXONOMICA SINICA, 39(1): 78 (2001)

ETYMOLOGY

Paphiopedilum helenae was named in honour of Mrs. Helena Averyanova.

DISCUSSION

Paphiopedilum helenae differs from *P. barbigerum* by the subcircular form of the staminodal shield, the straight (not undulate) petals, its flower colour, and the much smaller plant size.

DESCRIPTION

Paphiopedilum helenae is a dwarf herb, growing as a humus epiphyte. Each growth produces three to five leaves. They are straight or slightly bent, rigid, sometimes thick, sub-succulent, very deep green with a yellowish-white or pale green edging along the margins of the upper side, pale green below, and often with some fine violet-purple marks at the base. The leaves are broadly lanceolate to lanceolate, obtuse and minutely tridentate at the apex, and 4 to 12 cm long by 1 to 2 cm wide. The inflorescence is generally one-flowered, sub-erect, horizontal or slightly pendent. The peduncle is 4 to 8 cm long, slender, terete, and covered by short black hairs. The bract is ovate to elliptic, folded, obtuse at the apex, 0.8 to 1.9 cm long, about 0.4 cm wide, and covers about one quarter of the ovary. The flower is 5 to 7 cm across. The dorsal sepal is bright yellow with a white edging at the margin. It is ovate, sub-circular or circular, somewhat emarginate or obtuse at the apex, and 1.8 to 3.5 cm long by 1.5 to 3.0 cm wide. The synsepal is white, ovate-elliptic, obtuse at the apex, and 1.5 to 2.5 cm long by 0.8 to 1.6 cm wide. The petals are brownish-orange with a few longitudinal reddish-brown stripes and straight (non-undulate) margins. The petals are ligulate or ligulate-spathulate, obtuse or truncate at the apex, slightly covered by hairs or sub-glabrous at the base, and 2.5 to 3.5 cm long by 0.4 to 0.8 cm wide. The lip is shaped like an inverted helmet, glabrous on both surfaces, brownish-orange, sometimes slightly inflated at the apex, and 2.0 to 3.0 cm long by 1.5 to 2.0 cm wide. The staminode is usually circular with a diameter of about 0.7 to 0.8 cm and is papillose with a sub-central hemispheric yellow or green tooth. The pedicel and ovary, which are covered by short black hairs, are 2.0 to 4.0 cm long.

DISTRIBUTION AND HABITAT

Vietnam. *Paphiopedilum helenae* is found near Cao Bang in the extreme northeastern part of Vietnam. This region has many, eroded, limestone ridges and mesas which emerge from the relatively flat, alluvial valley. These formations have almost vertical sides and stand 100 to 150 m above the valley floor. The valley floor has numerous eroded sinkholes in the underlying limestone which usually fill with water during the rainy season, resulting in many small to medium-sized lakes. Called karst lakes, they may dry out near the end of the dry season. For most of the dry season, however, they serve as a moisture source which increases the average humidity in the area. *Paphiopedilum helenae* often grows in pine forests of *Keteleeria davidiana*, which occur primarily in southern China. This orchid is usually found on open or lightly shaded ledges with a northern exposure. It grows near the top of vertical bluffs at 850 to 900 m, where it is found on small, narrow shelves and in rocky crevices, often at the base of small trees and shrubs. Averyanov (1996) reports that it is not unusual to find plants growing directly on the seamless, vertical limestone cliffs with the plant roots firmly attached to the more or less smooth rock face.

FLOWERING

In cultivation, *Paphiopedilum helenae* generally blooms between July and September.

VARIETIES AND FORMS

Paphiopedilum helenae is quite variable in its flower colour, especially in its intensity. Whereas the leaves of the plants rarely grow longer than 8 cm in the wild, they can be distinctly larger (up to 12 cm long by more or less 2 cm wide) in the usually more shaded greenhouse conditions. The pouch colour varies from clear yellow through reddish-brown. The pure yellow form was described as *Paphiopedilum helenae* forma *aureum* by Gruß and Röth in 1999. Without doubt, some other colour forms will receive horticultural names. However, with the exception of forma *aureum*, none of the colour variants deserves scientific recognition beyond the status of cultivar.

PAPHIOPEDILUM MARKIANUM

FOWLIE

ORCHID DIGEST, 54(3): 124-127 (1990)

SYNONYMS

Paphiopedilum tigrinum Koopowitz & Hasegawa

THE ORCHID ADVOCATE, 16(3): 76-79 (1990)

Paphiopedilum smaragdinum Liu & S.C. Chen

JOURNAL OF WUHAN BOTANICAL RESEARCH, 21(6): 489-491 (2003)

ETHYMOLOGY

Paphiopedilum markianum was named for Mr. Buddy S. Mark, an orchid amateur residing in Kowloon City District, HongKong.

DISCUSSION

The validity of this taxon as a "good species" is beyond question. There is, however, an ongoing discussion about the priority of the name '*Paphiopedilum markianum*' over '*P. tigrinum*' or vice versa. Quite a bit has been said about this "battle" and the interested reader may refer to the pertinent literature (besides the two "original" publications, see also Braem 1991a,b). In the meantime, the controversy has settled around the question whether the material sent was printed material and whether sending printed material by facsimile transmission (fax) constitutes valid publication. The answer to both questions is simply "yes". The pertinent part of the INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (article 29) effective at the time of the publication stated clearly: "Publication is effected ... by distribution of printed matter...". Nowhere does it state how this distribution has to be done. The fact is that the printed material with the publication of *P. markianum* reached the Oakes Ames Library at Harvard, Massachusetts, USA, and at least one European institution on May 24th of 1990. The material sent by Fowlie consisted of pages from a finished and printed copy of ORCHID DIGEST. Cribb's claim (1998) that Fowlie sent galley proofs does not correspond to the facts. And even if Cribb would have been right about the galley proofs, it would not have changed anything regarding the validity of the publication, as galley proofs are printed materials.

The concept of Koopowitz & Hasegawa, on the other hand, was not published before June 4th of that year. Thus there can be no doubt about the validity and priority of the name "*P. markianum*" and those who argue against the priority of *P. markianum* do so against better knowledge, out of plain ignorance, and/or out of linguistic and ethnic chauvinism.

The umbonate staminode, the single-flowered inflorescence, and the green, non-tessellate leaves show that *P. markianum* is correctly placed in subgenus *Paphiopedilum* section *Paphiopedilum*. Koopowitz & Hasegawa (*loc. cit.*) place the taxon near *P. hirsu-*



TOP:
PAPHIOPEDILUM MARKIANUM
 COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

BOTTOM:
 FLOWERS OF *PAPHIOPEDILUM MARKIANUM*
 WATERCOLOUR PAINTING BY DIANDRA AMETIA
 COURTESY OF DIANDRA AMETIA

tissimum. Fowlie (*loc. cit.*) surprisingly placed it near *P. lowii* and *P. haynaldianum*, two multi-floral species of subgenus *Polyantha*, and Koopowitz & Hasegawa (*loc. cit.*) also note similarities between *P. markianum* and the two *Polyanthas*. The interpretations of Fowlie, as well as those of Koopowitz & Hasegawa, however, do not agree with the results of the cytogenetic study rendered by Karasawa, Aoyama & Kamimura (1997) which shows that the karyotype of *P. markianum* is similar to that of *P. henryanum*, another species of subgenus *Paphiopedilum*, and that it has no similarities with the karyotypes of *P. hirsutissimum*, *P. haynaldianum*, or *P. lowii*.

The concept of *Paphiopedilum smaragdinum* corresponds exactly with the description of *P. markianum* except for the spots and stripes on the flower parts. It is, therefore, to be considered as a colour variant of *P. markianum*.

DESCRIPTION

Paphiopedilum markianum is an herbaceous plant growing in decaying leaf litter. The narrowly ligulate leaves, which are 9.0 to 22.5 cm long by 2.0 to 2.8 cm wide, are fleshy, uniformly light green, and not tessellated. The inflorescence usually carries a single flower. The scape is erect, shortly pilose, and about 12 to 21 cm long. The flower bract is approximately 3.5 cm long by 6 mm wide, distally spatulate, greenish-yellow, and pilose. The ovary is about the same length as the bract. The flower is about 7.5 cm across, measured from tip to tip over the petals in the natural state. The dorsal sepal is ovate, about 3.5 cm long by 2.8 cm wide, more or less strongly bent forward over the aperture, distally apiculate, and contracted at the base. It has a light green background colour with a dark lavender longitudinal stripe in the centre. On both sides of the median, it has two rows of longitudinally coalescing dark lavender spots, grading to lines. The synsepal is narrowly acuminate, very concave, and 3.0 to 3.3 cm long by about 1.8 cm wide. It has two dark purple-brown longitudinal lines with a spot on each side. The petals are ligulate, distally strongly expanded, apically mucronate, and strongly undulate on the top edges of the proximal two-thirds. They are about 5 cm long by 8 mm wide at the base, expanding distally to about 1.8 cm wide. The margins are covered with short white hairs. Petals are green at the base, grading to deep lavender in the distal third. They are covered with many dark purple hairs proximally and have two relatively parallel lines formed by brownish-lavender coalescing spots. These stripes run from the base to about 3/4 of the length of the petals and terminate in the uniform lavender coloration on the distal part of the widened petals. The pattern of lines and spots on the petals and sepals is greatly variable. The three-lobed lip is non-emarginate, brownish, and has a main lobe shaped like an inverted helmet. It is distally rounded, about 3.3 to 3.8 cm long by 2.4 to 2.6 cm wide, and has distally erect margins that form prominent lateral 'ears' on either side of the pouch. The side lobes are folded inward to form a tube. The staminodal shield, which is about 9 mm long by 5 mm wide, is oblong-ovate, distally non-emarginate, dorsally distinctly notched and with a single central boss.



PAPHIOPEDILUM MARKIANUM
WATERCOLOUR BY KARYONO APIC
COURTESY OF KARYONO APIC

DISTRIBUTION AND HABITAT

Western Part of Yunnan, China. Plants are reported to grow from elevations between 1,400 and 2,500 meters.

FLOWERING

In cultivation, *Paphiopedilum markianum* flowers from April through June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa *et al.*, 1997 - as *P. tigrinum*).

VARIETIES AND FORMS

PAPHIOPEDILUM MARKIANUM FORMA SMARAGDINUM

(Z.J. LIU & S.C. CHEN) BRAEM

RICHARDIANA, 13: 172-178 (2013)

BASIONYM

Paphiopedilum smaragdinum Z.J. Liu & S.C. Chen

JOURNAL OF WUHAN BOTANICAL RESEARCH, 21(6): 489-491 (2003)

SYNONYMS

Paphiopedilum tigrinum var. *smaragdinum* (Z.J. Liu & S.C. Chen) Z.J. Liu & S.C. Chen
GEN. PAPHIOPEDILUM CHINA 163 (2009)

Paphiopedilum tigrinum forma *smaragdinum* (Z.J. Liu & S.C. Chen) Groß
DIE ORCHIDEE, 56(1): 71 (2005)

This variant originates from Mt. Gaoligong, Pianma, Yunnan, where it was collected at an elevation of 2,500 metres. The variant differs from the nominal form of *P. markianum* only by the lack of dark spots and stripes on the flower parts.



PAPHIOPEDILUM TRANLIANUM
COURTESY OF DOROTHY POTTER BARNETT

PAPHIOPEDILUM TRANLIENIANUM

GRUSS & PERNER

CAESIANA, 7(11): 63-73 (1998)

SYNONYM

Paphiopedilum caobangense N. T. Tich, 1999

HOA CANH, 1: 14 (1999) - *nomen illegitimum*

ETYMOLOGY

Paphiopedilum tranlienianum was named in honour of Mrs. Tran Ngo Lien, the reported discoverer of the taxon.

DISCUSSION

Paphiopedilum tranlienianum is said to have been discovered by Mrs. Tran Ngo Lien in northern Vietnam and was imported into Germany by the authors Gruss & Perner. *Paphiopedilum tranlienianum* has plain, unmottled green leaves, a single-flowered inflorescence, and well-developed lateral auricles of the upper margin of the main lobe of the labellum, and thus obviously belongs in subgenus *Paphiopedilum*. It definitely finds its closest relatives within section *Paphiopedilum* although its petals do not widen toward the apex.

Although Gruss & Perner described the plant at the species level, it has been postulated that *P. tranlienianum* is a natural hybrid between *P. hirsutissimum* and *P. helenae*, but little evidence is available to substantiate this hypothesis. If it is a hybrid, the strongly undulate petals may be the only indication of a possible influence by *P. hirsutissimum*. As *P. tranlienianum* is obviously related to all taxa of the *P. insigne* complex, it is natural that it has certain features in common with other plants of that group, and it is possible that other similarities will be found in the gene-pools of these taxa. However, to deduce hybrid status from the results of ITS sequence analysis alone is highly speculative. The taxon was also published as *P. caobangense* (*loc. cit.*). In addition to the fact that this name would not take priority over the earlier published designation as *P. tranlienianum*, its publication is invalid as there was no Latin description (as required at the time of publication), diagnosis, or appropriate type citation.

DESCRIPTION

Paphiopedilum tranlienianum is an herbaceous plant growing in leafy humus. Plants are up to about 20 cm wide as measured from leaf tip to leaf tip. Each growth carries up to 5 leaves. The leaves are imbricate at the base, up to 18 cm long by about 1.7 cm wide, and linear with an acute and sometimes minutely bilobate apex. They are coriaceous and sharply keeled underneath. Their upper surface is plain dark green with a narrow, distinctly delimited white margin. The underside is also evenly coloured but with a brighter green. The inflorescence generally bears a single flower. The bright green

scape is terete, erect to slightly arching, about 8 cm high by about 0.2 cm in diameter, and densely covered by short, purplish-maroon hairs. The flower bract is about 1.6 to 2.0 cm long by up to 1.6 cm wide, ovate, acuminate, imbricate, and distinctly folded. It is bright green with darker green veins and a purple tinge at the base. The bract is covered with purplish-maroon hairs, and its keel is densely covered with maroon setaceous hairs at the base. There are some whitish hairs toward the tip and along the margins near the apex. The ovary is approximately 2.8 to 3.2 cm long, cylindrical, ribbed, and covered with reddish to purplish hairs, with the pubescence densest on the ribs. The flower is 5.0 to 5.8 cm long by 5.5 to 6.0 cm wide when measured from petal tip to petal tip on living plants in their natural position. The dorsal sepal is 3.0 to 3.2 cm long by 3.0 to 3.5 cm wide, sub-orbicular when spread and minutely acuminate at the apex. In the natural position the dorsal sepal is bent slightly forward, and its margins are reflexed at the base, thus forming a funnel. The back is distinctly keeled and covered with short white hairs. The margins are covered with white cilia. The white dorsal sepal has a green to yellow-green suffusion at the base, a distinct maroon stripe at the central vein, and to each side of the centre are about five short, pale green to maroon-coloured veins that start at the base. The base of the keel is covered with maroon hairs. The lateral sepals are united into a synsepal, which is ovate, acute, concave, and about 2.4 to 2.6 cm long by 1.5 to 1.8 cm wide. The synsepal is white to bright green on the inner surface and bright green on the outer surface. There are about five darker green stripes that are apparent on both sides. The margins of the synsepal, which roll inward, are covered with white hairs, and the outer surface is covered with maroon bristles. The petals, which are 3.0 to 3.5 cm long by about 0.7 to 0.8 cm wide, somewhat slanting, ligulate, and acuminate, have margins that are strongly undulate except at the base. The inner surface of the petals is yellowish-green at the base, turning brown toward the apex, with the brown colour becoming more intense toward the tip. They have brown veins and a narrow white margin that is covered with brown cilia, and near the base there are some brown bristles. The outer surface of the petals is yellowish-green with dark brown veins. The lip is 3.5 to 4.0 cm long by about 1.5 cm wide and distinctly three-lobed. The side lobes of the lip are curved to the inside but do not form a closed tube. The main lobe is shaped like an inverted helmet, 1.0 to 1.2 cm long, and distinctly auriculate on both sides of the orifice, which is large and positioned much further down than is usually the case in *Paphiopedilum* plants. The front margin of the lip curves slightly outward and is cuspidate at the centre. The lip has a yellowish-green ground colour, but the front part is dark brown with darker brown veins, and the inside is brighter with brown hairs toward the base. The yellow column is 0.8 to 1.0 cm long and covered with maroon hairs. The staminodal shield is ovate with introrse margins and about 1.2 cm long by 0.8 cm wide. It has a distinct incision at the upper margin, a bluntly rounded apex, and a well-developed boss in the centre of the basal half. The staminodal shield is yellow with reddish-brown bristles at the base. The tip of the boss is green. Because of the unusual position of the orifice, the staminodal shield is freer and further above the pouch than in the other species of the genus.

DISTRIBUTION AND HABITAT

Northern Vietnam. Plants are reported from elevations of 350 to 800 metres in Bac Kan and Thai Nguyen Provinces. The plants grow in humus that has collected in the cracks and crevices of the highly eroded crystalline limestone mountains.

FLOWERING

Plants of *Paphiopedilum tranlienianum* have been reported to bloom from September through December.

VARIETIES AND FORMS

PAPHIOPEDILUM TRANLIENIANUM FORMA ALBOVIRIDE

GRUSS

DIE ORCHIDEE, 56(2): 70 (2005)

This is the albino. The flower is green and white with a yellow staminode.



PAPHIOPEDILUM TRANLIENIANUM FMA. ALBOVIRIDE

COURTESY OF ALEXEJ POPOV (POPOV ORCHIDS)



PAPHIOPEDILUM VILLOSUM
WATERCOLOUR PAINTING BY HEMLATA PRADHAN
COURTESY OF HEMLATA PRADHAN

THE PAPHIOPEDILUM VILLOSUM COMPLEX

Within this complex, six taxa have been described at the species level: *Paphiopedilum affine*, *P. boxallii*, *P. dilectum*, *P. gratrixianum* ([Masters] Guillaumin non Williams), *P. papilio-laoticus*, and *P. villosum*. For the purpose of this work, we recognise *P. gratrixianum*, *P. papilio-laoticus*, and *P. villosum* as autonomous species.

Paphiopedilum affine was described as a separate species (but said to be closely related to *P. villosum* and *P. dilectum*) on the basis of differences in the staminode. Unfortunately, the description of *P. affine* (De Willdeman, 1906) does not include a drawing and the type specimen (if it ever existed) has never been found. Nowadays, *P. affine* is generally considered to be a synonym of *P. gratrixianum*. A closer look at the original description brings up some serious doubts. The plant is described as having (1) fairly dark green leaves with a white margin and striped and spotted with a darker green, and (2) *villosum*-like flowers. It may, therefore, be better to consider this as a dubious entity.

Paphiopedilum boxallii was described as *Cypripedium boxallii* by Reichenbach fil. in 1877. It was transferred to the genus *Paphiopedilum* by Pfitzer in 1888 but treated as a variety of *P. villosum* by the same author in 1903. Neither Cribb (1987) nor Braem (1988) accepted this taxon as a species, whereas horticultural sources have generally done so since its description. After having reviewed all pertinent materials, we have come to the conclusion that the *boxallii* concept is indeed better treated as a variety of *P. villosum*.

Paphiopedilum dilectum has been considered synonymous with *P. villosum* by many authors. Reichenbach (1888) described the taxon in THE GARDENERS' CHRONICLE as a natural hybrid between '*Cypripedium boxallii* and *C. hirsutissimum*,' but from the text it appears that Reichenbach fil. did not have fresh material to work with. Pfitzer (1903) lists it as a separate species but writes: "dubious species, very much like *P. villosum* but with a distinctly different staminode". After a review of the original description and all pertinent data, we have decided to list this entity as a synonym of *P. villosum* var. *boxallii*.

Recently, *Paphiopedilum papilio-laoticus* has been described as an autonomous species by Schuiteman, Luang Aphay & Lio. (2018). Although this plant has been known for decades as a variety of *P. gratrixianum*, we have decided to accept it as a valid species in this book.

Key to the Taxa belonging to the *Paphiopedilum villosum* complex

- 1. Inflorescence and ovary with long villose purple hairs, dorsal centrum with deep-brown vertical striations forming a dense conglomerate *P. villosum*
- 1a. Inflorescence and ovary with short purple hairs, dorsal spotted 2
- 2. Dorsal with distinctly reflexed margins, white with agreenish basal part, covered by irregular dark purple to blackish spots *P. gratrixianum*
- 2a. Dorsal suborbicular, nearly fully spread, white, more or less strongly covered by a light purple flush, at the base bright yellow and covered with irregular reddish-purple, spots with a somewhat lighter-coloured centre *P. papilio-laoticus*



PAPHIOPEDILUM VILLOSUM
COURTESY OF RAMON DE LOS SANTOS

PAPHIOPEDILUM VILLOSUM

(LINDLEY) STEIN

STEIN'S ORCHIDEENBUCH: 490 (1892)

BASIONYM

Cypripedium villosum Lindley

THE GARDENERS' CHRONICLE, 1st. series, 14: 135 (1854)

SYNONYM

Cordula villosa (Lindley) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

ETYMOLOGY

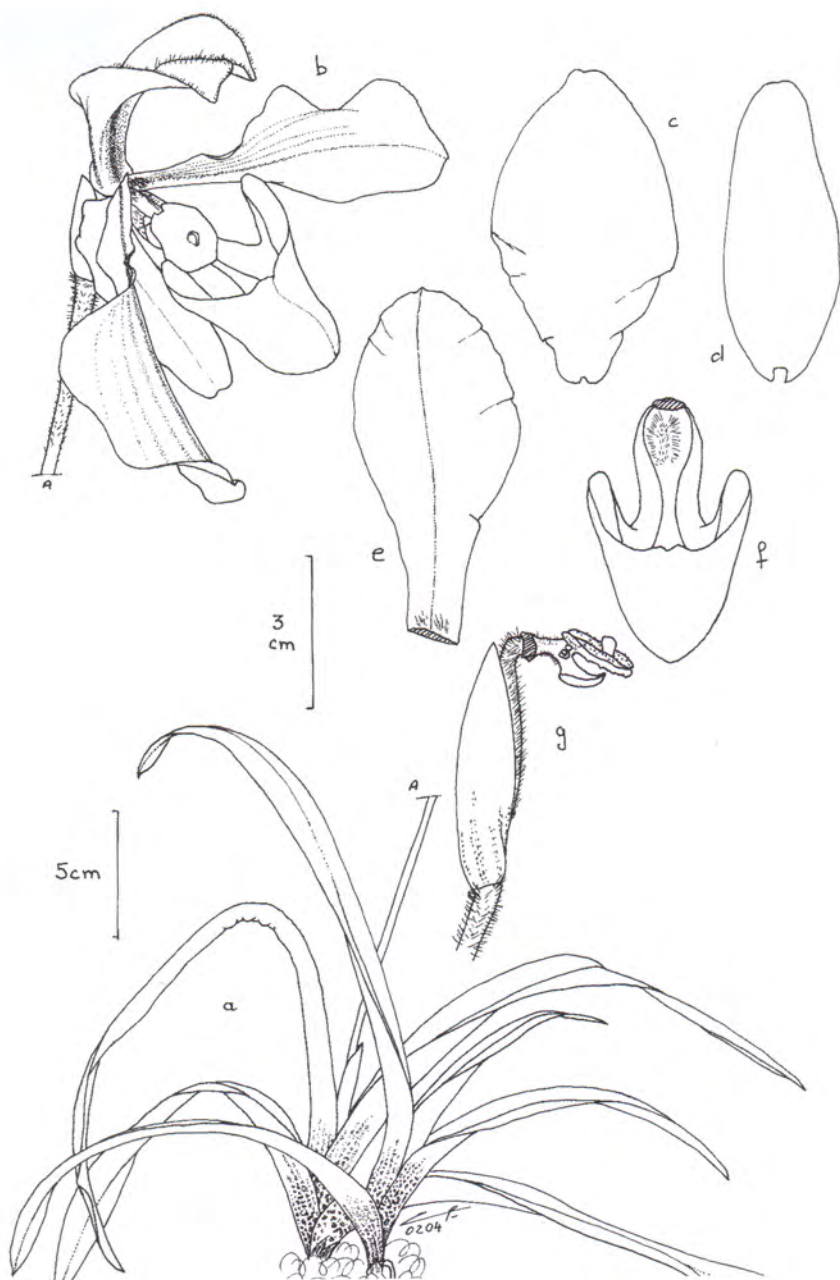
This species was named *villosum* because the peduncle, ovary, and parts of the flower are covered with fairly long, soft hairs.

DISCUSSION

Paphiopedilum villosum was discovered by Thomas Lobb in 1853 in the mountains of the Mawlamyine (formerly Moulmein) District in southeastern Myanmar at about 1,600 m above sea level. This species was first imported into England by Veitch in the same year, and it has been recorded that their correspondent, the Reverend C. Parish, found more populations in the same region. Authors have included various other taxa in this species (*P. affine*, *P. boxallii*, *P. dilectum*, and *P. gratrixianum*). Whereas the identities of *P. affine* and *P. dilectum* are rather confused, we consider *P. boxallii* to be a variety of *P. villosum* and *P. gratrixianum* as an autonomous species.

DESCRIPTION

Paphiopedilum villosum is an herbaceous, clump-forming plant that usually grows in decaying leafy debris. Each growth produces four to five leaves. The plants attain an overall height of about 30 cm. The leaves are narrow-lanceolate to linear-ligulate, 14 to 42 cm long by 2.5 to 4 cm wide, acuminate to acute at the bilobate apex, semi-erect, deep yellow-green. The base of the underside is speckled purple, and the basal margins are ciliate. The inflorescence, which is sub-erect to arcuate, has a 7.0 to 24.0 cm long peduncle. It is dark green, often spotted purple, covered by long, villose, reddish-purple hairs, and generally carries a single flower. The bract is elliptic, obtuse, about 3.7 to 6.5 cm long, usually about as long as the ovary, 3.0 to 3.8 cm wide, green with maroon spots, and glabrous. The pedicel and ovary are triangular in cross-section, 3.0 to 6.0 cm long, ochre-coloured, and densely covered with purple villose hairs. Generally, the flowers are 7.5 to 11.5 cm across, but they can be remarkably larger (up to 15.0 cm across), with a glossy, varnished-appearing surface. The dorsal sepal is obovate, obtuse, about 4.5 to 6.5 cm long by 3.5 to 4 cm wide, ciliate. It has reflexed margins in the basal region. It is bright green, suffused with intense purple in the lower two-thirds, has a



PAPHIOPEDILUM VILLOSUM

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON

narrow white band along the margins, and deeply coloured veins in the middle. The synsepal, which is usually adpressed to the ovary, is ovate, sub-acute, 3.8 to 5.0 cm long, 1.8 to 2.7 cm wide, bright yellowish-green, and reflexed. The petals are 4.6 to 7.0 cm long by 2.5 to 3.0 cm wide, obovate-spathulate to spathulate, retuse-emarginate, and rounded at the apex. The petals are undulate with ciliate margins, purple villose at the base, somewhat curved inward, and glossy with a broad brown-purple to maroon mid-vein. The superior half is yellowish-brown to reddish-brown, the inferior half is paler. The lip is shaped like an inverted helmet, 4.0 to 6.0 cm long by 3.0 to 3.8 cm wide, more or less pointed, with a wide mouth. It is bright brownish-yellow flushed with pink or red, has darker venation, and there is a tawny-yellow rim around the aperture. The staminodal shield is inverted oblong-cordiform, truncate, about 1.6 cm long and only slightly narrower. It is verrucose and hirsute, tawny-yellow, with a small yellow or green horn-shaped tooth below the centre, and a short protuberance at the lower margin.

DISTRIBUTION AND HABITAT

Northern Thailand, southern China, western Myanmar, and northeast India. In India, *Paphiopedilum villosum* is found in Assam and the Lushai Hills of Mizoram Province. In Myanmar plants of this species are found in the Chin Hills. *Paphiopedilum villosum* grows in the forks of tall trees at 1,100 to 2,000 m. They develop into large clumps with their roots strongly attached to the host trees or embedded in matted ferns and mosses. The habitat is wet most of the year. In addition to the heavy monsoon rains in summer, late-night and early-morning fog, mist, and heavy dew are common during the drier winter season.

FLOWERING

Most plants of *Paphiopedilum villosum* have been reported to flower from January through April, but specimens of this species have been reported to flower all year round.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Mehlquist, 1947; Duncan 1947; Duncan & MacLeod 1948b; Kamemoto *et al.*, 1963; Karasawa, 1979, 1981).

VARIETIES AND FORMS

A number of variants of *Paphiopedilum villosum* have been described. Most of them differ only slightly from the "typical" forms. The interested reader is again referred to the pertinent literature. (Linden *et al.*, 1885-1906; Pucci, 1891; Desbois, 1898). Discussed here are the variants that can be regarded as well differentiated.



PAPHIOPEDILUM VILLOSUM
COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

PAPHIOPEDILUM VILLOSUM FORMA ANNAMENSE

(ROLFE) BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
2: 245 (1999)

DISCUSSION

Originally described as *Paphiopedilum villosum* var. *annamense* by Rolfe (in CURTIS' S BOTANICAL MAGAZINE, 133, t. 8126 [1907]), this form was discovered by Wilhelm Micholitz, a collector for Sander & Sons of St. Albans, in Annam (now Laos and northern Vietnam). It differs from the "typical" *P. villosum* in having narrower, more erect leaves and a smaller flower with a different colour pattern. *Paphiopedilum villosum* forma *annamense* should not be confused with *P. x annamense* (Rolfe) Guillaumin (1924) which, although originally named as if it were a natural hybrid, is an artificial hybrid between *P. Ashburtoniae* (*barbatum* x *insigne*) and *P. Numa* (*lawrenceanum* x *stonei*). According to SANDERS' LIST OF ORCHID HYBRIDS, *P. Whitefieldense* is the correct name for this garden hybrid.

DESCRIPTION

The leaves of *Paphiopedilum villosum* forma *annamense* are erect or arching, linear-oblong, bidentate at the apex, coriaceous, and 20 to 40 cm long by nearly 2.5 cm wide. They are dull green with brown spotting at the conduplicate base. The scape is stout, erect, villous, 15 to 25 cm high, green with brown spots, and generally bears a single flower. The bract is elliptic-oblong, sub-obtuse, conduplicate, and about 3.8 cm long. The ovary is shaggy. The flowers are large. The dorsal sepal is erect, obovate-orbicular, obtuse, and slightly ciliate. It is nearly 5 cm long, and has margins that are somewhat curved to the inside at the apex and curved backward at the base. The dorsal sepal is cream-coloured to whitish and is veined and suffused with dark purple in the centre, with the purple area slightly bordered with green and/or yellow. The greenish synsepal is elliptic-oblong, acute, and about as long as the lip. The petals are spreading, obovate-oblong, obtuse, ciliolate, slightly undulate, about 6.3 cm long, and light yellow with brown veins and reticulations. The lip is shaped like an inverted helmet and is about 3.8 cm long. It is yellow with a brown suffusion in front. The aperture of the lip is somewhat dilated, and the side lobes are about 1.3 cm long. The pale yellow staminode is orbicular-elliptic, 1.3 cm long, somewhat concave, three-toothed at the apex, and two-lobed at the base, with an erect fleshy tooth in the centre.

This form has its natural distribution in Laos, northern Vietnam (Annam), and southwest China. More recent collections have been reported from Yunnan Province, China. The plants were found in the Xishuangbanna District at 1,200 to 1,600 m, growing in humus in monsoon forests. *Paphiopedilum villosum* forma *annamense* flowers all year round with a peak season from January through April. The chromosome count is unknown.



PAPHIOPEDILUM VILLOSUM VAR. *BOXALLII*
IN SITU (MYANMAR)
COURTESY OF SANTANU DEY

PAPHIOPEDILUM VILLOSUM VAR. BOXALLII

(REICHENBACH FIL.) PFITZER

ENGLER, DAS PFLANZENREICH, IV. 50 ORCHIDACEAE-PLEONANDRAE, (12): 73 (1903)

BASIONYM

Cypripedium boxallii Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 7: 367 (1877)

SYNONYMS

Cypripedium villosum var. *boxallii* (Reichenbach fil.) Veitch

A MANUAL OF ORCHIDACEOUS PLANTS, 4: 54 (1889)

Cordula boxallii (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

Paphiopedilum boxallii (Reichenbach fil.) Pfitzer

Engler & Prantl, DIE NATÜRLICHEN PFLANZENFAMILIEN, II, 6: 83 (1888)

Cypripedium dilectum Reichenbach fil.

THE GARDENERS' CHRONICLE, 3rd series, 3: 330-331 (1888)

Paphiopedilum dilectum (Reichenbach fil.) Pfitzer

Engler, DAS PFLANZENREICH, IV. 50 Orchidaceae-Pleonandrae, (12): 73 (1903)

Cypripedium boxallii var. *atratum* Masters

THE GARDENERS' CHRONICLE, 3rd series, 1: 210, fig. 47 (1887)

ETYMOLOGY

Named *boxallii* for William Boxall (1844-1910), a plant collector in the service of Mr. Hugh Low & Co.

DISCUSSION

Paphiopedilum villosum var. *boxallii* probably was discovered in the Taunggyi District in the Shan State, Myanmar, by William Boxall in 1877 during a collecting trip for Messrs. Hugh Low & Co. The plant was originally described as *Cypripedium boxallii* (*loc. cit.*), and it can easily be differentiated from *P. villosum* by its spotted dorsal. According to Reichenbach's original description, it should be possible to differentiate between *P. villosum* var. *boxallii* and *P. gratrixianum* by the length of the lateral auricula ('ears') on the lip: 'long' in *P. gratrixianum* and 'short' in *P. villosum* var. *boxallii*. De facto, however, such a differentiation is rather dubious. The plants can, however, be distinguished by pubescence of the ovary which is villose in *P. villosum* var. *boxallii* but only covered by short purple hairs in *P. gratrixianum*.

The description of *Paphiopedilum dilectum* is also inconclusive, and this taxon may well be regarded to be conspecific with *P. villosum* var. *boxallii*.

Masters's *Cypripedium boxallii* var. *atratum* is based on a "dwarf plant" with "dark green foliage not exceeding 8 in. [20 cm] in height, the flower stems topping those by almost 2 in. [5 cm]." Masters continues in his description: "The colours of the lip and lateral petals consist of reddish-purple, associated with light green; the dorsal sepal is green, black-brown speckled. The upper margin being white. The whole flower has the waxed appearance seen in *C. villosum*."

DESCRIPTION

In lieu of an extensive description, we have decided to reproduce here Reichenbach's original publication from THE GARDENERS' CHRONICLE (*loc. cit.*).

"There is no doubt of *C. boxallii* standing near the well-known *C. villosum*, Lindl., but it has many points of difference. The bract is much larger, covering the basal quarter of the superior sepal, and it is besides much broader. The peduncle is covered with dark blotches, which I never saw in *C. villosum*, and hairs have alternating pellucid and rather blackish cellules. Both sepals are much broader at their bases, and quite obtuse, while the inferior sepal of *C. villosum* is quite acute. The petals, too, are much less cuneate. The lip has not the long lateral horns of *C. villosum*, and the staminode is narrower at its base. In a pencil-sketch at hand, the upper sepal and petal (said to be greenish white) are very nicely marbled with numerous blackish spots."

DISTRIBUTION AND HABITAT

Myanmar and northern Vietnam. In Myanmar, plants were found in the region around Lake Inle at 1,070-1,220 m where they grow high up on dolomite cliff faces, exposed to bright light but not direct sun. These plants most often grow close to a water source with their roots embedded in wet collections of leafy debris and mosses. In northern Vietnam, unconfirmed reports indicate that the plants occur on the Huang Son range in Lai Chau and Lao Cai Provinces in elevations up to 2,000 m.

FLOWERING

Plants of *Paphiopedilum villosum* var. *boxallii* have been reported to flower from November through July. The peak season, however, extends from February through May.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan & MacLeod 1948b, Karasawa 1979).

PAPHIOPEDILUM VILLOSUM FORMA AUREUM

BRAEM

ORCHIDEES. CULTURE ET PROTECTION, NO. 36: 35-38 (1998)

Several "forms" of *Paphiopedilum villosum* "aureum" have appeared in cultivation. Some



PAPHIOPEDILUM VILLOSUM FMA. *AUREUM*

COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

of them, however, are hybrids that can be recognised by the deviation of the staminodal shield from that of the true species.

The anonymous author who wrote about *Cypripedium villosum* var. *aureum* in THE GARDENERS' CHRONICLE for 1883 (3rd series, 19: 374), indicated that it had "the bright yellow line of beauty known as *aureum*." Desbois, however, in CYPRIPEDIUM, SELENIPEDIUM & UROPEDIUM - MONOGRAPHIE (1898), states that it was strongly maculated with black. The treatments by Linden (LINDENIA, 3: 76 [1892]) and Pucci (LES CYPRIPEDIUM ET GENRES AFFINES [1891]) are inconclusive. The plant discussed as *Cypripedium villosum* var. *aureum* de Lytutwyche as listed by Desbois (*loc. cit.*) had the front of the labellum rose ("... mais cette fleur est tout a fait distincte; le labelle est rose sur le devant."). Therefore, this plant can by no means have been an albino.

DESCRIPTION

The real *Paphiopedilum villosum* forma *aureum* has no red pigmentation anywhere on the flower. The dorsal sepal is yellowish-green with a distinct white margin. The pouch is the same colour. The petals are distinctly longitudinally divided into two shades of colour. The upper half is golden-yellow, and the lower part is yellowish-green like the dorsal sepal and pouch. The knob on the staminodal plate is green. Otherwise, the plant answers the characteristics of the type.

PAPHIOPEDILUM GRATRIXIANUM

(MASTERS) GUILLAUMIN

BULLETIN DE LA SOCIÉTÉ BOTANIQUE DE FRANCE, 4TH SERIES, 24: 548-558 [556]
(1924) (AS PAPHIOPEDILUM GRATRIXIANUM)

BASIONYM

Cypripedium gratrixianum Masters (non Williams)

THE GARDENERS' CHRONICLE, 3rd. series, 37: 76-77, fig. 35 (1905)

SYNONYMS

Cordula gratrixiana (Masters) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

Paphiopedilum affine De Wildeman

LA TRIBUNE HORTICOLE, 1: 57 (1906)

Paphiopedilum villosum var. *gratrixianum* (Masters) Braem

PAPHIOPEDILUM, 119 (1988)

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

PAPHIOPEDILUM, 119 (1988)

Paphiopedilum guangdongense L.J. Chen, Z.J. Liu, Y.Y. Li, & L.Q. Li

JOURNAL OF SYSTEMATICS AND EVOLUTION, 48(5): 350-355 (2010)

Paphiopedilum stenolobum Z.J. Liu, O. Gräß, & L.J. Chen

DIE ORCHIDEE, 62(3): 189-190 (2011)

Paphiopedilum x wuliangshanicum Z.J. Liu, O. Gräß, & L.J. Chen

DIE ORCHIDEE, 62(3): 190-193 (2011)

Paphiopedilum cornutatatum Z.J. Liu, O. Gräß, & L.J. Chen

DIE ORCHIDEE, 62(4): 275-279 (2011)

Paphiopedilum daoense (Averyanov) Averyanov *et al.*

DIE ORCHIDEE, (Interent Edition), 3 (6): 39-46 (2017)

Paphiopedilum christensonianum (Perner & Koopowitz) Koopowitz

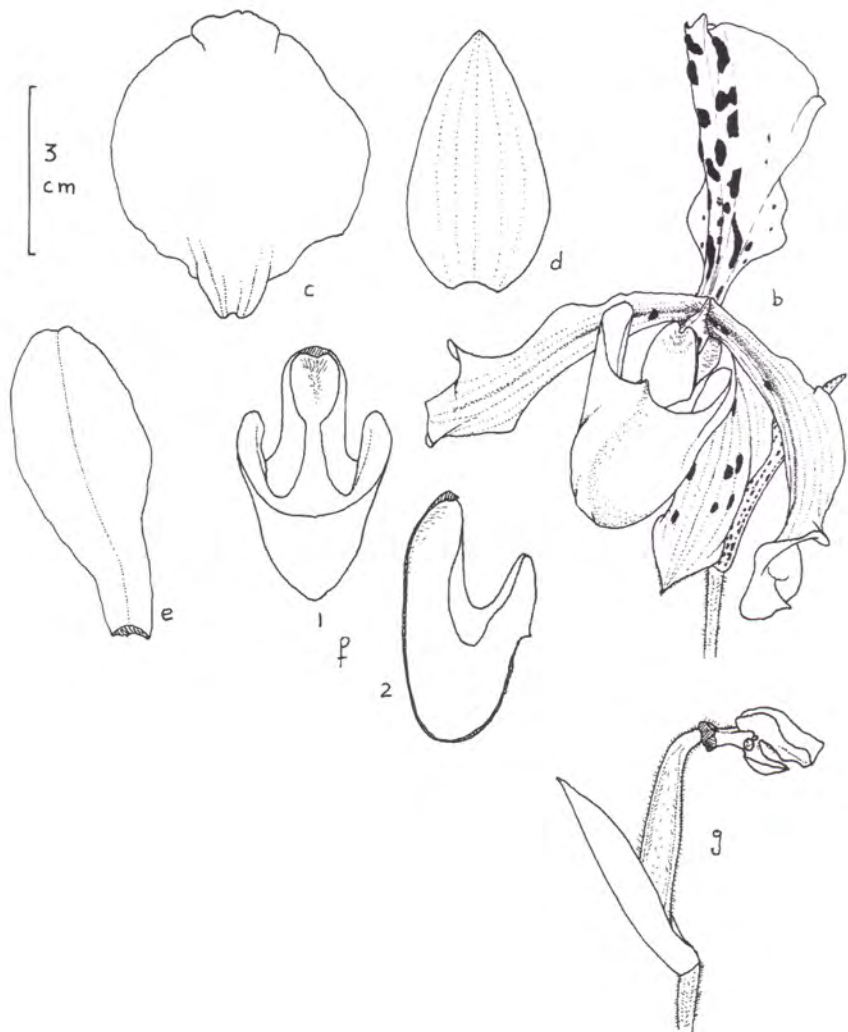
ORCHID DIGEST, 82(4): 190 (2018): *nomen invalidum*

ETYMOLOGY

Named *gratrixianum* in honour of Mr. S. Gratrix of Manchester, England.

DISCUSSION

Paphiopedilum gratrixianum is very closely related to *P. insigne* and *P. villosum*. It has an overall similarity of its floral segments with *P. villosum*, and its petals are distinctly widened toward the apex from a narrower base, a criterion clearly differentiating the plants of the *P. villosum* complex from those of *P. insigne*. From *P. exul*, it can be sepa-



PAPHIOPEDILUM GRATIXIANUM
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON

rated by its growth habit, foliage, as well as by the different form of its dorsal sepal and pouch. From *P. villosum* it can be differentiated by the lack of long, soft villose hairs on the inflorescence and ovary.

The species is not to be confused with the plant published under the same name as t. 524 in volume eleven of THE ORCHID ALBUM (Warner & Williams, 1897). This latter concept represents a man-made hybrid between *P. bellatulum* and *P. Enfieldense* (*hookerae* x *lawrenceanum*), which should correctly be referred to as *P. James Buckingham*, the name under which the cross was first registered by Hollington in 1896.

The taxa published as *P. guangdongense*, *P. stenolobum* and *P. x wuliangshanicum* are geographical variants of *P. gratrixianum* and do by no means warrant being treated as autonomous species.

DESCRIPTION

Paphiopedilum gratrixianum is an herbaceous plant growing in leafy humus. The plants are tufted, and growths produce four to eight linear, sub-erect, coriaceous, glabrous leaves that are acute or minutely three-lobed at the apex. The leaves may be up to 30 cm long by 2.0 to 4.0 cm wide. They are green with purple spots on the base of the under surface. The leaves are channelled in the middle of the upper surface, and show a prominent midrib beneath. They are tapered toward their sharply folded base. The flowers, which are 7.0 to 12.0 cm across at their widest point, are borne on an erect scape that can be up to 35 cm long. The terete, green scape is covered near the top with fine purplish hairs. The bracts are narrowly oblong-lanceolate to obovate, acute to obtuse, conduplicate, green, purple-dotted, 3.0 to 4.5 cm long by 1.2 to 1.5 cm wide, and glabrous. The ovary is triangular in cross-section, three-sided and three-ridged, pale green, and covered with short purple hairs. Together with the pedicel, the ovary is about 3.5 to 5 cm long. The dorsal sepal is ovate to broadly obovate, undulate, obtuse, 4.8 to 5.2 cm long by 4.4 to 4.6 cm wide, and the outer surface is covered with short purple hairs. The dorsal sepal is constricted at the base, greenish from the base and for two-thirds of its length. Its upper portion and margins are porcelain white, and the entire surface is studded with rather large, nearly circular purple spots. The synsepal is distinctly smaller than the dorsal sepal, usually shorter than or only very slightly exceeding the pouch, ovate-elliptic to oblong, acute, and 3.5 to 5.0 cm long by about 2.5 cm wide. It is greenish with a few purplish dots and the outside is covered with short purple hairs. The petals are spreading, slightly curved inward, oblong-spathulate to spathulate, obtuse, 4.5 to 5.2 cm long by 1.8 to 2.5 cm wide, waxy at the margins, and minutely ciliate. The side margins are reflexed. The shiny petals are pale greenish to yellow, flushed and veined with purplish brown. The lip is a similar but deeper colour, shaped like an inverted helmet, tapering to the apex, with distinct lateral auriculae. Overall, the lip is 4 to 4.2 cm long by 2.4 to 3 cm wide. The staminode is slightly hairy at the base. The staminodal shield is more or less round to obcordate, flattened, yellowish, with a shiny projecting boss near the apex, about 11 mm long and wide, and the basal half is covered with purplish hairs.



PAPHIOPEDILUM GRATRIXIANUM
PHOTOGRAPH COURTESY OF PAUL UPWARD

DISTRIBUTION AND HABITAT

Paphiopedilum gratrixianum has been reported from southeastern Laos (Attapeu Province) near Pak Song, just west of the border with central Vietnam, and from a single locality in northern Vietnam (Dam Dao Ridge between Vinh Phuc and Thai Nguyen Provinces). The plants grow in humus on steep slopes in primary broad-leaved evergreen forest at elevations between 850 and 1,200 m.

FLOWERING

In cultivation, *Paphiopedilum gratrixianum* generally flowers from September through April. In their natural habitat in Vietnam, the plants bloom from October through December.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan & MacLeod, 1948b).

Paphiopedilum gratrixianum produces numerous new growths every year, but growths do not bloom until they are fully mature, which usually takes two or three years. Growers indicate that flowers last longer when plants are grown in diffuse light.

VARIETIES AND FORMS

Paphiopedilum gratrixianum is extremely variable, and it does, therefore, not surprise that a number of variants have been described as autonomous entities at various taxonomic levels (see list of synonyms).



PAPHIOPEDILUM PAPILIO-LAOTICUS
WATERCOLOUR PAINTING BY DEINITISA AMARAWI
COURTESY OF DEINITISA AMARAWI

PAPHIOPEDILUM PAPILIO-LAOTICUS

SCHUITEMAN, LUANG APHAY & LIO

ORCHIDEENJOURNAL (INTERNET), 6(4): 3-6 (2018)

ETYMOLOGY

Named *papilio-laoticus*: “*papilio*” being the Latin designation for “butterfly”, and “*laoticus*” being a reference to the country of origin.

DISCUSSION

Paphiopedilum papilio-laoticus is very closely related to *P. gratrixianum*, and in fact has been known for more than 40 years, but until recently considered but a geographical variant of the latter. However, there is a series of differences that together add up to a very distinct taxon that may, in our opinion, be considered an autonomous species. More will possibly have to be said when molecular studies concerning the plants of the *P. villosum* complex are carried out.

DESCRIPTION

Paphiopedilum papilio-laoticus is an herbaceous plant growing in leafy humus. The plants are tufted, and growths produce four to five pendent to sub-erect leaves with an obtuse apex. They are linear, up to 38 cm long by up to 4.8 cm wide, grass-green, not tessellated. The underside is lighter green, near the base densely covered by fine purple spots, the base nearly completely solid purple. The inflorescence is about 20 to 33 cm long, 7-8 mm in diameter, is covered by very short purple hairs, and generally carries a single flower. The floral bract is ligulate, about 5.2 cm long by 3.4 cm wide, bright green, glabrous. The pedicel and ovary are curved, light green, up to 4.4 cm long by about 9.5 mm in diameter, and, like the inflorescence, are covered by short purple hairs. The flowers are large and showy, about 12 cm across. The dorsal sepal is suborbicular, nearly fully spread and standing upright about 8.2 cm high by about 8.5 cm wide, the apex emarginated, and mucronate. It is white, more or less strongly covered by a light purple flush, except for the margins that remain white. At the base there is a bright yellow blotch and the basal half of the dorsal is adorned with some irregular reddish-purple spots with a somewhat lighter- coloured centre. The synsepal is narrowly ovate, about 6.7 cm long by about 3.2 cm wide. It is subacute, light green. The petals generally point downward at an angle of about 35 degrees and are somewhat incurved. They are narrowly oblanceolate, about 7.3 to 7.8 cm long by about 1.8 cm wide. Their apex is rounded, the margins are slightly undulate, at the base there is a small patch of long hairs, and the apex is slightly pubescent. The petals are glossy, light brown to greenish-brown with a distinct darker brown dividing line horizontally, the colouration above that line being distinctly darker than below. The lip is about 6.5 cm high by about 3.9 cm wide, at the claw about 2 cm wide, and inside the base the lip is pubescent. The pouch is shaped like an inverted helmet, tapered to an obtuse apex. The lip is white at the base, the pouch light reddish-brown, somewhat darker than the petals. The column



PAPHIOPEDILUM PAPILIO-LAOTICUS
COURTESY OF SULIVONG LUANG APHAY

is white, covered by purple hairs. The staminode is subcordate, more or less intensely covered by minute rose spots, leaving only the margins white. The knob on the staminode is bright yellow. The staminode is broadly ovate, about 1.7 cm high by 2 cm wide. The stigma is ovate, glabrous.

DISTRIBUTION AND HABITAT

Paphiopedilum papilio-laoticus has hitherto been reported from Laos. One population is reported from Van Vieng in Vientiane Province, and another population is reported from the Phongsali Province about 350 km to the north.

FLOWERING

In its natural habitat, *Paphiopedilum papilio-laoticus* generally flowers from March through August.



PAPHIOPEDILUM FAIRRIEANUM
WATERCOLOUR PAINTING BY EUNIKE NUGROHO
COURTESY OF EUNIKE NUGROHO

PAPHIOPEDILUM FAIRRIEANUM

(LINDLEY) STEIN

STEIN'S ORCHIDEENBUCH, 467 (1892)

BASIONYM

Cypripedium fairrieana Lindley

THE GARDENERS' CHRONICLE, 1st series 17: 740 (1857)

SYNONYM

Cordula fairrieana (Lindley) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Named *fairrieana* for Mr. Fairrie, a British orchid enthusiast.

DISCUSSION

In a genus fraught with taxonomic and nomenclatural confusion, *Paphiopedilum fairrieana* is a refreshing exception as it is easy to identify. The plants, besides having the typical characteristics of subgenus *Paphiopedilum* including plain green leaves, a single-flowered inflorescence, and well-developed lateral auricles (ears) on the pouch of the labellum, are unique in their overall flower morphology, and thus, they are placed in their own section - *Ceratopetalum*. The petals generally are almost vertically pendulous and show apical portions that are strongly curved backward. The large white dorsal sepal is adorned with bold purple stripes.

Paphiopedilum fairrieana often grows in association with *P. venustum* in the wild. It is, therefore, not at all surprising that a natural hybrid, *P. x pradhanii*, has been described (Pradhan, 1979).

Paphiopedilum fairrieana first reached England in 1857, and according to W. J. Hooker (CURTIS'S BOTANICAL MAGAZINE, 83, sub t. 5024) "[the plants] were, we believe, obtained at a sale of East Indian Orchids, at Steven's Rooms, of a collection sent from Assam."

By late 1857, plants had obviously flowered at Burnham, Somerset, in Reis's collection in the Hornsey Nursery, and in Liverpool in Mr. Fairrie's collection. That latter plant was exhibited in October of that same year in Willis's Rooms at the London Horticultural Society and attracted the attention of John Lindley, who published the new species (*loc. cit.*) dedicating it to Mr. Fairrie.

The Belgian horticulturist Van Houtte (1810-1876) wrote in 1857 (FLORE DES SERRES, 12: 120, sub t. 124), however, that it was he who imported the plants from Bhutan (neighbouring Assam) and subsequently sold them without a name to some of his "cor-



PAPHIOPEDILUM FAIRRIEANUM IN SITU
COURTESY OF UDAI C. PRADHAN

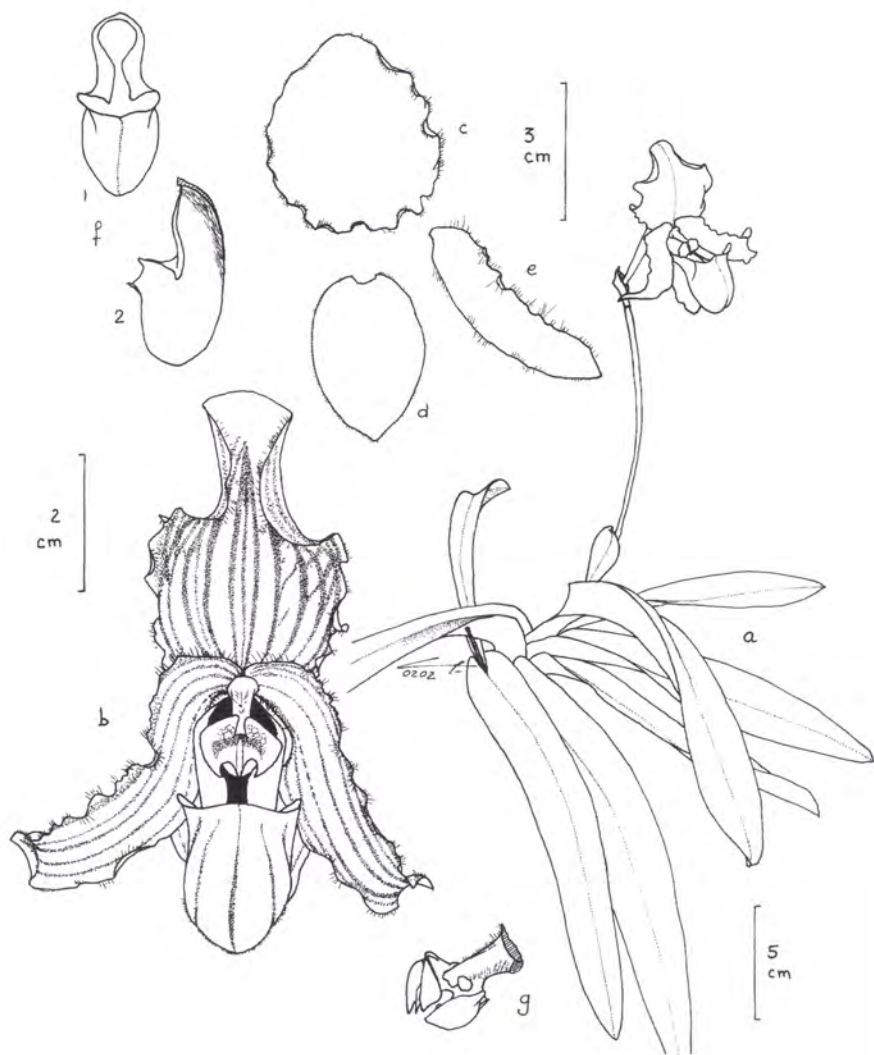
respondents." The accuracy of this statement cannot be verified, but history records a number of instances in which English orchid dealers purchased plants on the continent and subsequently sold them as their own importation.

The exact origin of this beautiful slipper orchid remained an enigma for many years. Although Hooker indicated "Assam" as its native area of distribution, the advertisement for the sale at Steven's Rooms said "India", and apparently, no further or more detailed information was available. Due to mistreatment of the plants by subjecting them to extreme heat and stale air conditions in the typical "hothouses" of the time, *P. fairrieianum* had almost disappeared from cultivation by the end of the century. In 1905, Sir Trevor Lawrence had the only plant known to have survived in England. On the continent, four small plants were cultivated by Mr. Opoix in the greenhouses of the Senate in Paris, but these plants were apparently in rather bad condition. In an article published in LA REVUE HORTICOLE for 1903, Opoix stated that his plants originated from a collector named Simons, an apothecary who had lived for many years in the Nowgong (now Nagaon) District, in the center of Assam State, in the Brahmaputra Valley, and who in his leisure time had made many excursions both into the Khasia and the Mikir Hills.

The demand for this marvellous slipper orchid was accordingly high. Sander & Co. of St. Albans were in financial trouble, and Sander needed a "coup" to save his company. Importing *P. fairrieianum* would be just the thing. Thus, near the end of 1904, Frederick Sander, the "Orchid King", set out a price of £ 1,000 for a plant of *P. fairrieianum* and the exclusive knowledge of its origin. Obviously the prospects of this fortune would bring out all plant hunters in the area. Whether Sander really intended to pay the price may be doubted. Micholitz, Sander's collector in the area, refused to join the hunt. He wrote his employer:

"I deeply deplore the unfortunate turn the *fairrieianum* [sic] affair has taken, because there can be no doubt that the plant will be collected by a lot of people, and nobody will make anything out of it [meaning that the large number of plants he anticipated to be collected would cause the sales price to fall into oblivion]. Permit me to say that to a great extent you have only yourself to thank for it, after loudly proclaiming to the whole world you would pay £ 1,000 for the plant, which I am fully convinced you are no more intending to pay than to jump from London Bridge."

The rest is orchid history. Indeed, the "orchid hunters" became extremely active, and a scant three months after the offer, rediscovery of the species was announced. A British engineer named G. C. Searight claimed to have rediscovered the plants in Bhutan, and stock was said to be in cultivation in Calcutta on the premises of the nurseryman Chatterji. The identity of the plants Searight claimed to have discovered, however, was questioned, and it was not until the end of April, 1905, when some had arrived at Kew, that it was more or less accepted that *P. fairrieianum* had indeed been rediscovered. In the meantime, Perreira, a freelance collector sometimes employed by Sander, had made contact with the native porters who had accompanied Searight on his travels to Bhutan and obtained plants of *P. fairrieianum* from them.



PAPHIOPEDILUM FAIRRIEANUM
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON

He offered "a few hundred" to Sander, and Sander was more than happy to take them, as he was convinced that they would fetch good prices. On June 18, 1905, the plants finally arrived, and the British as well as the American press made a big story of it. Still, there were some sceptics, and it was not until September, after a plant had flowered at Kew, that all doubts were removed.

On September 15, 1905, at the auction house of Protheroe & Morris, Sander put up 179 of the plants for sale, a number of which were in bloom. Micholitz's prediction came true. The plants did not fetch the anticipated sums, whereby the highest price paid was twenty-one guineas for "a magnificent specimen plant." These prices were far from the hundred guineas paid for plants like *Cattleya labiata* "vera", *Cattleya sanderiana* or *Vanda sanderiana*, only a few years earlier. In all, the sale reached only £ 550. Sander, however, had already sold many of the choicest plants of his importation to his regular rich clientele before the auction, and years later, his son Fred would write that in 1905 the firm was saved "by the luck of the *fairieanum* [sic]."

Of course, Sander would have had to deduct the offered £ 1,000 from his profits. But again, Micholitz proved to be a prophet. Sander argued that Searight had not given him complete priority, allowing plants to go to Calcutta and Kew, and that, furthermore, plants had reached the market via other sources [i.e. the native porters via Perreira]. He, therefore, was only willing to pay £ 500. Searight's comments about this are not on record.

By the end of 1905, native porters arrived in Darjeeling with another 800 plants. Whatever happened to these is not known, but presumably they were sent to England. Around that time, the price of *P. fairrieianum* dropped to a few shillings.

Chatterji, the nurseryman who had stocked the plants for Searight, was not to leave the scene without further ado. He travelled to Darjeeling and hired a collector by the name of Longook to go to the Ammochu Valley where Searight had found the orchid, to bring as many plants as he could carry, and to uproot the rest and throw them into the river! Longook, however, maintained that he did not follow these instructions because he intended to return to the site to collect *P. fairrieianum* on his own account at a later date. The real truth will forever remain a secret.

In much of the older literature the species name is spelled with a single "r," probably due to the fact that in Lindley's original description Mr. Fairrie's name was misspelled (no matter whether by the author or by the typesetter). It has, however, been conclusively established that the correct spelling of Mr. Fairrie's name is with a double "r". According to article 60.1 of the International Code of Botanical Nomenclature, such orthographic or typographic error is to be corrected.

DESCRIPTION

Paphiopedilum fairrieianum is a compact, clump-forming, herbaceous plant of dwarf habit that grows in leafy humus. Each growth produces four to eight leaves on a short



PAPHIOPEDILUM FAIRRIEANUM FLOWERS — TOP: TYPICAL FORM, BOTTOM: FMA. *BOHLMANNIANUM*
 WATERCOLOUR PAINTING BY EUNIKE NUGROHO
 COURTESY OF EUNIKE NUGROHO

stem. The leaves are oblong-ligulate to linear-ligulate, obtuse or rounded at the apex, minutely tridenticulate, 7.5 to 27 cm long by about 2.5 cm wide, and commonly coloured plain mid- to dark-green, sometimes very faintly mottled. The underside is paler green, distinctly keeled, and the margins are serrulate toward the apex. The inflorescence, which is 10 to 20 cm high (rarely taller), is dark green, covered with purple bristles, and usually bears one flower, seldom two. The bract is elliptic, obtuse, 1 to 4 cm long, about 0.8 cm wide, whitish, and covered with purple hairs. The very showy flowers vary from small to large, but they are generally 6 to 7.5 cm high and about 4 cm across. The dorsal sepal is about 3.5 to 8 cm long by 2.5 to 7 cm wide, elliptic to ovate, obtuse, ciliate, undulate at the margin, and curved backward at the bilobed apex. The outer side has a hairy keel. The dorsal sepal may be white to greenish-white with a pale yellow-green stain at the base and purple longitudinal veins. The synsepal is somewhat smaller, about 2.5 to 3.5 cm long by 1.7 to 2.5 cm wide, elliptic to ovate, rounded at the apex, and white to bright green with purple veins. The petals are oblong-ligulate to lanceolate, more or less S-shaped, pendulous, acute, 4 to 5 cm long by 1 to 1.5 cm wide, deflexed with an apex that is curved backward, fringed with minute near-black hairs at the undulate margins, and greenish-white to yellowish-white with longitudinal streaks and marginal bands of purple. The main lobe of the lip is deeply saccate, shortly apiculate, and 3 to 4 cm long by 1.6 to 2.3 cm wide with a relatively broad aperture. It is sometimes brownish-green with purplish veining, sometimes plain greyish-green and sometimes yellow-green or olive, but always with darker veins. The lateral lobes are folded inward, creamy-white, often with purple spots. The staminodal shield is orbiculate-lunate to elliptic with a tooth between the horns of the crescent at the bottom. It is ivory-white to yellow, mottled with green, has a purple band along the front, and is about 0.9 cm long by about 0.7 cm wide.

DISTRIBUTION AND HABITAT

Northeast India and adjacent regions. *Paphiopedilum fairrieianum* grows in India in Sikkim and Arunachal Pradesh and in southern Buthan. It is most often found on west-facing slopes between 1,400 and 2,200 m. It grows in a variety of habitats, including sheltered grassy slopes which cover outcrops of crystalline limestone, on rocks in oak forest, in the midst of grasses on open gneiss ledges, and in dolomite gravel on ledges above rivers and streams.

FLOWERING

In cultivation, the bloom season of *P. fairrieianum* extends from September through March, but plants have also been reported to bloom in the remaining months of the year. In the habitat, the plants bloom in winter.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Mehlquist 1947, Duncan 1947, Duncan & MacLeod 1949a, Tanaka & Aoyama 1974, Karasawa 1979).



PAPHIOPEDILUM FAIRRIEANUM
COURTESY OF DOROTHY POTTER BARNETT

VARIETIES AND FORMS

Although *Paphiopedilum fairrieianum* is, at first sight, a relatively uniform species, the description previously given indicates that flower size and colour may differ considerably within the species. The great majority of the variants that have been described were based on insignificant differences occurring in single plants and are of “academic interest” only. Most of them have not been described validly and do not deserve any scientific validation. As for many other species of the genus *Paphiopedilum*, the only variant of continuous interest is, without any doubt, the albino:

PAPHIOPEDILUM FAIRRIEANUM FORMA BOHLMANNIANUM (MATHO) BRAEM

ORCHIDÉES, CULTURE ET PROTECTION, NO. 36: 35-38 (1998)

This is a well-known albino, which was originally described as *P. fairrieianum* var. *bohlmannianum* in July of 1942. It is often erroneously referred to as “*P. fairrieianum* var. *album*” in horticultural circles. The flowers, however, are not white, but yellow to yellowish-green with darker green veining. There are several different clones of this true albino. The plants are usually smaller than those of the typical form and rather difficult to grow. Unfortunately, plants have been awarded as “var. *album*” by the American Orchid Society and were described (though invalidly) as *Paphiopedilum fairrieianum* var. *flavum* (ORCHID DIGEST, 42 [4]: 151-158 [1978]).

Paphiopedilum fairrieianum forma *bohlmannianum* was named for Ernst Bohlmann, who was chairman of the orchid section of the German Horticulture Society (Deutsche Gartenbaugesellschaft) at the time of description.



PAPHIOPEDILUM HIRSUTISSIMUM

DETAIL OF A WATERCOLOUR PAINTING BY HEMLATA PRADHAN

COURTESY OF HEMLATA PRADHAN

THE PAPHIOPEDILUM HIRSUTISSIMUM COMPLEX

In this complex, four taxa have been described at the species level: *Paphiopedilum hirsutissimum* by Willam Jackson Hooker on the basis of a manuscript by Lindley in 1857, *P. esquirolei* by Rudolf Schlechter in 1919, *P. chiwuanum* by Tang & Wang in 1951 and *P. saccopetalum* by Hua in 1998. The last taxon is the easiest to deal with as it represents, without the slightest doubt, a one-time deformed mutation of *P. hirsutissimum* or *P. esquirolei*.

The question whether *Paphiopedilum esquirolei* is a good autonomous species or ‘merely’ a variant of *P. hirsutissimum* is as old as its description. There are, however, real differences and we choose to treat the two taxa as separate species, whereby we will discuss said differences in detail under each entity.

The description of *Paphiopedilum chiwuanum* by Tang & Wang is based on a dubious herbarium specimen that allows for interpretation. It could be viewed as a plant in bud or, alternatively, as a plant similar to *P. hirsutissimum* but with much smaller flowers. One should bear in mind that the authors of *P. chiwuanum* were not versed in orchid taxonomy. On the same page of their publication, they had already described *P. micranthum*, mistaking the bud of the herbarium specimen for a fully developed flower. Thus, it does not surprise that they brought considerable confusion to *Paphiopedilum* taxonomy by writing: “It is near akin to *P. micranthum* ...”.

Cribb, although treating *P. chiwuanum* as a separate variety of *P. hirsutissimum* in his 1987 monograph, chooses to sink it into the synonymy of *P. hirsutissimum* var. *esquirolei* in his 1998 monograph. Since we accept *P. esquirolei* as an autonomous species, we choose to consider *P. chiwuanum* as a variety thereof.

The judging systems of the various orchid societies have awarded plants of *P. esquirolei* both as an autonomous species and as a variety of *P. hirsutissimum*. The orchid registrar of the RHS treats both taxa as belonging to the same species.

Key to the Taxa Belonging to the *Paphiopedilum hirsutissimum* Complex

- 1. Peduncle and ovary covered with long hairs (hirsute), humps on the staminodal shield distinctly protruding *P. hirsutissimum*
- 1a. Peduncle and ovary covered with very short hairs, humps on the staminodal shield only slightly protruding *P. esquirolei*



PAPHIOPEDILUM HIRSUTISSIMUM IN SITU
COURTESY OF DR. PANKAJ KUMAR

PAPHIOPEDILUM HIRSUTISSIMUM

(LINDLEY EX HOOKER) STEIN

STEIN'S ORCHIDEENBUCH, 470 (1892)

BASIONYM

Cypripedium hirsutissimum Lindley ex Hooker

CURTIS'S BOTANICAL MAGAZINE, 83 t. 4990 (1857)

SYNONYMS

Cordula hirsutissima (Lindley ex Hooker) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum saccopetalum Hua

DIE ORCHIDEE, 49(1): 38-39 (1998)

ETYMOLOGY

Named *hirsutissimum*, referring to the "villous or rather shaggy" coverage of the scape, bract, ovary, and the entire back of the flower with long, spreading hairs.

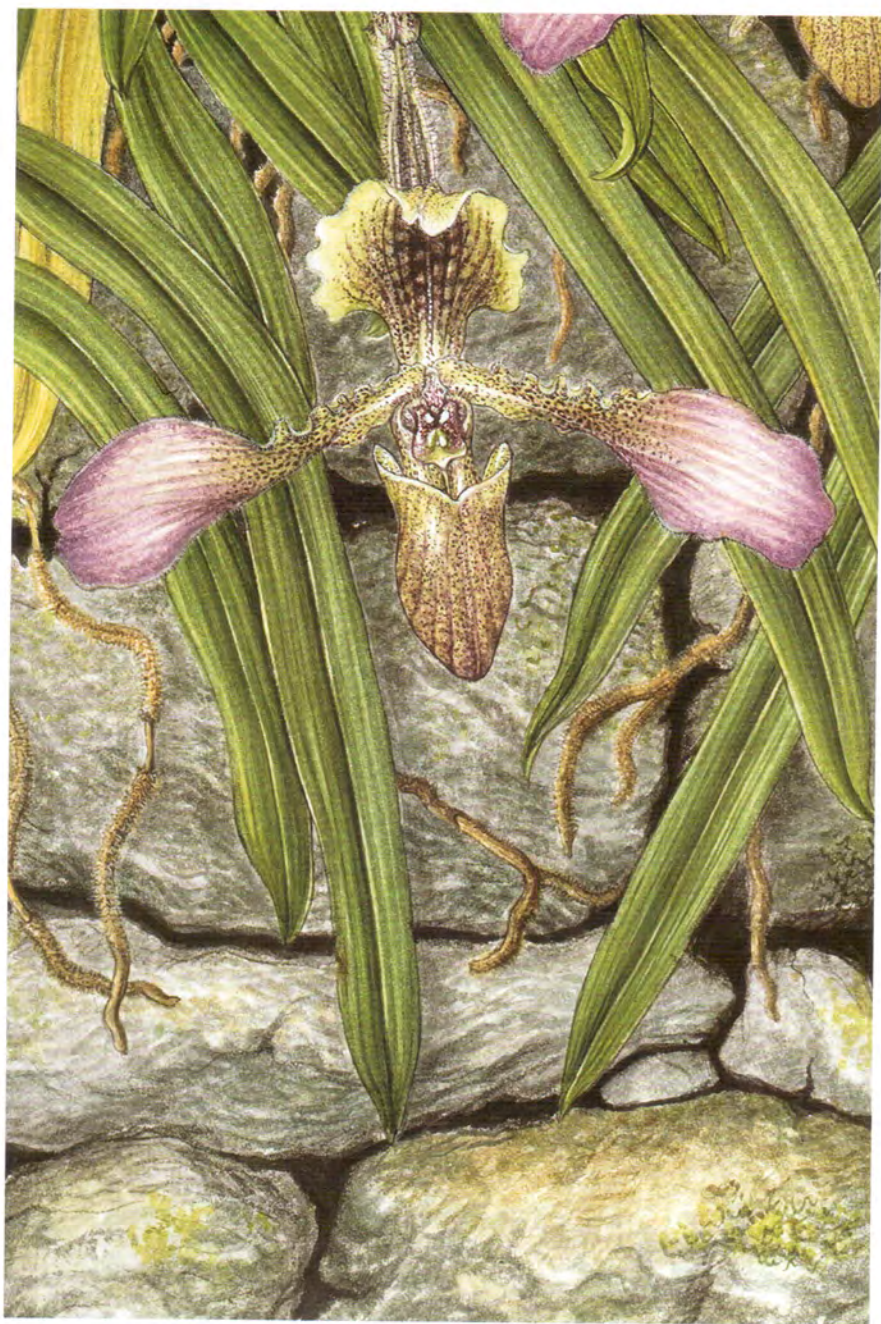
DISCUSSION

Plants of *Paphiopedilum hirsutissimum* were first sent to England by a plant collector named Simons. The exact origin remained unclear until John Day received some plants of the same species from his nephew, Captain Williamson, which were collected in the Khasia Hills in what was then the large Indian State of Assam. This area is now part of Meghalaya State. The publication by Hooker was based on a manuscript from John Lindley.

The plant more recently published as *Paphiopedilum saccopetalum* (Hua, 1998) is an aberrant form of *P. hirsutissimum* (or *P. esquirolei*) with labelloid petals (thus a peloric form). Although the author states that the plants "differ clearly" from both latter taxa by stiffer, shorter, narrower leaves, as well as by the "acute" staminodal shield, it is quite certain that the taxon represents a monstrosity. This plant does not warrant taxonomic status.

DESCRIPTION

Paphiopedilum hirsutissimum is an herbaceous plant, generally growing in decaying plant debris. Each growth carries five or six leaves which are 16 to 45 cm long, about 1.5 to 3 cm wide, uniformly green, linear-ligulate to linear-oblong, and acute to obtuse at the obliquely bilobed apex. The basal part of the leaves is suffused and spotted with purple on the underside. The inflorescence is 17 to 30 cm long, usually green, covered with dark purple hairs, and generally bears a single flower. The peduncle is subtended at the base by a sheath up to 11 cm long. The bract is 1.5 to 2.8 cm long, about a third of the length of the ovary, elliptic, and obtuse to sub-acute. The bract and ovary, just as



PAPHIOPEDILUM HIRSUTISSIMUM

DETAIL OF A WATERCOLOUR PAINTING BY HEMLATA PRADHAN
COURTESY OF HEMLATA PRADHAN



PAPHIOPEDILUM HIRSUTISSIMUM IN SITU
COURTESY OF DR. PANKAJ KUMAR

the scape and the entire outside of the flower, are covered with near-black-purple hairs. The large flower is 10 to 15 cm high and all the segments are ciliated. The basic colour of the dorsal sepal may be pale yellow or pale green, the central and basal areas are densely suffused or spotted with glossy, dark, near-black-purple, and the broad margins vary from deep green to pale green or pale yellow. The dorsal sepal is broadly cordate to ovate-elliptic, obtuse to emarginate, keeled behind, 3.8 to 4.5 cm long by 2.5 to 4 cm wide, and ciliate with undulate margins. The synsepal is similar but somewhat smaller, ovate, pale green with some purplish marks along the veins, and measures 3.2 to 3.7 cm long by 1.2 to 2.2 cm wide. The petals, which are 5.5 to 7.5 cm long by 1.2 to 2.2 cm wide, are spatulate to broadly spatulate, spreading horizontally or somewhat deflexed, and slightly twisted with margins that are crisped and undulate along the basal half. The narrower basal part is green or pale yellow, blotched and spotted with deep purple, and studded with numerous near-black hairs. The dilated apical part is bright violet-purple with ciliate margins. The lip is shaped like an inverted helmet, 3.5 to 5 cm long by 2 to 3 cm wide, dull to pale green or pale yellow, stained with rose-purple to brownish-purple, and dotted with minute near-black warts. The staminodal shield, which is 10 mm long by 8 mm wide, is nearly square (sub-quadrate), pale yellow to green with purple spots toward the base, glossy dark brown toward the middle, and has two white spots ("eyes") near the basal edge. The pedicel and ovary are 5 to 7.5 cm long and densely covered by long hairs.

DISTRIBUTION AND HABITAT

Northeast India, Myanmar, and China. *Paphiopedilum hirsutissimum* is found in Mizoram, Nagaland, and the Manipur regions. This area is near the Burmese border in the Naga and Lushai Hills at 700 to 1,200 m. Plants sometimes grow in thick accumulations of decaying plant debris at the base of trees. It is occasionally found on moss-covered rocks and along cliff faces, but the plant is most often found in the crotches of tree branches where thick moss and leaf litter collect.

FLOWERING

Paphiopedilum hirsutissimum has its main flowering season from March through May, but plants of this species have been reported to flower at other times of the year.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan 1947, Duncan & MacLeod 1949a, Sasa & Torigata 1967, Tanaka & Aoyama 1974, Karasawa 1979).

VARIETIES AND FORMS

Paphiopedilum hirsutissimum is quite a variable species and several "variants" can be found in the horticultural literature. These variants do not deserve scientific recognition. The variant considered to be an albino of *P. hirsutissimum* by Gruss belongs to the concept of *P. esquirolei* and is discussed there.

PAPHIOPEDILUM ESQUIROLEI

SCHLECHTER

FEDDE, *REPERTORIUM SPECIERUM NOVARUM REGNI VEGETABILIS*,
BEIHEFTE, 4: 39-40 (1919)

SYNONYMS

Cordula esquirolei (Schlechter) Hu

RHODORA, 27: 105-107 (1925)

Paphiopedilum hirsutissimum var. *esquirolei* (Schlechter) Karasawa & Saito

BULLETIN OF THE HIROSHIMA BOTANICAL GARDEN, No. 5: 1-69 (1982)

ETYMOLOGY

Named *esquirolei* for the missionary priest and linguist Joseph Henri Esquirol (1870-1934), the discoverer of the taxon and collector of the type material.

DISCUSSION

The concept of *Paphiopedilum esquirolei* was based on plants collected by Father Joseph Henri Esquirol in June of 1912 in the Chinese Province of Guizhou.

The taxon is often regarded as a mere variant of *P. hirsutissimum* (Cribb, 1987, 1998; Braem, 1988, Cash, 1991, Koopowitz, 1995, 2000, 2012, 2018). The differences, however, are present and were clearly delineated by Schlechter (1919b):

"it [*P. esquirolei*] differs from that species [*P. hirsutissimum*] by the longer, somewhat narrower petals and the more ovate, acute upper sepal. The staminode is similar to that of *P. hirsutissimum* (Ldl.) Pfitz., but the humps protrude only slightly."

In his original publication only a few months earlier, however, Schlechter (1919a) described the dorsal as being "obtuse."

The taxon was reduced to a variety by Karasawa & Saito (*loc. cit.*). The type specimen was destroyed during a bombing raid on Berlin in 1943, but fortunately, Schlechter's original description is very detailed.

In respect to hybrids, *Paphiopedilum esquirolei* is regarded as identical to *P. hirsutissimum* by the Orchid Hybrid Registrar (Royal Horticultural Society, London, England). On the other hand, it has repeatedly been awarded as an autonomous species by the American Orchid Society.



PAPHIOPEDILUM ESQUIROLEI
COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

DESCRIPTION

Paphiopedilum esquirolei is an herbaceous plant usually rooted in leafy humus. Plants overall are 30 to 35 cm high. The rhizome is very short and the roots are thick and covered with hairs. Each growth produces five to six leaves which are ligulate-linear, obtuse, erect, leathery, glabrous, and about 35 cm long by nearly 2.0 cm wide halfway between the base and apex. The apex is bidentate with a small intermediate tooth. The inflorescence is erect, one-flowered, terete, densely covered with purple hairs, and up to 30 cm long. The bracts are ovate-cucullate, obtuse and apiculate, and covered with purple hairs. The showy flower resembles those of *Paphiopedilum hirsutissimum* and is about 14 cm across. The dorsal sepal is ovate-elliptic to ovate, obtuse, minutely pubescent on the outside, finely ciliate on the margins, and glabrous on the inside with about 13 veins. It is approximately 5 cm long by up to 3.5 cm wide when measured halfway between the base and apex. The lateral sepals are obtuse, keeled to the apex, ovate, and connate for about 4 cm. The petals are spreading, strongly undulated, widening progressively toward the apex from a narrower base, ligulate, obtuse, and about 7.5 cm long by 1.8 cm wide below the apex. Both sides of the petal margins are ciliate, and on the inside, the basal area is densely covered with long hairs. The lip is about 4.5 cm long and has a glabrous outer surface. The infolded side lobes are obliquely triangular, obtuse, and rather large. The main lobe is deeply saccate and 2.3 cm high. The auriculae (lateral "ears") are erect, concave, triangular, obtuse, and about 7 to 8 mm high. The inside of the pouch is completely covered with bristles. The staminodal shield is nearly square (sub-quadrate), has two white spots ("eyes") near the basal edge, and is about 7 mm long and equally wide. The ovary is obtusely triangular in cross section, rostrate, fully covered by purple hairs, and about 4.5 cm long.

DISTRIBUTION AND HABITAT

Southwest China, northern Thailand, northern Laos, Vietnam. The type specimen was originally collected near Sa-Lô-Fou in southwest China where it grew "on rocks" at 800 m. Distribution, which is now known to include Guizhou, Yunnan, and Guangxi Provinces, extends as far south as northern Thailand. Over most of the range, plants grow at 1,200 to 1,800 m. Fowlie (1990), however, reported finding plants on the Guizhou-Guangxi border at 340 m. He also reported finding *P. esquirolei* in extreme northwestern Guangxi Province, where it grows in the shade of trees on northeast-facing benches on steep slopes above the openings of limestone caves. Air circulation from the caves continuously bathes plants with moisture-laden air. Cribb (1998) adds Vietnam and northern Laos to the distribution area. Averyanov *et al.* (2003) report the plants from the northern Vietnamese Provinces Cao Bang, Ha Giang, Hao Binh, Lao Cai, Son La, Thai Nguyen and Thanh Hoa. In Vietnam, *P. esquirolei* grows in the humus-filled cracks and crevices of the highly eroded crystalline limestone formations in mixed and coniferous forests at elevations of 300 to 1,300 m.



PAPHIOPEDILUM ESQUIROLEI FMA. VIRIDE
COURTESY OF PAUL UPWARD

FLOWERING

In the natural habitat, *Paphiopedilum esquirolei* generally flowers from March through June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa 1979).

VARIETIES AND FORMS

Paphiopedilum esquirolei is extremely variable in flower colour. The most striking variant, and possibly the only one deserving separate status, is the form described as *P. hirsutissimum* var. *esquirolei* forma *viride* by Gruss & Röth in CAESIANA, no. 12: 57-65 (1999).

The variant, however, belongs to the concept of *P. esquirolei* and was transferred accordingly:

PAPHIOPEDILUM ESQUIROLEI FORMA VIRIDE

(GRUSS & RÖTH) BRAEM & CHIRON

PAPHIOPEDILUM: 180 (2003)

There are several clones of *P. esquirolei* with albinosque flower colouration. The blooms are all more or less yellowish-green to bright green in their ground tone, but nearly all have remnants of red pigments. These remnants can be seen on the lighter coloured extremities of the petals and in the numerous dark spots near the base of the petals and sepals. The staminodal shield is white with green protuberances near the apex. The flowers as a whole, however, are not white, and the designation as *P. hirsutissimum* var. (or forma) *album* as in the award from the Japan Orchid Society and in at least 8 awards from the American Orchid Society is just as erroneous as it is misleading. Only the clones without a trace of red pigmentation are to be regarded as true albino.

PAPHIOPEDILUM ESQUIROLEI VAR. CHIWUANUM

(TANG & WANG) BRAEM & CHIRON

PAPHIOPEDILUM: 181 (2003)

DISCUSSION AND DESCRIPTION

In 1951, the Chinese botanists Tang and Wang described a plant that they called *Paphiopedilum chiwuanum* (ACTA PHYTOTAXONOMICA SINICA, 1[1]:56). The type specimen, being kept in the herbarium of Beijing, was collected in the southeastern part of Yunnan and consists of a plant in bud. Chen (1976) as well as Tang & Cribb (1982) have viewed the type and concluded that *P. chiwuanum* is synonymous with *P. hirsutissimum*. Cribb (1987), however, stated that he has seen no living material, only the dried type collection. Cribb interprets the plant as having "much smaller flowers" and, therefore,



PAPHIOPEDILUM ESQUIROLEI VAR. *CHIWUANUM*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

recognises it as an autonomous variety (Cribb, 1987), a view which he revises in his 1998 monograph where he sinks *P. chiwuanum* in the synonymy of *P. hirsutissimum* var. *esquirolei*. In 1997, Averyanov *et al.* surveyed the slipper orchids of Vietnam. They report that in every population of *P. hirsutissimum* and *P. esquirolei* they have studied, some plants produce smaller blossoms which are 7.0 to 8.0 cm in diameter. They write that these plants have nearly flat or slightly undulate petals, covered by fewer, shorter hairs, compared to the other plants of the populations. They also have smaller leaves and flower earlier, usually in March. Averyanov and his co-workers are “inclined” to consider those plants as *P. hirsutissimum* var. *chiwuanum* and the taxon is treated as such in SLIPPER ORCHIDS OF VIETNAM (Averyanov *et al.*, 2003).

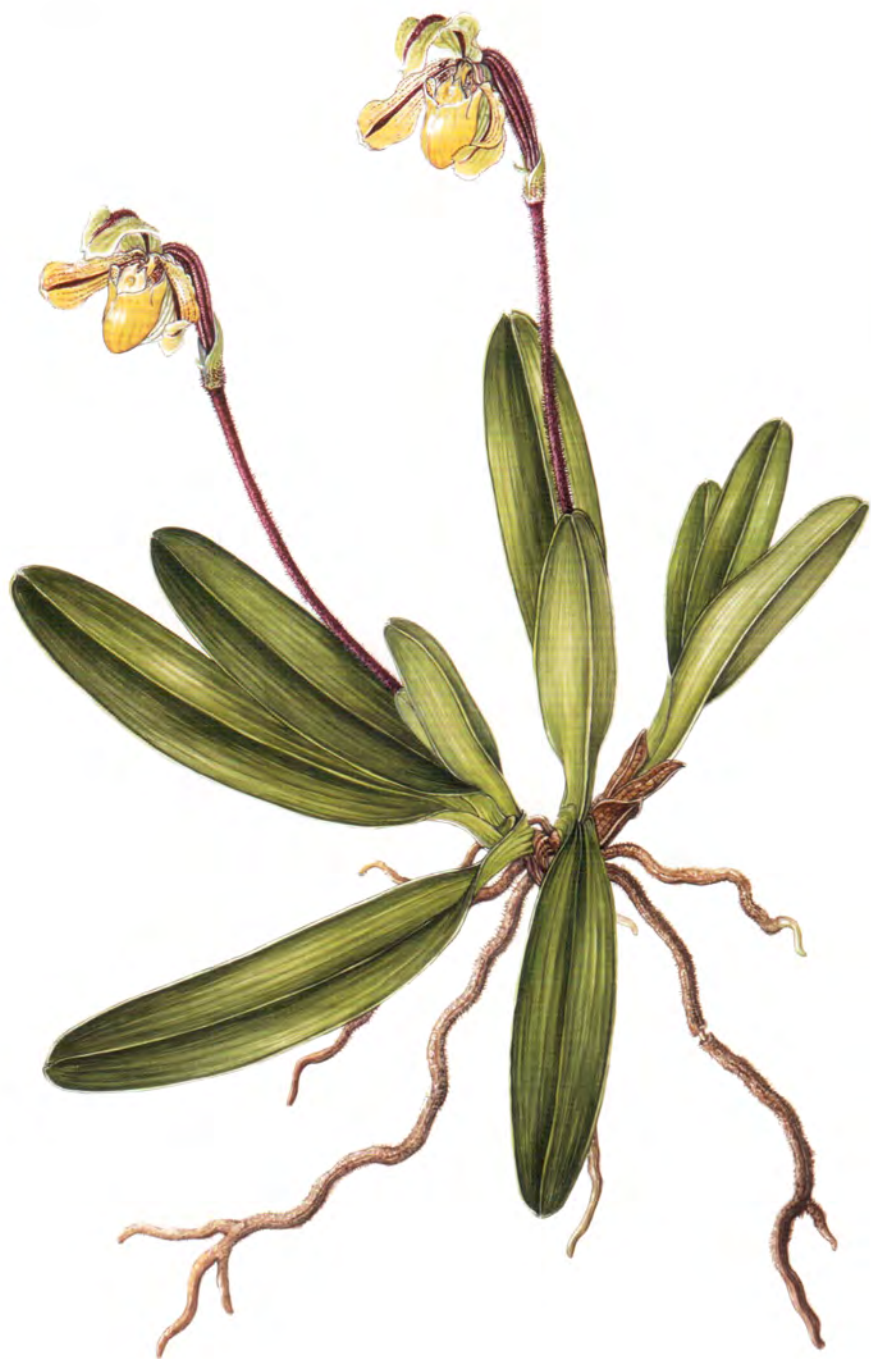
The occurrence of smaller-flowered plants with smaller leaves is not unusual. Furthermore, flowering of *P. hirsutissimum* in March is nothing special. Kent [in Veitch] (1889) gives the flowering time for the species as “March to May”. Although the description of this “variety” is not at all conclusive and is based on a single dried specimen, and in spite of serious doubts as to the taxonomic identity of *P. chiwuanum*, we here list this plant as being a valid variety of *P. esquirolei*. That the “smaller” flowers of *P. esquirolei* var. *chiwuanum* were indeed misinterpreted buds remains a possibility.

ETYMOLOGY

Presumably named *chiwuanum* for its “small flower”.

DISTRIBUTION AND HABITAT

China. The type specimen was collected from rocks at 700 m at Fooning Hsien, Ban-Loun in southeastern Yunnan. Averyanov *et al.* report this form from Cao Bang Province in northern Vietnam. The photographs in their book show that the plants grow in humus in cracks and crevices of steep, strongly eroded mountain slopes. They report this form of *P. esquirolei* from elevations of 750 to 1,450 m. In their natural habitats, the plants flower from March through May.



PAPHIOPEDILIN DRURYI
WATERCOLOUR PAINTING BY HEMLATA PRADHAN
COURTESY OF HEMLATA PRADHAN

PAPHIOPEDILUM DRURYI

(BEDDOME) STEIN

STEIN'S ORCHIDEENBUCH, 466 (1892)

BASIONYM

Cypripedium druryi Beddome

ICONES PLANTARUM INDIAE ORIENTALIS; OR PLATES AND DESCRIPTIONS OF NEW AND RARE PLANTS, FROM SOUTHERN INDIA AND CEYLON, 23, t. 112 (1874)

SYNONYM

Cordula drurii (sic.) (Beddome) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

ETYMOLOGY

Named *druryi* for Colonel Henry Drury Harness (later General Sir Henry Drury Harness) (1804-1883), a British army officer stationed in India at the time.

DISCUSSION

Paphiopedilum druryi was discovered by Mrs. J.A. Brown around the year 1865 on "Aghusteer Hill" (Agastyamalai [?]) in the Western Ghats in Kerala State (formerly known as the Travancore Highlands), in southern India. The plants were acquired by the British Army Colonel H. Drury, who is generally but erroneously said to be their discoverer. Later, the plant was found "very abundantly on the top of Calcad Hill, in flower in January" by Lt.-Col. Beddome, who described the taxon as *Cypripedium drurii* (sic.)

Paphiopedilum druryi has remained a rarity in collections; the reason for this is the extreme isolation of the species in nature. For some time, the plant was said to be extinct in the wild, and Cribb (1978) reported that the last Kew specimen was cultivated to death (!) in 1961. However, V. & J. Mammen collected plants at the original habitat in 1972 (Mammen, 1974). Rumours prevail that shortly thereafter the habitat was destroyed by fire. On the other hand, K.T. Pempahishey (1976) reported finding more plants in the same area. A few years ago, further populations were discovered. Whether these habitats are the same as those found by Pempahishey is not known. In 2018, an Indian correspondent suggested that *P. druryi* was again considered lost in the wild. In the mean time, the species has been propagated artificially in several nurseries.



PAPHIOPEDILUM DRURYI IN SITU
COURTESY OF JIS SEBASTIAN AND PROF. DR. GIBY KURIAKOSE

DESCRIPTION

Paphiopedilum druryi is an herbaceous plant. The plants are readily recognised by their stout, creeping and ascending rhizome, along which growths are produced at intervals of one to several cm. The short stems carry up to five, narrowly oblong to ligulate, acute leaves. These are 12 to 25 cm long by 2.5 to 3.5 cm wide. The leaves are leathery, sub-erect to spreading, rounded at the apex, uniformly bright green. The erect inflorescence is up to 30 cm high. The peduncle is terete, purple at the base with a short compressed green sheath, and densely downy. It usually carries a single flower. The bract is small and clasping, ovate, obtuse, about 2 cm long, green, and covered by purple hairs. The flower is showy, spreading, up to 7.5 cm long by about 5.5 cm across, and somewhat inclined. The downy outer surface may be dull yellow, greenish-yellow, or chartreuse and is striped and spotted with brown to purple-violet. The dorsal sepal is elliptic to broadly ovate, obtuse, inflexed above, and 3 to 3.8 cm long by 2.5 to 3.3 cm wide. It is keeled on the back, curved forward over the aperture of the lip, ciliate at the margin, coloured dull yellow, greenish-yellow, or chartreuse, has a conspicuous, broad, maroon to maroon-brown median band, and is studded with numerous near-black hairs. The synsepal is 2.7 to 3.5 cm long by 2 to 2.5 cm wide, elliptoid, ovate, obtuse to acuminate, pubescent, paler in colour than the dorsal sepal, and frequently has two very dark purple longitudinal lines. The petals are stretched outward and forward (porrect), elongated lanceolate to ligulate, and 4 to 4.5 cm long by 1.3 to 2 cm wide. They are somewhat drooping with margins that are ciliate, undulate and reflexed, and have an apex that is distinctly tridentate. The petals are ochreous, almost golden-yellow, with a broad maroon to maroon-brown median band and purple spotting. They are pubescent and have longer brown hairs at the base. The lip is three-lobed with the lateral lobes folding inward and almost touching to form a tube. The main lobe is deeply saccate, slightly compressed, 3.3 to 4.5 cm long by about 1.2 to 2 cm wide, and auriculate. The outside is bright yellow, and the inside is spotted reddish to purple. The staminodal shield is obcordate, bilobed at the top, three-toothed, deep yellow with a yolk-coloured raised boss near the centre, and 1 to 1.2 cm long and wide.

DISTRIBUTION AND HABITAT

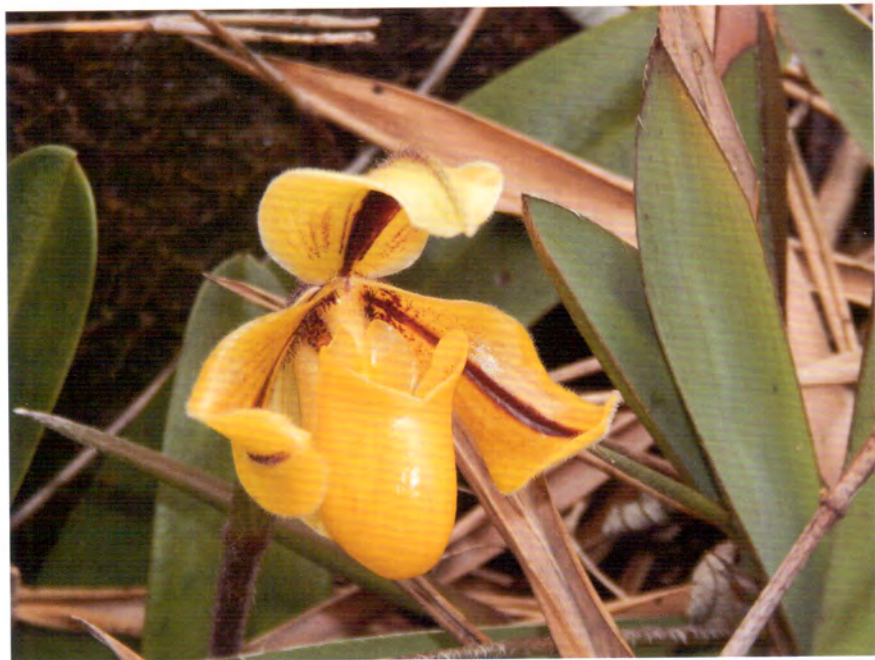
Southern India. Plants are found in the southern part of the Western Ghats at 1,500 to 1,600 m. They grow on hard, shallow, limy soil, fortified only slightly with decaying grass and plant debris. Plants grow in full sun or in lightly shaded patches among scrub brush or grass.

FLOWERING

Paphiopedilum druryi generally blooms around May, but plants have been reported to bloom from February through September. In its natural habitat, *P. druryi* blooms in spring.

MISCELLANEOUS NOTES

The mitotic chromosome counts are $2n = 26$ (Duncan 1947, Duncan & MacLeod 1949a); and $2n = 30$ (Karasawa 1979, 1981).



PAPHIOPEDILUM DRURYI IN SITU

COURTESY OF JIS SEBASTIAN AND PROF. DR. GIBY KURIAKOSE

PAPHIOPEDILUM SPICERIANUM

(MASTERS & T. MOORE) PFITZER

PRINGSHEIM, JAHRBÜCHER FÜR WISSENSCHAFTLICHE BOTANIK, 19: 164 (1888)

BASIONYM

Cypripedium spicerianum Masters & T. Moore

THE GARDENERS' CHRONICLE, 2nd Series, 12: 505 (1879)

SYNONYM

Cordula spiceriana (Reichenbach fil.) [sic] Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Named *spicerianum* for Mr. and Lady Spicer.

DISCUSSION

In the autumn of 1878, a previously unknown slipper orchid flowered in the green-houses of Mr. and Lady H. Spicer of the Woodlands, near Godalming, not far from London, England. A flower of the plant was forwarded to Messrs. Veitch & Sons, which so impressed Mr. Veitch that he travelled to the Spicer residence in search of information about the habitat of this new species. He was told that the plants had been sent from India as part of a mixed collection of orchids but the Spicers would offer no additional information. Veitch, according to the account given by Adolphus Kent (in a *MANUAL OF ORCHIDACEOUS PLANTS*, 1889), reports that "Arrangements were made by which a portion of the plants passed into our hands for propagation, and subsequently, we acquired the remainder." History tells us that Veitch paid 70 guineas for the plants, which at the time was more than the average agricultural worker earned in a year and a half.

The firm of Veitch & Sons decided against sending a collector to search for more plants, as they had no information about the location of the natural habitat. Instead, they sold divisions whenever their plants could be divided. Each division was sold at an astronomical price. Thus, it is not surprising that other orchid firms, such as Low & Co. and Sander & Co., became extremely interested. Before long, Sander arranged to be invited for tea at the Spicer residence where conversation revealed that the hosts' son owned a tea plantation in Bhutan. Sander needed no further hint and immediately sent his star collector Förstermann to visit young Mr. Spicer. In due time, Förstermann managed to extract the valuable information about the plant's habitat from Mr. Spicer's manager, who, in fact, had been the one who had originally found the plant in the territory of the Bhutanese. Förstermann proceeded to seek out the habitat and sent 40,000 (!) plants to England. The plants were auctioned in Steven's Auction Rooms in London on March 9th, 1884, but because of the large number of plants available, it does not surprise that they fetched only an insignificant price per plant compared to the fortunes paid for each division only a few months earlier. Shortly after, the collectors for Messrs. Low & Co.

also reached the habitat, and another, probably equally large shipment of *P. spicerianum* plants was again sent to England.

Although Reichenbach fil. received material of *P. spicerianum* from Veitch in 1878, he did not publish his description until two years later. In the meantime, Masters & T. Moore (1879) had published their description, and Reichenbach's publication of 1880 is, therefore, ineffective. The authors of the original description are sometimes quoted as "Reichenbach ex Masters & T. Moore." However, there is no indication that Masters & Moore used any material from Reichenbach fil. for their description of *Cypripedium spicerianum* in 1879.

DESCRIPTION

Paphiopedilum spicerianum is an herbaceous orchid with a tufted habit, and each growth usually bears four or five leaves. The leaves are spreading to pendent, narrowly oblong-elliptic to linear-oblong or ligulate, obtuse to acute, and 15 to 30 cm long by 3.5 to 6.0 cm wide. They are more or less undulate at the margins and glossy dark green with a distinct groove above. The keeled underside is lighter green spotted with purple toward the base. The apices are irregularly dentated. The inflorescence is 13 to 35 cm long. The peduncle is terete, slender, erect to slightly arcuate, 8 to 23 cm long, purple, glabrous near the base, and sparsely pubescent above. It usually bears one or rarely two flowers. Bracts are elliptic, acute to obtuse, and 1.8 to 3.0 cm long. Pedicel and ovary are 3.5 to 5.5 cm long, glabrous, and purple. Flowers are 5.5 to 8 cm high by 5.5 to 7 cm wide. The dorsal sepal, which is obovate, transversely elliptic or broadly obcordate, curves forward. It is 2.7 to 4.2 cm high by 3.5 to 5.5 cm wide. It is folded longitudinally in the middle, the lateral margins are much reflexed at the base, and the apical margin is bent forward. The pubescent dorsal is white except for a crimson-purple to maroon band at the central fold, a large green blotch speckled with dull red at the base, and sometimes the apex is suffused with rose. The ovate to broadly ovate synsepal, which is bright green with an off-white margin, is sub-acute to acuminate at the apex. It is 2.7 to 3.5 cm long by 1.5 to 2.2 cm wide. The petals are falcate to ligulate, linear-tapering, and acute to obtuse, deflexed and curved forward, undulate at the margins, ciliate toward the apex only, and yellowish-green with dull red spots and a crimson to brown-purple central vein. Petals are 3 to 4 cm long by 8 to 13 mm wide. The lip is 3.5 to 4.3 cm long by 2.5 to 3 cm wide, deeply saccate, shiny bronze-green to glossy pale green, and heavily flushed with crimson to brown with darker brown veins and purple spots on the yellow lateral lobes that are folded inward forming a tube. The staminodal shield is sub-orbicular. At its upper margin there is a V-shaped notch. It is white with a rose to violet centre, which is marked with an irregular greenish to yolk-yellow, more or less cross-shaped pattern.

DISTRIBUTION AND HABITAT

Northeast India and Myanmar. *Paphiopedilum spicerianum* is found along the Myanmar border in the States of Mizoram and Manipur. It grows in the Barak and Sonai River gorges near Silchar and is also reported in extreme northwest Myanmar. Plants grow on limestone outcroppings and cliffs at 300 to 1,300 m. *Paphiopedilum spicerianum* usually



PAPHIOPEDILUM SPICERIANUM
WATERCOLOUR PAINTING BY HEMLATA PRADHAN
COURTESY OF HEMLATA PRADHAN



PAPHIOPEDILUM SPICERIANUM

COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

grows in the shade of ferns and ginger plants, but it also is found in a variety of places including shallow, humus-filled pockets in the limestone where the roots are anchored to the underlying rocks, in moss and thick humus at the base of trees, and on moss-covered rocks. Plants usually grow where water is always available. Even during the winter dry season, moisture is available from mists rising daily in the river gorges and from water seepages along the cliff faces, so the substrate is constantly moist.

FLOWERING

Paphiopedilum spicerianum has been reported to flower in cultivation from July through April, with a distinct peak from October through December. In the wild, plants bloom in autumn.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 28$ (Duncan & MacLeod 1949a), 30 (Francini 1930, 1931, 1932; Tanaka & Aoyama 1974; Karasawa 1979, 1981).

VARIETIES AND FORMS

Paphiopedilum spicerianum is, in respect to flower colour and shape, probably the most stable species in the genus. The flower size, however, is rather variable. A total of about 20 variants are published or known, eleven of them without any description or illustration. Only the true albino, described as forma *immaculatum*, deserves scientific and horticultural recognition.

PAPHIOPEDILUM SPICERIANUM FORMA IMMACULATUM

BRAEM IN BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
2: 270 (1999)

The plant lacks any red pigmentation and is, therefore, a true albino. The sepals are pure white, the petals and lip are immaculate green, and the staminode is white. A possibly similar plant was mentioned by an anonymous author (probably Rolfe) in THE ORCHID REVIEW for 1897.



PAPHIOPEDILUM VENUSTUM
WATERCOLOUR PAINTING BY HEMLATA PRADHAN
COURTESY OF HEMLATA PRADHAN

SUBGENUS SIGMATOPETALUM

HALLIER FIL. (1897)

SUBGENERIC CHARACTERISTICS

Leaves tessellated. Inflorescence with a single flower, rarely two. Pouch shaped like an inverted helmet, with well-developed lateral 'ears'. Synsepal distinctly smaller than dorsal. Staminal shield semi-lunate. Pollen granular. Mitotic chromosome count $2n = 28, 32, 34, 35, 36, 38, 40, 41, 42$. Type: *Paphiopedilum venustum*.

DISCUSSION

Sigmatopetalum is the largest and most complex group within the genus *Paphiopedilum*. It is, however, well-characterised by the combination of mottled leaves, inflorescences generally bearing a single flower with narrow petals, and a main labellum lobe (pouch) having well-developed lateral 'ears,' a synsepal that is distinctly smaller than the dorsal, and a more or less semi-lunate staminal shield.



PAPHIOPEDILUM VENUSTUM
COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

PAPHIOPEDILUM VENUSTUM

(WALLICH EX SIMS) PFITZER

PRINGSHEIM, JAHRBÜCHER FÜR WISSENSCHAFTLICHE BOTANIK, 19: 163 (1888)

BASIONYM

Cypripedium venustum Wallich ex Sims

CURTIS'S BOTANICAL MAGAZINE, 47, t. 2129 (1820)

SYNONYMS

Stimegas venustum (Wallich ex Sims) Rafinesque

FLORA TELLURIANA, 4: 45 (1838)

Cordula venusta (Wallich ex Sims) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

According to STEARN'S BOTANICAL LATIN, *venustum* means beautiful, graceful. We suspect, however, that Wallich referred to the venation of the pouch.

DISCUSSION

Paphiopedilum venustum was discovered in 1816 by Wallich in Sylhet (now a District of Bangladesh) and, although originally placed in the genus *Cypripedium* when published in 1820, it is the first true *Paphiopedilum* to be officially described. The plants were introduced to Europe from Calcutta Botanic Garden by the British company of Whitley, Brames, and Millne in 1819. Material was forwarded to Sims who described the species (*loc. cit.*), giving it the name suggested by Wallich. Rafinesque (1838), who recognised the differences between this species and other *Cypripediums* known at that time, placed it into a separate genus *Stimegas*. Although the publication of the genus *Stimegas* predates the publication of the genus *Paphiopedilum*, the latter name has been conserved.

The natural distribution of *P. venustum* is quite extensive, and thus, it is not surprising that the species shows great variation in the mottling of the leaves and the flower colour. In Meghalaya State, near the Indo-Bangladesh border, *P. venustum* grows sympatrically with *P. insignis*. It is also said to hybridise with *P. spicerianum* in northeast India and with *P. fairrieanum* in Bangladesh.

DESCRIPTION

Although usually smaller, it is not uncommon to find plants of *Paphiopedilum venustum* as large as 45 cm from leaf tip to leaf tip. Each leaf is up to 25 cm long by 4.0 to 5.0 cm wide. Leaves vary in form from narrowly oblong-lanceolate to broadly ovate. The somewhat older leaves are slightly undulate and curve downward toward the apex. The surface colour is also variable in that the mottling can be very faint to distinct. Leaves are often dull silvery-green with a random, dark green, blotchy pattern on the upper side,

and the underside is usually richly spotted with purple, the denser areas corresponding with the darker spots on the upper surface. Each leaf has a sharp keel on the underside, and the leaf edges, which are smooth for nearly their complete length, are slightly serrated at the apex. The growths are closely spaced, giving the plant a tightly clustered habit. The inflorescence is 15 to 20 cm high, terete, dark purple, shortly hirsute, and usually carries one or two flowers with a natural spread of up to 9 cm. The most striking feature of the *P. venustum* flower is the deep green venation covering almost the entire blossom, which is masked only in the apical regions of the petals by an orange to red colouration. The dorsal sepal is obcordate, often quite broad at the base, 2.5 to 3 cm high by 2 to 3.5 cm wide, pointed, and slightly cupped with the margins sometimes slightly wavy. It is white with twelve to twenty deep green, longitudinal veins. The synsepal, which is distinctly concave because of its forward-rolling margin, is 2.5 to 3 cm long by 1.2 to 1.5 cm wide and is whitish with five to ten deep green longitudinal veins. The petals are horizontally spreading, 4.5 to 5.5 cm long by 1.2 to 1.7 cm wide, and the upper margins usually are undulate distally. The apical region of the petals is more or less recurved. The petal rim is irregularly ciliate and interrupted by sparse, randomly placed warts. Some brown spots are scattered irregularly over the light green basal area of each petal, from which dark green veins stretch out and fade into the orange to red apical region. A brown median line with a high concentration of spots alongside it separates the more intensely coloured upper half from the lower one. The lip is shaped like an inverted helmet. It is 4 to 5 cm high by 2.2 to 3 cm broad, and stands at a 45 degree angle to the scape. Its margins are smooth. The infolded side lobes are rounded and light brown. The ground colour of the lip is light brownish-cream, sometimes suffused with reddish tones, and is always covered by dark green, web-like veining, giving the pouch surface a distinctly marbled appearance. The staminodal shield is shaped like a crescent moon with strongly rounded tips. It is about 13 mm wide by more or less 8 mm high, slightly concave with a raised centre, and has a rounded, inward-pointing tooth at the lower rim. The glossy, light green staminode is marked with a dark green, web-like pattern in the centre. The rear of the staminodal disc is purple-brown.

DISTRIBUTION AND HABITAT

Eastern Nepal, Bhutan, northeast India, and Bangladesh, on the southern slopes of the Himalayas. In northeastern India, plants are found in Assam, Sikkim and the north of West Bengal near Darjeeling. *Paphiopedilum venustum* usually grows at 300 to 1,350 m at the base of cliffs in thick jungle undergrowth or dense bamboo thickets. The roots are usually embedded in humus, but plants occasionally grow in tree crotches with their roots in composted leaf litter. In Assam, plants grow north of the Brahmaputra River. The habitats are situated in some of the wettest areas of our planet.

FLOWERING

Paphiopedilum venustum usually flowers from December through March but plants have been reported to flower all year round.



PAPHIOPEDILUM VENUSTUM FMA. *MEASURESIANUM*
 DETAIL OF A WATERCOLOUR PAINTING BY HEMLATA PRADHAN
 COURTESY OF HEMLATA PRADHAN

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 40, 41$ (Tanaka & Aoyama 1974, Karasawa 1979).

VARIETIES AND FORMS

Paphiopedilum venustum is an extremely variable species in flower colour as well as in respect to the tessellation and form of the leaves. In the discussion of the species in his EXOTIC FLORA for 1823, William Jackson Hooker wrote:

“... and not a little remarkable for the variety of its hues, both on the leaves and flowers.”

It is, therefore, quite surprising that relatively few variants have been described in the horticultural literature. Of these, the albino, originally described as *Cypripedium venustum* var. *measuresianum*, is the most striking. The other recognised variant is the plant originally described as *C. pardinum*. Although this latter plant is within the normal variation for a species with such a large range of distribution, it is a well-defined variant and therefore it is included here. Both variants are reduced to the status of a botanical form, however. Two variants (*aureum* and *Griffithianum*) were listed in the LINDENIA without any description. Four additional variants (*amabile*, *illustre*, *mirabile*, and *niveum*) were listed in commercial catalogues.

PAPHIOPEDILUM VENUSTUM FORMA MEASURESIANUM

(HORT. EX THE GARDENERS' CHRONICLE) BRAEM

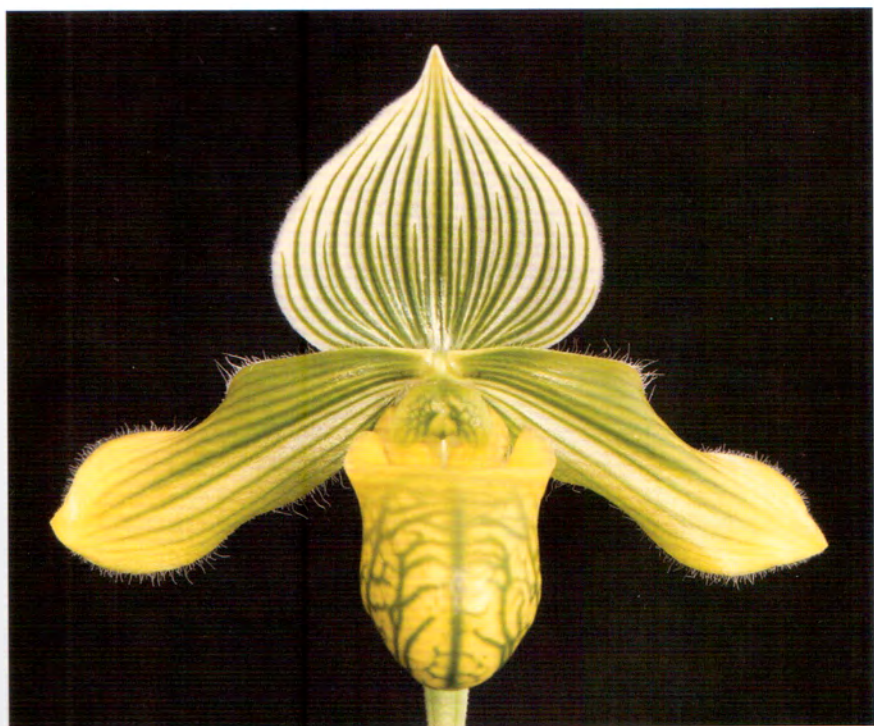
BRAEM, BAKER & BAKER,

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
2: 274 (1999)

Originally described as *Cypripedium venustum* var. *measuresianum* in 1893 (THE GARDENERS' CHRONICLE, 3rd series, 14: 756), this albino was exhibited on November 28th, 1893 at a meeting of the Royal Horticultural Society by Measures. The anonymous author wrote:

“an extraordinary and beautiful form with white and green flowers, without any of the brown and red seen in the type”.

There are various clones of this albino. They differ in the intensity and shade of the greenish to greenish-yellow colour pattern and in the shade of the more or less white to yellowish-white background colour. Plants offered as albinos of *P. venustum* sometimes show, although faintly, the remnants of reddish or brownish pigmentation. However, only those clones lacking any red or brown should be accepted as albinos.



PAPHIOPEDILUM VENUSTUM FMA. *MEASURESIANUM*
COURTESY OF OF JAMES HADLEY CASH (MARRIOTT ORCHIDS).

PAPHIOPEDILUM VENUSTUM FORMA PARDINUM

(REICHENBACH FIL.) BRAEM IN BRAEM, BAKER & BAKER,

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
2: 274 (1999)

Reichenbach's original description of this taxon as *Cypripedium pardinum* (THE GARDENERS' CHRONICLE, 1st series, 29: 554 [1869]) is not very clear. He writes:

"The dorsal sepal is white with green nerves, while the under one is of the same colour, but shorter. The petals are rich yellow, with a copper-coloured hue towards the apex, ciliate at the edge, with small prominent dark purplish brown warts. The lip is saccate, with inflexed triangular apical warts on the side laciniae, yellowish, with green veins. Staminode obtuse, angled, triangular, emarginate, trilobed at the anterior border, the side lobes rounded, the middle lobe triangular, minute. It comes near the old *Cypripedium venustum*, but the staminode, the warts of the side laciniae of the lip, the warts over the whole of the petals, and the colours, as well as the marks of the leaves, are widely different."

Reichenbach himself reduced his "*pardinum*" to the varietal status without any reference to his earlier publication. He writes (THE GARDENERS' CHRONICLE, 3rd series, 1: 382 [1887]):

"*C. venustum* var. *pardina* [sic.] ... is perhaps the finest and the largest flowered variety. The sepals and petals are white striped with green, the petals being also blotched with dark chocolate. The lip is greenish-yellow, tinged with rose."

Kent (in Veitch, 1889) states:

"Flowers larger; the sepals of a purer white, with the veins broader and of a deeper green; the warts on the petals larger and more scattered; the lip of a brighter colour, with the reticulations more prominent."

Pfitzer transferred the taxon at the species level to the genus *Paphiopedilum* in 1894 (Engler, BOTANISCHE JAHRBÜCHER, 19: 40) but treats it as a variety of *P. venustum* in his 1903 work.

THE PAPHIOPEDILUM HOOKERAE COMPLEX

Within this complex, two taxa, *Paphiopedilum hookerae* and *P. volonteatum*, have been described at the species level. There is no doubt that the two concepts are very closely related, and most authors have hitherto treated them as two varieties of the earlier concept, *P. hookerae*. The same view is taken by the registrar of orchid hybrids at the RHS. The judges of the American Orchid Society have not been consistent in their treatment. Some plants of *P. volonteatum* have been awarded as such while others were awarded as *P. hookerae* var. *volonteatum*. The differences between the two taxa are indeed very subjective, especially in view of the fact that *P. volonteatum* has proven to be extremely variable in respect to the shape of the petals, lip, staminodal shield, and the characteristics of the leaves. Some low-elevation populations of *P. volonteatum* show leaves that are as broad as those normally considered typical of *P. hookerae* and have purple markings underneath only at the base. This variation is not surprising considering that *P. volonteatum* occurs from 60 m to 2,300 m.

Key to the Taxa Belonging to the *Paphiopedilum hookerae* Complex

- 1. Leaves oblong ligulate (tongue-shaped), uniformly coloured green on the under-side. Petals spatulate, subacute *P. hookerae*
- 1a. Leaves narrowly ligulate, the underside spotted purple. Petals broadly spatulate, obtuse *P. volonteatum*



PAPHIOPEDILUM HOOKERAE

COURTESY OF JERRY LEE FISHER (ORCHIDS LIMITED)

PAPHIOPEDILUM HOOKERAE

(REICHENBACH FIL. EX HOOKER FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 470 (1892)

BASIONYM

Cypripedium hookerae Reichenbach fil. ex Hooker fil.

CURTIS'S BOTANICAL MAGAZINE, 89, tab. 5362 (1863)

SYNONYMS

Cypripedium barbatum var. *hookerae* Regel

GARTENFLORA, 26: 245 (1876)

Cordula hookerae (Reichenbach fil. ex Hooker fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Named *hookerae* for Lady Maria Sarah Hooker (née Turner) (1797-1872), the wife of Sir William Jackson Hooker and mother of Sir Joseph Dalton Hooker.

DISCUSSION

Paphiopedilum hookerae was discovered by Hugh Low, the son of a Scottish horticulturist of the same name in North Borneo (now Sabah) in 1862 and introduced shortly thereafter to the growers of Europe. The exact place of discovery was not disclosed and has remained a secret. It was subsequently found on limestone cliffs growing together with *P. stonei* in Sarawak by a collector working for Veitch, but here again, the exact locality remains unknown.

The taxon was described by the younger Reichenbach, dedicating it to Lady Hooker, the wife of William Jackson Hooker, the director of the Royal Botanic Gardens at Kew until 1865, almost certainly following a request from Low. The publication of the species in CURTIS'S BOTANICAL MAGAZINE (*loc. cit.*) includes a Latin diagnosis by Reichenbach, whereas the text of the article should be credited to Joseph Dalton Hooker (Hooker fil.), who used Reichenbach's notes. Credit for the original publication as *Cypripedium hookerae* should, therefore, be given to both authors, and the taxon should be cited respectively as *C. hookerae* Reichenbach fil. ex Hooker fil. and as *P. hookerae* (Reichenbach fil. ex Hooker fil.) Stein.

The plant described as *C. hookerae* var. *bullenianum* (Reichenbach fil.) Veitch is now generally considered to be an autonomous species, and should be known as *P. bullenianum* which is dealt with later in this book. The interpretation of *P. hookerae* as a variety of *P. barbatum* by Regel (*loc. cit.*) was without doubt a slip of the pen or memory.

Paphiopedilum hookerae has been fairly rare in cultivation. For some time after the original importation by Low and Veitch (from Sarawak in 1865), the species was consid-

ered extinct in the wild and new importation did not occur until around 1972. It is still one of the most prized of all *Paphiopedilums*.



PAPHIOPEDILUM HOOKERAE

COURTESY OF DOROTHY POTTER BARNETT

DESCRIPTION

Paphiopedilum hookerae is an herbaceous plant, generally growing in decaying plant debris. The leaves are elliptic-oblong, deep green, distinctly mottled with greyish-green to yellowish-green sections, and the under surface often is suffused with red. They are up to 25 cm long by 3.8 to 5.2 cm wide, leathery, fleshy, and often have margins that are curved backward. The inflorescence is 20 to 55 cm high, brownish-purple, and covered with stiff grey hairs. It usually bears a single flower. The lanceolate, acute bract is 2 to 3 cm long by about 1.5 cm wide. It covers only half of the bright green, pubescent ovary, which is about 5 cm long. The flower is up to 10 cm wide by 6.5 to 7.5 cm high. The dorsal sepal is 3 to 4 cm long by about 2.3 to 3 cm wide, ovate to cordate, acute, sometimes slightly striped, yellowish-white with a greenish centre, and distinctly keeled and hairy on the reverse. The synsepal is smaller, 2 to 3 cm long by 1.5 to 2.2 cm wide,

ovate, and pale yellow-green. The petals are spatulate, more or less depressed, and the narrower basal part is undulate. The petals are green with near-black spots and purple margins, and the dilated distal part is rose-purple. They are 4 to 5.5 cm long by 1.5 to 2.2 cm wide. The saccate lip is shaped like an inverted helmet and is 3.7 to 4.3 cm long by about 1.8 cm wide. It is yellowish-green suffused with brown-purple on the lower part and deep olive on the upper part. The infolded lateral lobes form the usual tube. They are yellowish-brown with reddish-purple spots. The staminodal shield, which is about 1 cm in diameter, appears enormous compared to the size of the other floral parts and relative to the overall size of the flower. It is sub-orbicular, usually with more or less distinct notches at either the upper or lower or both margins. It is brown-purple with a pale yellow centre and pale yellow margins.

DISTRIBUTION AND HABITAT

West Borneo. Plants are found in Sarawak and western Kalimantan on northfacing slopes at 300 to 800 m. *Paphiopedilum hookerae* grows below the summits of hills and cliffs of weathered sandstone or limestone under an open canopy of trees. Plants are found in deep leaf litter at the base of trees in continuously moist and humid places or in moss-filled rock crevices where they are kept constantly moist from water seepage.

FLOWERING

In cultivation, *Paphiopedilum hookerae* generally flowers from May through July, but flowering plants of this species have been reported from January through August. Mature, healthy plants may bloom more than once a year.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 28$ (Karasawa, 1979).

VARIETIES AND FORMS

Eleven "varieties" of *Paphiopedilum hookerae* have been described. 'Variety' *volonteanum* and 'variety' *bullenianum* are treated as separate entities in this work. Three of the other varieties refer to *Paphiopedilum bullenianum*. Four were published without any description or illustration and can, therefore, hardly be identified. One simply refers to a two-flowered specimen, and the description of the last one refers to a plant with "short broad lateral petals".



PAPHIOPEDILUM VOLONTEANUM IN SITU
COURTESY OF ROGIER VAN VUGT

PAPHIOPEDILUM VOLONTEANUM

(SANDER) STEIN

STEIN'S ORCHIDEENBUCH, 491 (1892)

BASIONYM

Cypripedium volonteum Sander

THE GARDENERS' CHRONICLE, 3rd series, 8: 7 (1890) [list of awards]

SYNONYMS

Cypripedium hookerae var. *volonteum* (Sander) Rolfe

THE GARDENERS' CHRONICLE, 3rd series, 8: 66 (1890)

Paphiopedilum hookerae var. *volonteum* (Sander) Braem

PAPHIOPEDILUM, 147 (1988)

ETYMOLOGY

According to the editor of THE GARDENERS' CHRONICLE (July 19, 1890), this taxon first appeared in the collections of Hugh Low & Co. (Clapton) and F. Sander & Co. (St. Albans). Until data appears which indicates another explanation, we assume that the plant was named for a customer of one of those establishments.

DISCUSSION

The original publication of this taxon as *Cypripedium volonteum* dates back to July 5th, 1890, when a report of the plants awarded by the Royal Horticultural Society was published in THE GARDENERS' CHRONICLE.

Rolfe rendered the first description two weeks later in that same journal as follows:

"This attractive *Cypripedium* is a recent Bornean introduction, known in gardens as *C. Volonteum*, though I doubt if botanically it is more than a distinct variety of *C. Hookerae*."

Indeed, the differences are very minor, and as already stated, very subjective. Rolfe (*loc. cit.*) writes:

"The leaves are proportionally narrower than in the typical form, the petals broader and more obtuse, the lip a little constricted below the horizontal mouth, and the staminode quite orbicular, without notches. In other respects, it is quite like the typical *Cypripedium hookerae*."

As far as the lack of "notching" of the staminodal shield is concerned, it must be stated that this is not a stable characteristic within the *P. hookerae* complex. All illustrations corresponding to this taxon found in the literature show flowers with a distinct notch at the apex of the staminodal shield. In fact, the same is true for all live flowers of plants



PAPHIOPEDILUM VOLONTEIANUM IN SITU
COURTESY OF RYAN GRAY

answering to the description of *P. volonteum* that we have examined. The indication by Rolfe, therefore, may be a misinterpretation, as his description was based on a "wild dried flower".

Cribb (1987 and 1998) credits authorship of the name *P. hookerae* var. *volonteum* to Kerchove de Denterghem (1894), but this results from linguistic misinterpretation. Kerchove, a Belgian author, wrote in French, and his use of "v." was not intended as the abbreviation for variety as interpreted by Cribb. On the same page of Kerchove's book, it is evident that his abbreviation for variety is "var." His use of "v." represents the French verb "voir" which means "see." This clearly indicates that Kerchove simply considered *P. volonteum* to be synonymous with *P. hookerae* and by no means described or meant to describe the former as a variety of the latter.

DESCRIPTION

In general, the description given under *Paphiopedilum hookerae* can be followed. The leaves of *P. volonteum* are proportionally narrower and spotted purple on the underside, the petals are broader and more obtuse, and the lip is more constricted below the orifice. The petals are about 2.5 cm wide, bright purple at the apex, and intensely spotted with purple toward the base. *P. volonteum*, however, is a highly variable entity occurring over a vast range of altitudes.

DISTRIBUTION AND HABITAT

Borneo. Found only in Sabah in northern Borneo at 60 to 2,300 m. Plants grow in a variety of habitats. They have been reported growing on serpentine rocks and cliff faces along major waterways, in moss or humus-filled cracks and pockets in rocks, in deep leaf litter, in moderate shade, and on rocks and tree roots in light shade near waterfalls.

FLOWERING

In cultivation, *Paphiopedilum volonteum* generally blooms from April through July. In the habitat, plants bloom in spring.

VARIETIES AND FORMS

PAPHIOPEDILUM VOLONTEANUM FORMA SANDOWII

BRAEM

ORCHIDEES, CULTURE ET PROTECTION, NO. 36: 35-38 (1998)

This is a typical albino. The plant lacks any red pigmentation. The inflorescence is pure green, unspotted. The dorsal sepal is clear green with a white margin. The petals are brighter green with white at the apices. The pouch is evenly coloured the same green as the petals. The staminodal shield is white with green reticulations in the centre. The plant was named in honour of Mr. Leonard "Len" Sandow of Miami, Florida, USA.



PAPHIOPEDILUM SANGII
WATERCOLOUR PAINTING BY EUNIKE NUGROHO
COURTESY OF EUNIKE NUGROHO

PAPHIOPEDILUM SANGII

BRAEM

DIE ORCHIDEE, 38(4): 169-172 (1987)

SYNONYM

Paphiopedilum ayubianum (Gruß & Röth) Koopowitz
ORCHID DIGEST, 82(4): 184 (2018); *nomen invalidum*

Paphiopedilum sangii var. *ayubianum* Gruß & Röth
DIE ORCHIDEE, 57(1): 61-62 (2006); *nomen invalidum*

ETYMOLOGY

Named *sangii* for Mr. Helmut Sang of Essen, Germany. in whose collection the first specimens flowered in the spring of 1987.

DISCUSSION

Paphiopedilum sangii was discovered on the island of Sulawesi. The combination of characters (tessellated leaves, single-flowered inflorescence, auriculate labellum, and synsepal distinctly smaller than the dorsal sepal) indicates that this species belongs in subgenus *Sigmatopetalum* Hallier fil.. Because of the morphology of the dorsal sepal and petals, *P. sangii* was originally positioned in section *Blepharopetalum* Pfitzer at the side of *P. mastersianum*, *P. papuanum*, and the plants of the *P. violascens* complex. *P. sangii*, however, differs from all known taxa of that group by its *venustum*-like venation of the pouch and especially by the obcordate staminodal shield. Furthermore, Karasawa, Aoyama & Kamimura (1997) established that the karyotype of *P. sangii* is similar to that of *P. hookerae*.

The original collection of *Paphiopedilum sangii* did include some plants which showed a dorsal with more or less symmetrical incisions on both sides. This characteristic, however, is not genetically stable. Braem recognised that fact at the time of the original publication, and although the feature was discussed, it was not included as a taxonomic marker in the diagnosis.

Wild plants brought into cultivation show that there is great variation among the different populations of this species. Plants with incised dorsal sepals have not yet been discovered among the other populations of *P. sangii*, and the plants of those collections show an overall flower morphology that is reminiscent of the plants belonging to the *P. hookerae* complex. However, the staminodal shield is not as enormous as that found in the latter complex.

DESCRIPTION

Paphiopedilum sangii is an herbaceous, humus epiphyte attaining an overall width of about 50 cm when measured from leaf tip to leaf tip. Each growth carries up to four



PAPHIOPEDILUM SANGII

WATERCOLOUR PAINTING BY LINDA WALSH PETCHNICK

COURTESY OF LINDA WALSH PETCHNICK

leaves, which are up to 28 cm long by 5.2 cm wide. On the upper surface, they are greyish-green and distinctly tessellated with darker green. The underside is uniformly coloured green with a pale purple hue near the base. The oblong-lanceolate leaves are acute and have a distinct, sharp keel underneath. The inflorescence, which is up to 25 cm high, is terete, very dark brown, and intensely covered by stiff, ivory-coloured hairs. It usually bears a single flower which emerges from a distinct, protective sheath. The floral bract is about 2.5 cm long by 8 mm wide, acuminate, and is yellowish-green with darker green at the apex and purple at the base. The ovary is about 5.5 cm long by approximately 5 mm wide. It is very dark brown and, like the inflorescence, covered with ivory-coloured hairs. However, the hairs on the ovary are longer than those covering the other parts of the plant. The flower is up to 8.5 cm high by about 5.4 cm wide when measured across the rather drooping petals. The dorsal sepal is up to 4.3 cm long by about 3.3 cm across, narrowly ovate, and acuminate. Some clones have dorsal sepals with symmetrical incisions about 8 mm deep on each side about halfway between the base and apex (see preceding discussion). The dorsal sepal is apple-green with a purplish-brown base, a bright green apical region, and uniform apple-green margins. It is marked with about 18 dark green longitudinal stripes and is covered both ventrally and dorsally with ivory-coloured hairs whereby the hairs on the outside are longer than those on the inside. As is typical for the genus *Paphiopedilum*, the lateral sepals are united into a synsepal which is about 3.3 cm long by 1.6 cm wide, distinctly double-pointed at the apex but with a single keel, and is sometimes bilaterally notched with small incisions on the margins. It is yellowish-green, more or less indistinctly striped longitudinally and, like the dorsal sepal, covered with stiff hairs on both sides. The petals are up to 4.6 cm long by 1.2 to 1.4 cm wide, lanceolate, and more or less rounded at the apex. The position of the petals relative to the pouch varies greatly between populations. In the type specimen, they are directed downward at an approximate angle of 45 degrees, distorted slightly backward, and the upper margins are strongly undulate from the base for about two-thirds of their length. They are dark brown-red, brightest near the apex, with a narrow band of apple-green along the margins and at the apex, and the upper half of the inside surface is more or less intensely covered with ivory-coloured hairs. The labellum is three-lobed and is overall up to 4.7 cm long by about 1.9 cm wide. The lip has a distinctly saccate main lobe and lateral lobes that are folded inward to form a nearly closed tube. The lateral lobes are up to 2.5 cm high by about 1.5 cm wide and are bright purple with a white margin covered by deep purple spots. The main lobe is up to 3.5 cm long by 1.9 cm wide and has a rounded apex. The aperture is about 2 cm wide with borders that are not folded inward but rather directed outward. The main lobe of the labellum is olive-green, distinctly veined with darker green, and the borders of the aperture are uniformly green. The obcordate staminodal shield is up to 1.5 cm wide and about equally high. It is bright yellow-green with a whitish centre and green apical margins.

DISTRIBUTION AND HABITAT

Northern Sulawesi. No further habitat information has hitherto been reported.



PAPHIOPEDILUM SANGII

WATERCOLOUR PAINTING BY KARYONO APIC

COURTESY OF KARYONO APIC

FLOWERING

Paphiopedilum sangii flowers from late November until mid-April in cultivation.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 28$ (Karasawa et al., 1997).

VARIETIES AND FORMS

The collections brought into cultivation have made it evident that *Paphiopedilum sangii* is quite a variable species in respect to overall flower morphology, position of the petals in respect to the pouch, flower colour, and leaf mottling. The variety *ayubianum* as described by Gruß & Röth (*loc. cit.*) definitively fits into the natural variation of the species.



TWO VARIETIES OF *PAPHIOPEDILUM SANGII*

LEFT: COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

RIGHT: COURTESY OF MANOTE QUAPHANIT (TROPICAL EXOTIC ORCHIDS)



PAPHIOPEDILUM NATASCHAE
WATERCOLOUR PAINTING BY HENNY HERAWATI
COURTESY OF HENNY HERAWATI

PAPHIOPEDILUM NATASCHAE

BRAEM

RICHARDIANA, 15: 276-281 (2015)

ETYMOLOGY

Paphiopedilum nataschae was named for Miss Natascha Popow.

DISCUSSION

Quite some interesting plants have been discovered on Sulawesi (formerly Celebes) over the last decades. In respect to the genus *Paphiopedilum*, we note the discovery and description of *P. sangii* Braem in 1987, of the multifloral *P. gigantifolium* Braem, Baker & Baker (1997), and of *P. robinsonianum* Cavestro (2014). We can now add yet another species to the flora of that Indonesian island. *Paphiopedilum nataschae* is, just like *P. sangii* and *P. robinsonianum*, a species that generally produces a single flower per growth, has mottled leaves and shows a distinct auriculum on each side of the pouch. Thus all three find their place in subgenus *Sigmatopetalum*.

When comparing *P. nataschae* with *P. sangii*, we find the staminode of the two species to be very different in shape and colour: In *P. sangii*, the staminode is without any protrusions of the basal margin and rather unicoloured. Furthermore, the pouch of *P. sangii* is prominently veined.

Comparing *P. nataschae* with the fairly recently discovered *P. robinsonianum*, we can see a distinct difference in the shape and colouration of the dorsal sepal, and we note that the length of the pouch in relation to the overall length of the labellum is much shorter in *P. robinsonianum* than in *P. nataschae*, and the staminodes of both species are quite different.

DESCRIPTION

Paphiopedilum nataschae is an herbaceous plant with tufted growths, reaching an overall height of approximately 46 cm. The natural span from leaf-tip to leaf-tip is about 30 cm. Each mature growth usually generates 5 leaves which are oblong-lanceolate, to 28 cm long by up to 5.5 cm wide, light green, mottled with darker green, the underside covered with many minute purple spots, the keel purple. The scape is terete, to 38 cm tall by 3.5 mm in diameter. The pedicellate ovary is approximately 5.7 cm long by 4 mm in diameter. The flower bract is conduplicate, 2.6 to 2.8 cm long by 1.0 cm wide (folded in the natural condition). The flower is large, overall generally 10 cm tall by 7.6 cm wide (as measured on a living plant in its natural condition). The dorsal sepal is narrowly ovate, 4.5 cm tall by 2.5 cm wide. The synsepal is 3.4 cm long by 1.7 cm wide. The petals are 4.2 cm long by 1.4 cm wide, spreading at an angle of 25-30 degrees. The labellum is overall (including the claw) 5.0 cm tall. The claw has a width of 1.3 cm. The pouch is 3.9 long by 2.3-2.5 cm wide at the rim, deeply saccate, shaped like an inverted helmet. The staminodal plate is concave, approximately 0.9 cm high by 1.1 cm wide, sub-circular (somewhat trapezoid) with a thickened centre part, a thickened basal (upper) margin

that contains up to several toe-like protrusions of which the last one on each side stands out like a little horn, and a distinct incision in the centre of the apical (lower) margin, the side margins turned backward and crimped over their basal half. The scape of the inflorescence, including the flower bract and the pedicellate ovary, is brown and densely covered by white hairs. The margins of the petals and sepals are ciliate. The margins of the sepals are very wavy. The dorsal is green over its basal half turning to yellowish-green toward the apex. The synsepal shows the same colour pattern as the dorsal. The petals are bright greenish-yellow near the base and deep purple over most of the remaining area, forming a dark stripe at the midline of each petal, and leaving a bright greenish-yellow margin. The reverse sides of the petals and sepals are covered by short whitish hairs. The pouch is dark olive green to purple. The staminode is supported by a thick, greenish-yellow base, the staminodal shield is white along the margins and in its basal (upper) part, the raised centre is yellow and the lobes on each side of the median yellow area are more or less strongly covered by a purple hue and purple spots.

DISTRIBUTION AND HABITAT

Paphiopedilum nataschae is hitherto only known from north central Sulawesi. Further information regarding the habitat has not yet become available.

FLOWERING

The type specimen flowered in cultivation in west central Europe in May and June.

PAPHIOPEDILUM APPLETONIANUM

(GOWER) ROLFE

THE ORCHID REVIEW, 4: 364 (1896)

BASIONYM

Cypripedium appletonianum Gower

THE GARDEN, 1: 95 (1893)

SYNONYMS

Cypripedium bullenianum var. *appletonianum* (Gower) Rolfe

THE ORCHID REVIEW, 1: 135 (1893)

Cypripedium poyntzianum O'Brien

THE GARDENERS' CHRONICLE, 3rd series, 15: 36 (1894) and THE ORCHID REVIEW, 2: 54 (1894)

Cypripedium wolterianum Kraenzlin

THE GARDENERS' CHRONICLE, 3rd series, 17: 166 (1895)

Cypripedium waltersianum Kraenzlin - *lapsus calami*

Desbois, CYPRIPEDIUM, SELENIPEDIUM & UROPEDIUM - MONOGRAPHIE: 477 (1898)

Paphiopedilum wolterianum (Kraenzlin) Pfitzer

Engler, DAS PFLANZENREICH, IV (50) Heft 12: 79 (1903)

Cordula appletoniana (Gower) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum hookerae (Reichenbach fil. ex Hooker fil.) Stein subsp.

appletonianum (Gower) M. W. Wood

THE ORCHID REVIEW, 85(1007): 159 (1977), *nomen nudum*

Paphiopedilum hainanense Fowlie (as *P. hainanensis*)

ORCHID DIGEST, 51(2): 69-70 (1987)

ETYMOLOGY

Named *appletonianum* for William Morton Appleton (1854-1951), an English mechanical engineer and amateur orchid grower in Somerset.

DISCUSSION

Little is known about the discovery of this species. Originally, *Paphiopedilum appletonianum* was said to have been imported with *P. hookerae*, suggesting that it might have originated in Borneo. The next record of importation appeared when plants of this species were part of a shipment of *P. crossii* (formerly *P. callosum*) and the putative natural hybrid *P. x siamense*. The shipment was for Wolter, owner of a German (Magdeburg) orchid nursery. It was he who reported that the natural habitat of *P. appletonianum* would be found in Thailand.



PAPHIOPEDILUM APPLETONIANUM
COURTESY OF PAUL UPWARD

Paphiopedilum appletonianum is very close to *P. bullenianum*, a species that does occur in Borneo (see below). It is therefore not surprising that *P. appletonianum* was at one time considered a variety of the latter species.

Paphiopedilum appletonianum and *P. bullenianum* are two of the most problematic taxa in *Paphiopedilum* taxonomy. They are generally differentiated by the clarity of the tessellation of the leaves in *P. bullenianum*, the obscurity of the tessellation of the leaves in *P. appletonianum*, and by the morphology of the staminodal shield. Plants of *P. appletonianum* have a transversely elliptic staminodal shield with a distinct, wide incision at the lower margin, which causes the lateral teeth to be much larger than the middle tooth. The plants of *P. bullenianum*, on the other hand, have a suborbicular to subrhombic staminodal shield and a narrow incision at the lower margin.

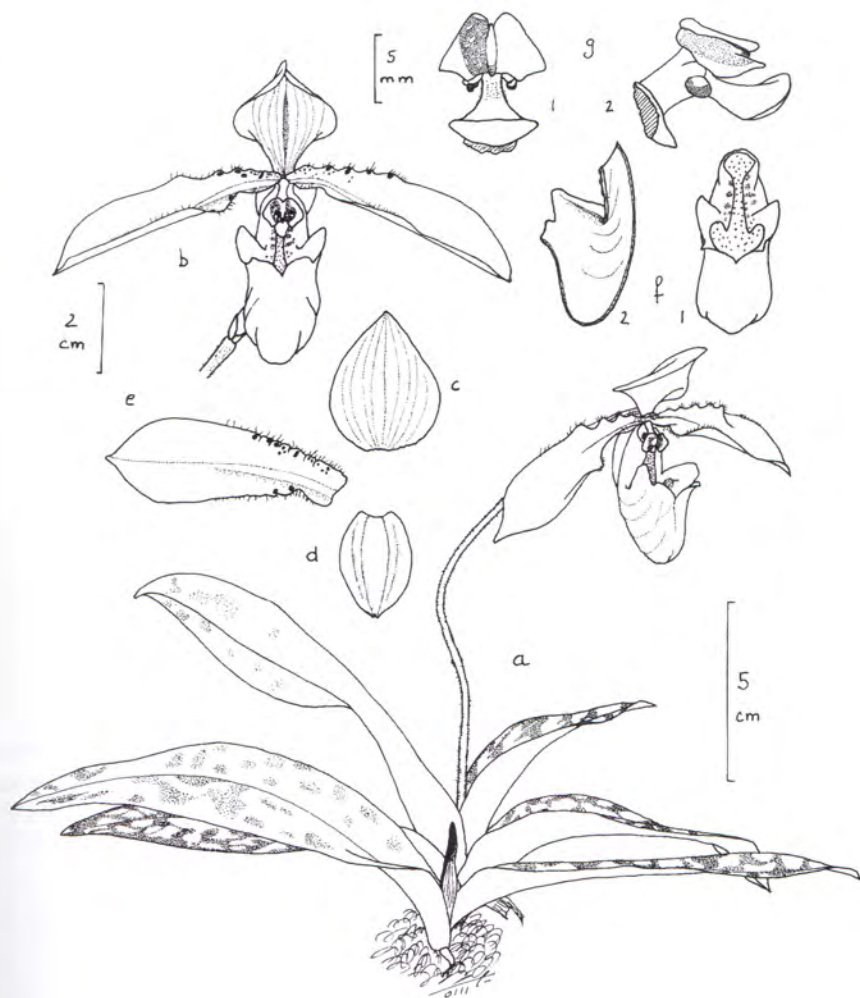
Neither of these taxonomic markers, however, is by any means absolute. *Cypripedium poyntzianum* and *P. hainanense*, two taxa said to have boldly tessellated foliage, are regarded as variants of *P. appletonianum* by most present-day authors. *Paphiopedilum tortipetalum* and *P. johorensense* are plants with staminodal shields that have wide apical incisions and lateral teeth that are distinctly larger than the middle tooth, and accordingly, they were treated in Braem's 1988 book within the synonymy of *P. appletonianum*, whereas Cribb (1987, 1998), includes them as variants of *P. bullenianum* although *P. johorensense* was considered synonymous with *P. appletonianum* in one of his earlier publications (Cribb, 1982). Clarification might have been expected from the karyomorphological studies, but the counts are quite diversified with $2n = 38, 40$, and 42 (Karasawa, 1979, 1982, 1986). Furthermore, counts are not available for a number of the taxa involved. Therefore, this data is also inconclusive. However, the karyotype of *P. johorensense* proved to be very close to that of *P. bullenianum* (Karasawa 1986), and Fowlie sets his *P. tortipetalum* close to *P. johorensense*. Therefore, until more conclusive data is available, we will include these two taxa in *P. bullenianum*.

Paphiopedilum wolterianum was described as *Cypripedium wolterianum* by Kraenzlin (1895, 1896) and transferred to the genus *Paphiopedilum* by Pfitzer (1903). The drawings accompanying Kraenzlin's original description are confusing and show variation in the staminodal shield. As Kraenzlin compared *P. wolterianum* with the very distinct *P. lowii* and *P. barbatum* (Kraenzlin, 1895) and with *P. lowii* and *P. crossii* (as *P. callosum*) (Kraenzlin, 1896), it may be assumed that he was unaware of the descriptions of *P. appletonianum* and *P. bullenianum*. Whereas Fowlie (1966, 1969) treats *P. wolterianum* as an autonomous species, Braem (1988, 1999) and Cribb (1987, 1998) consider it conspecific with *P. appletonianum*. Indeed, the differences between *P. appletonianum* and *P. wolterianum*, as described by Fowlie (1969), are no greater than those of the two illustrations of the staminode given by Kraenzlin (1896). The differences in petal morphology and variation of the foliage are also well within the normal range for *P. appletonianum*. Desbois (1898) lists this taxon as *C. waltersianum*, obviously an absent-minded error.

Cypripedium poyntzianum was described by O'Brien (1894) and transferred to the genus *Paphiopedilum* as a variety of *P. appletonianum* by Pfitzer (1903). The plant on which



PAPHIOPEDILUM APPLETONIANUM (AS *WOLTERIANUM*)
COURTESY OF PAUL UPWARD



PAPHIOPEDILUM APPLETONIANUM

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON

O'Brien based his description was found among plants imported as *P. callosum* in 1894. Kerchove (1894) considered it a natural hybrid between *P. callosum* and *P. hookerae*. Cribb (1987, 1998) treats it as a variant of *P. appletonianum* with boldly marked leaves. There is, however, no indication about the nature of the foliage in the original description, and comments about that feature are also missing in the text accompanying the transfer to the varietal status. In his earlier treatments, Braem (1988, 1999) followed Pfitzer in respect to this matter, and until further plants answering to the description of this taxon become available, there seems to be no reason to do otherwise.

Paphiopedilum hainanense was described by Fowlie (as *P. hainanensis*) in 1987. The description was based on a plant which was imported from the mountains of Hainan Island and flowered in the greenhouses of the Los Angeles Arboretum. It was described as differing from *P. appletonianum* by having extremely tessellated foliage and staminal differences that Fowlie found "somewhat difficult to describe." Braem (1988) and Cribb (1998) treated the taxon within the synonymy of *P. appletonianum*, but the distinctly different foliage markings prompted Braem to accept it at the variety level in 1999 and we see no reason to proceed here in any other way.

DESCRIPTION

Paphiopedilum appletonianum is a perennial herb, growing in decaying leafy debris that has accumulated on the forest floor. The stems are short, 2 to 3 cm high, and bear three to eight leaves. The leaves are distichous, about 23 cm long by 2.5 to 5 cm wide, narrowly elliptic to ligulate-elliptic, and at the apex they are acute and tridentate. The leaves are glabrous, their margins minutely papillose, their upper surface medium to bright green with obscure darker green venation and tessellation, and their under surface grey-green, suffused with purple at the base, and distinctly keeled. The brown inflorescence is 16 to 60 cm high, shortly pubescent, and usually bears a single flower. The bract is 1.8 to 2.5 cm long, ovate, shortly pubescent, keeled, and green with purple at its base. The ovary is 3.5 to 6.5 cm long, shortly pubescent, and varies from purple-brown to reddish-brown. The dorsal sepal and synsepal are slightly keeled and have ciliate margins. Their outer surfaces are minutely papillose to minutely pubescent and ciliate at the base. Their inner surfaces are minutely papillose and shortly pubescent. The dorsal sepal is ovate and acute with basal margins that are strongly curved backward. The entire sepal is distinctly cucullate and directed forward. It is apple-green with darker veins, 3.5 to 4 cm long by about 2.5 cm wide. The synsepal is ovate-elliptic, acute, 2.5 to 3 cm long by about 1.5 cm wide, and apple-green. The petals are ligulate to spatulate, broadest toward the apex, and sometimes obscurely toothed at the apex. They are more or less obtuse, gently twisted, 5 to 6 cm long by 1.4 to 2 cm wide, and glabrous with slightly undulate, ciliate margins. The petals are more or less horizontally spreading, but they may be slightly drooping. They are bright green with small brown spots toward the base that shade to pinkish-purple distally. The lip is about 4.5 cm long by 1.5 to 1.8 cm wide, and trilobate. The lateral lobes are folded inward, acute, converging, and covered with shiny warts. The mid-lobe is deeply saccate, shaped like an inverted helmet, with distinct lateral auricula; the outer surface is glabrous and the inner surface is shortly hirsute. The lip is purplish-brown, becoming paler below, and the apex

is often creamy-white. The margin of the mouth is olive-green. The staminodal shield is oblong-rhomboid, with a middle tooth in the ventral sinus and ventral lobes that are variable in length. The green staminodal shield is darker at the centre, has white margins, is minutely hirsute, and is about 7 mm long and only slightly wider. In the centre of the lower margin there is a wide gap.

DISTRIBUTION AND HABITAT

Thailand, Cambodia, Laos, Vietnam, and Hainan Island (China). Plants generally grow with their roots embedded in deep leaf litter, detritus, or decaying leafy debris, but they are occasionally found on mossy boulders in dense forest. They grow at elevations between 400 and 1,500 m.

FLOWERING

Depending on the geographical provenance of the clone, *Paphiopedilum appletonianum* flowers in cultivation between October and July, with a peak season from January through March. Blooming in the habitat occurs before the end of the dry season.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 38$ (Karasawa, 1979).

VARIETIES AND FORMS

PAPHIOPEDILUM APPLETONIANUM FORMA IMMACULATUM

(BRAEM) BRAEM

ORCHIDEES. CULTURE ET PROTECTION, NO. 36: 35-38 (1998)

This is a typical albino lacking any reddish pigmentation. The sepals are bright green with darker green venation. The petals are a clear, immaculate apple-green with whitish apical regions. The saccate lip is apple-green with darker green venation and a whitish tip. The taxon was already called "var. *album*" by Birk in 1983, but in addition to being an inaccurate use of the term *album*, Birk's concept was never validly published.

PAPHIOPEDILUM APPLETONIANUM VAR. POYNTZIANUM

(O'BRIEN) PFITZER

ENGLER, DAS PFLANZENREICH, IV (50) HEFT 12: 79 (1903)

The petals are up to 6 cm long and pale green with purple near the apex. The saccate lip is whitish with a purple suffusion that becomes reddish toward the base. (see discussion above).



PAPHIOPEDILUM APPLETONIANUM VAR. *HAINANENSE*
COURTESY OF DOROTHY POTTER BARNETT

PAPHIOPEDILUM APPLETONIANUM VAR. HAINANENSE

(FOWLIE) BRAEM, BAKER & BAKER

THE GENUS *PAPHIOPEDILUM* - NATURAL HISTORY AND CULTIVATION,
2: 295 (1999)

This variant was originally described as an autonomous species by Fowlie (see above). The plants of this variety originate from the Chinese Island of Hainan where they grow on sandstone at elevations between 460 and 610 m. Although these plants are well within the natural variation of *P. appletonianum*, their island habitat is unique as all other populations occur on the mainland. The plants designated as *P. appletonianum* var. *hainanense* do differ from the mainland plants in the more brightly coloured flowers and more boldly tessellated leaves. For that reason, it seems best to retain them as an autonomous variety instead of sinking this taxon completely into the synonymy of the nominal form of *P. appletonianum*. Plants of this variety flower from March through May.



PAPHIOPEDILUM BULLENIANUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM BULLENIANUM

(REICHENBACH FIL.) PFITZER

Engler, BOTANISCHE JAHRBÜCHER, 19: 40 (1894)

BASIONYM

Cypripedium bullenianum Reichenbach fil.

BOTANISCHE ZEITUNG, 23: 99 (1865)

SYNONYMS

Cypripedium hookerae var. *bulleanianum* Veitch

A MANUAL OF ORCHIDACEOUS PLANTS, 4: 32 (1889)

Paphiopedilum hookerae var. *bulleanianum* (Reichenbach fil.) Kerchove

LE LIVRE DES ORCHIDEES, 454 (1894)

Paphiopedilum amabile Hallier fil.

NATUURKUNDIG TIJDSCHRIFT VOOR NEDERLANDSCH-INDIË, 54: 450-452 (1895)

Cypripedium hookerae var. *amabile* (Hallier fil.) Kraenzlin

ORCHIDACEARUM GENERA ET SPECIES, 1: 59 (1897)

Cordula bulleniana (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Cypripedium robinsonii Ridley

JOURNAL OF THE FEDERATED MALAY STATES MUSEUMS, 6: 183 (1915)

Cordula amabile (Hallier fil.) Merrill

JOURNAL OF THE STRAITS BRANCH OF THE ROYAL ASIATIC SOCIETY, SINGAPORE, No. 135 (1921)

Paphiopedilum robinsonii (Ridley) Ridley

FLORA OF THE MALAY PENINSULA, 4: 232 (1924)

Paphiopedilum linii Schoser

DIE ORCHIDEEN, 17(3): 177-181 (1966)

Paphiopedilum johorense Fowlie & Yap

ORCHID DIGEST, 36(2): 72 (1972)

Paphiopedilum tortipetalum Fowlie

ORCHID DIGEST, 49(4): 153-156 (1985)

Paphiopedilum tortisepalum, *lapsus calami*

Cribb, THE GENUS PAPHIOPEDILUM, 167 (1987)

ETYMOLOGY

Named *bulleanianum* for the British horticulturalist Bullen, the grower for Messrs. Low & Co.

DISCUSSION

Paphiopedilum bullenianum was discovered by Hugh Low in Sabah (North Borneo) and described by the younger Reichenbach in 1865. As discussed under *P. appletonianum*, there is little difference between the plants generally included in that species concept and those belonging to *P. bullenianum*. They are generally said to differ in the mottling of their foliage, obscurely mottled in *P. appletonianum* and distinctly mottled in *P. bullenianum*, and by the morphology of the staminodal shield. Plants of *P. appletonianum* have a transversely elliptic staminodal shield with a distinct and wide incision at the lower margin, and the lateral teeth are much larger than the middle tooth. On the other hand, the plants of *P. bullenianum* have a suborbicular to subrhombic staminodal shield and a narrow incision of the lower margin. We have, however, also discussed the variations of these taxonomic markers. In the context of *P. bullenianum*, again, a number of taxa have been described: *P. bullenianum* (as *Cypripedium bullenianum*) in 1865, *P. amabile* in 1895, *P. robinsonii* in 1915, *P. linii* in 1966, *P. johorensis* in 1972, *P. celebesense* in 1980, and *P. tortipetalum* in 1985.

Paphiopedilum amabile was described by Hallier fil. based on plants collected on K'lam Mountain (now known as Kelam Hill) near Sintang in West Kalimantan, Borneo, at an elevation of 700 to 950 m. In 1895, Hallier fil. was either unaware of the description of *P. bullenianum*, or he considered it a variety of *P. hookerae*. In any event, he put *P. amabile* close to *P. mastersianum* in his Latin diagnosis and compared it with *P. javanicum*, *P. dayanum*, *P. hookerae*, and *P. virens* but not with *P. bullenianum* in his general text. He did so, however, in his more elaborated text in the ANNALES DU JARDIN DE BUITENZORG indicating that he, although knowing *P. bullenianum* at that time (1897), wished to retain *P. amabile* as an autonomous taxon. There is, however, no difference in any vegetative or floral characteristics between the latter species and the Hallier concept of *P. amabile*, which has, therefore, been correctly reduced to synonymy. The concept of *Paphiopedilum robinsonii* as published by Ridley has often been misunderstood and should not be confused with the recently published *Paphiopedilum robinsonianum* Cavestro (2014). *Paphiopedilum robinsonii* was published as *Cypripedium robinsonii* in 1915 based on a 1911 collection on Gunung Tahan in peninsular Malaysia. Ridley compared his concept with *P. barbatum* but not with *P. bullenianum*. The concept has been considered a separate species by many authors besides Ridley, among them Van Delden (1968), Fowlie (1974), Karasawa (1986), and Braem (1988). Cribb (1987) included it as a synonym to *P. bullenianum*. However, the plant treated as *P. robinsonii* by Van Delden, Fowlie, Karasawa, and Braem does not correspond to the type material, to the original Ridley publication, or to any other described plant of the genus. It has, therefore, been validly described at the species level as *P. cerveranum* (Braem, 1999) and is treated as an autonomous entity in this volume. The concept of *P. robinsonii sensu* Ridley is considered a variant of *P. bullenianum*.

Paphiopedilum linii was described by Schoser (1966), who was the director of the Frankfurt Municipal Botanic Gardens at the time. The description was based on plants collected about 16 km from Kuching in Sarawak, Borneo. Schoser named his taxon for Mrs. Phyllis Sheridan-Lea, who was known as Mrs. Lin among the natives (as this taxon

was dedicated to a single human female, the spelling should have been "liniae."). He compared *P. linii* with *P. bullenianum* but claimed that there was no middle tooth in the incision on the apical side of the staminodal plate. However, the development of this middle tooth in *P. bullenianum* is extremely variable and *P. linii* definitely falls within the normal variation. Another feature that is often used to differentiate *P. linii* from *P. bullenianum* at the horticultural level is that the basal halves of the petals in *P. linii* are more intensely spotted than is usual for plants of *P. bullenianum*, but again, this is a rather variable feature. Karasawa (1980) carried out cytogenetic studies on plants corresponding to the *P. linii* concept and found that the chromosome count is identical to that of *P. bullenianum* ($2n = 40$) and that the karyotypes of both entities are extremely similar. Karasawa's findings leave little doubt that *P. linii* is best treated as a variant of *P. bullenianum*.

Paphiopedilum johorensense was described by Fowlie & Yap (1972). Plants of this taxon were first collected on Gunung Pantii (Mount Pantii) in Johor State in the southern Malay Peninsula and on Pulau Tioman (Tioman Island) in the South China Sea. This is one of the two taxa in this group (the other one being *P. tortipetalum*) in which the morphology of the staminodal shield is closer to that generally found among the plants of *P. appletonianum*. Fowlie & Yap described the mottling of the foliage as "only faintly visible" and compared their concept with this latter species and *P. linii*. The most important factor that leads us to include this taxon as a variety of *P. bullenianum* is the study by Karasawa (1986), who found the chromosome count to be identical and the karyotypes of the two taxa extremely similar. The differences in floral morphology, however, prompt us to accept *P. johorensense* as a distinct variety (see below).

Paphiopedilum celebesense was described by Fowlie & Birk in 1980. The concept was based on plants Birk collected in the area of Rantepao in central Sulawesi. They vary from the typical *P. bullenianum* by having less intensive spotting on the petal margins, a less emarginate apex of the lip, shorter petals, shorter lip, and some minor differences in the morphology of the staminodal shield. The chromosome count is different from that of *P. bullenianum* (Karasawa, 1979) and on that basis *P. celebesense* was considered a separate species by Karasawa & Saito (1982). Otherwise, the plants fit very well within the normal variability of *P. bullenianum*, and we do not think that this taxon deserves recognition at the species level. The differences from the typical plants of *P. bullenianum* are large enough, however, to accept *P. celebesense* as an autonomous variety.

Birk (1983) referred to some plants from Ceram Island in the Moluccas as *Paphiopedilum ceramense*. This concept was never validly published, so the name is considered a *nomen nudum*, and it is treated as a synonym of *P. bullenianum* var. *celebesense*.

The last taxon in this complex is *Paphiopedilum tortipetalum*, a concept published by Fowlie (1985). He put this taxon near *P. johorensense*, and differentiated the two taxa by the sigmoidal twist of the petals, the shape of the petals, the incision of the lip margins, and the amount of mottling on the foliage. Just as in *P. johorensense*, the staminodal morphology of *P. tortipetalum* is closer to that of *P. appletonianum* than to that of *P. bullenianum*. The upper surface of the foliage, however, is strongly mottled. There

is no chromosome count or karyomorphological data available. The plants on which the original description was based were collected in the Barisan Mountains of Sumatra near a river east of Payakumbuh at 900 m. We choose not to maintain this taxon as a variety but to sink it into the synonymy of the nominal form.

DESCRIPTION

Paphiopedilum bullenianum is a perennial herb growing in leafy humus. The leaves, which are oblanceolate to oblong-elliptic with an obtuse, tridentate apex, are up to 15 cm long by about 3.5 cm wide. Leaves vary from dull bluish-green to bright green. The upper surface is indistinctly to boldly mottled with darker green, and the underside sometimes has purple spots. The inflorescence is up to 55 cm high and generally bears a single flower, rarely two. The scape is green with purple spots and dense purple pubescence. The ciliate bract is ovate-elliptic, acute, up to 2 cm long, noded at the base, and about one-third the length of the ovary. The flowers are up to 9.5 cm across. The dorsal sepal is about 3.5 cm high and up to 2.2 cm wide, ovate, acute, usually concave, and the margins of the basal section are reflexed. It may be white to bright green with a darker green longitudinal centre stripe and more or less prominent green veins. The base is often marked with dark purple, and the outer surface is shortly pubescent. The synsepal, which is shorter and narrower than the dorsal sepal, is lanceolate to narrowly ovate, acute, and up to 2.5 cm long by 1 to 1.5 cm wide. It is whitish to bright green with more or less distinct green veins. The petals are spread horizontally, but droop at the apices. They are 3.8 to 5.5 cm long by 0.9 to 1.5 cm wide, oblong-spathulate to oblanceolate, and obtuse. The petals have a greenish to tawny-yellow ground colour with a variable number of purple spots toward the base and a purple to rose-purple suffusion in the distal part. The petal margins are somewhat undulate, ciliate, and bright yellow decorated with small near-black warts. The saccate lip is shaped like an inverted helmet, and 3 to 5 cm long by about 3.5 cm wide. It is ochre to greenish with a purple-red suffusion, a lighter coloured apex, and a greenish rim at the mouth. The sidelobes are folded inward and covered with large warts. The staminodal shield may be subcircular, subrhombic, or ovate. It is 6 to 9 mm long by 6 to 8 mm wide, notched above and below, and the under sinus is often deep with a more or less distinct tooth in the middle. The shield is green with a darker green pattern. Combined, the pubescent ovary and pedicel are 4 to 6 cm long.

DISTRIBUTION AND HABITAT

Borneo, Sumatra, and peninsular Malaysia. *Paphiopedilum bullenianum* grows in a variety of habitats from sea level to about 1,850 m, but it is most commonly found near 900 m. It grows in leaf litter on steep slopes and on moss-covered rocks in the light shade of low forest.

FLOWERING

Reports of blooming plants answering to the description of *Paphiopedilum bullenianum* are known from all months with the exception of August and September. There seems to be a peak flower season in February and March.



PAPHIOPEDILUM BULLENIANUM

TOP: PHOTOGRAPH BY PROF. G.J. BRAEM

BOTTOM: COURTESY OF DR. PANKAJ KUMAR

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 40$ (Karasawa, 1979; Karasawa & Aoyama, 1986 [as *P. linitii*]).

VARIETIES AND FORMS

PAPHIOPEDILUM BULLENIANUM VAR. CELEBESENSE

(FOWLIE & BIRK) CRIBB

THE GENUS *PAPHIOPEDILUM*, 167 (1987)

This variety was originally described at the species level as *Paphiopedilum celebesense* Fowlie & Birk in ORCHID DIGEST, 44(1): 23-30 (1980). It differs from a typical *Paphiopedilum bullenianum* in that it has fewer spots on the shorter, obtuse petals, which are 3.5 to 4.6 cm long by 1.2 to 1.7 cm wide. The labellum is 3.2 to 3.7 cm long, which is shorter and wider than those of other variants of *P. bullenianum*. It was also listed, but not validly described, as *Paphiopedilum ceramense* by Birk in THE PAPHIOPEDILUM GROWER'S MANUAL, 63 (1983).

Paphiopedilum bullenianum var. *celebesense* grows in Sulawesi (Celebes) and Ceram. Plants grow on north-facing slopes in lightly shaded places under ferns at about 950 m. Roots are usually embedded in deep humus and leafy forest litter. Plants are sometimes found in full sun, however, with their roots embedded in spongy moss. The plants flower between February and June in cultivation. The mitotic chromosome count is $2n = 42$ (Karasawa, 1979) and thus is different from the normal count in *P. bullenianum*.

PAPHIOPEDILUM BULLENIANUM VAR. JOHORENSE

(FOWLIE & YAP) BRAEM, BAKER & BAKER

THE GENUS *PAPHIOPEDILUM* - NATURAL HISTORY AND CULTIVATION, 2: 302 (1999)

This variety was first described as *Paphiopedilum johorensense* by Fowlie & Yap in ORCHID DIGEST, 36(2): 72 (1972). If it were not for the results of the karyomorphological studies through which Karasawa (1986) determined the extreme similarity to *P. bullenianum*, we would not hesitate to include this taxon under *P. appletonianum*. Indeed, the morphology of the staminodal plate and the obscure mottling of the foliage are characteristics more closely associated with *P. appletonianum* than with *P. bullenianum*.

Paphiopedilum bullenianum var. *johorensense* has four to six pairs of fleshy, oblanceolate leaves that are prominently keeled, about 20 cm long by up to 3.7 cm wide, and taper to a tridentate apex. The leaves are bluish-green with faintly visible marbling on the upper surface, and the under surface is uniformly light green. The inflorescence generally bears a single flower. The scape is up to 45 cm tall, green, and covered with dark brown hairs. The flower bract is about 2 cm long, dark green, and densely covered with hairs. The ovary is 4.5 to 5 cm long, light green, and hirsute. The flower is about 9 cm across and up to 6.6 cm tall. The hooded dorsal sepal is ovate with an acute tip. It is about

3.5 cm tall and pale green with darker green longitudinal veins. The basal one-third of the margins is reflexed, the apical two-thirds curls to the inside, and the outer surface is hairy. The synsepal is about 2.8 cm long, narrow, pale green, and is sometimes very obscurely striped, but in other respects, it is similar to the dorsal. The petals are 4.8 to 5.2 cm long with a narrow base, but they become wider toward the apex. Their basal one-third is light green, the apical portion is pink, and the margins are light yellowish-green. There are a few large and small brown spots about halfway along the upper margins. The basal one-half of both margins is undulate and carries a few brown hairs. The lip is about 4.4 cm long by nearly 1.5 cm wide. The main lobe is shaped like an inverted helmet. It is 2.5 to 2.7 cm long, and the upper portion on each side is laterally extended as a prominent auricle. The lip is yellowish-green to fawn, faintly suffused with light pink, and has veins that are barely visible. The inner surface of the pouch is pale pink with numerous dark pink spots. The side lobes are about 1.6 cm long, light yellowish-green flushed with pink, with three or four large, pink, warty structures. They are inflexed with touching margins, and the outer surface is the same colour as the pouch. The column is about 1 cm long with prominent teeth over the pollen masses. The stigma is about 6 mm wide, and is greenish white. The staminodal shield is about 7 mm wide and slightly less tall. It has an upper incision that is narrow and rounded, and a lower incision that is wide with a distinct middle tooth in the centre. The shield is green with a darker green centre.

Paphiopedilum bullenianum var. *johorensis* is found in southern Malaysia. The plant usually grows in the mountains and has been found on Gunong Pantu and Gunong Belumut, but plants have also been found on Tioman Island. They grow at about 500 m in dense, tall forests that provide heavy shade and are most often found on the surface of the ground in thick pads of decaying humus or on exposed, moss-covered tree roots.

Paphiopedilum bullenianum var. *johorensis* has been reported to bloom in May and June. The mitotic chromosome count is $2n = 40$ (Karasawa, 1986).

PAPHIOPEDILUM CERVERANUM

BRAEM

ORCHIDÉES. CULTURE ET PROTECTION, NO. 38: 28-30 (1999)

SYNONYM

Paphiopedilum robinsonii hort., non (Ridley) Ridley, non *robinsonianum* Cavestro.

ETYMOLOGY

Named *cerveranum* in honour of Frank Cervera, an ardent slipper orchid enthusiast from New York, USA.

DISCUSSION

Paphiopedilum cerveranum has been misinterpreted as *Paphiopedilum robinsonii* (Ridley) Ridley by most authors (Van Delden, 1968; Fowlie, 1974; Karasawa, 1986; Braem, 1988 and 1998; Koopowitz, 1995). Koopowitz (2018) in his ANNOTATED CHECKLIST OF PAPHIOPEDILUM SPECIES considers *P. cerveranum* to be a synonym of *P. apple-tonianum*, an interpretation that is pure nonsense. The staminodal shield of the plant now referred to as *P. cerveranum* has no indentation, but instead it has a protruding boss at the apical margin, and thus does not fall within the variability of either *P. apple-tonianum* or *P. bullenianum*.

The morphology of the staminode does not correspond with the original description of *P. robinsonii*, where Ridley clearly states that the anther (staminode) is "widely emarginate at the tip [= apex]." Neither does this plant correspond to the type specimen of *P. robinsonii*.

Cribb (1998) considers this taxon to be a possible hybrid between *P. bullenianum* and another species, possibly *P. hookerae*. However, he provides no data to support such a hypothesis.

Several clones of this taxon are known and in cultivation, and numerous specimens have been studied over the last twenty-five years. Several groups of the cultivated plants examined were undoubtedly collected in the wild. The exact locality of the collection of the type specimen has not been disclosed to protect the habitat. Plants answering the description of *P. cerveranum* were also found by Averyanov in Vietnam.

DESCRIPTION

Paphiopedilum cerveranum is a perennial herb, growing in leafy debris that has accumulated on the forest floor or in the cracks and crevices in rocks. The plants have short stems, bearing up to eight leaves. These are oblong-ovate, 10 to 25 cm long by about 4 cm wide, 3-toothed at the apex, distinctly tessellate, and deep green with irregular silvery-green or greyish-green areas. The inflorescence is terete, erect, up to 30 cm high,



PAPHIOPEDILUM CERVERANUM
COURTESY OF DR. HENRY OAKELEY

and usually bears a single flower. The bract is only about 8 mm long, green, pubescent, and curved at the apex. The ovary is about 4 cm long, pubescent, and purple-brown. The flower is up to 6.5 cm high by 9 cm wide. The green dorsal sepal is broadly ovate, about 3.5 cm long, acute, and bent forward. The basal half is sometimes slightly suffused with purple and marked with a deep purple median stripe, and the whitish margins are reflexed near the base. The lateral sepals are united to form a dull green, ovate synsepal which is shorter than the dorsal sepal. The petals, which are about 5 cm long by up to 1.8 cm wide, are spatulate, widening toward the apex, and slightly to strongly twisted. The basal portion is dull yellowish-green with two to four distinct folds and numerous near-black spots on the upper half, but the distal portion is uniformly suffused with pink to reddish-purple. The saccate lip, which is shaped like an inverted helmet, is 2.5 to 3.5 cm high by about 1.8 cm wide. It is dull green to honey-brown with a purple to purple-brown rim around the aperture, paler at the tip, and marked with a network of greenish veins. The staminodal shield is cordate with a sinus at the upper rim and a protruding tooth at the lower margin. It is honey-coloured with an ivory middle section which is surrounded by a greenish, web-like pattern.

DISTRIBUTION AND HABITAT

Indochina. Plants were collected in Vietnam near the Cambodian border at about 600 m. Plants have since been found by Averyanov and his research associates in the Bi Dup Mountains between the Lam Dong and Thanh Hoa Districts at elevations of about 800 to 900 m.

FLOWERING

In cultivation in central western Europe, *Paphiopedilum cerveranum* blooms from January through March.

MISCELLANEOUS NOTES

The mitotic chromosome counts are $2n = 38$ (Karasawa, 1986 [as *P. robinsonii*]), and $2n = 58$ (Duncan & MacLeod, 1950b [as *P. sublaeve*]). We can find no logical explanation for this enormous discrepancy. In the publication of Duncan & MacLeod, the authors illustrate the plant which they have allegedly examined. Although the illustration is labelled as *P. sublaeve*, a synonym for *P. crossii* (formerly *P. callosum*), the plant in the picture can be fairly positively identified as *P. cerveranum* (formerly *P. robinsonii*).

VARIETIES AND FORMS

PAPHIOPEDILUM CERVERANUM FORMA VIRIDE

BRAEM, BAKER & BAKER,

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY AND CULTIVATION,
2: 309 (1999)

This variant was originally described as *Paphiopedilum robinsonii* forma *viride* by Braem in ORCHIDÉES. CULTURE ET PROTECTION, No. 36: 35-38 (1998). It represents the typical albino. The flowers are uniformly green to yellow-green. In all other aspects it is identical with the nominal form of the species.

PAPHIOPEDILUM MASTERSIANUM

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 477 (1892)

BASIONYM

Cypripedium mastersianum Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 12: 102, (1879)

SYNONYM

Cordula mastersiana (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Named *mastersianum* for the editor of THE GARDENERS' CHRONICLE, Dr. Maxwell T. Masters (1833-1907).

DISCUSSION

The only thing known about the discovery of this species is that the plants first imported into Europe were said to originate from the Sunda Islands. Veitch sent material to Reichenbach fil. and later clarified that his nursery did not import the plant but obtained the material from Kew Gardens.

Paphiopedilum mastersianum is well-known and rather common in cultivation. It has been collected on at least two of the Molucca islands, namely Ambon and Buru (Boreoe). The American Orchid Society has awarded quite a few cultivars of this species, and it has been used extensively in hybridisation.

Paphiopedilum mastersianum is closely related to *Paphiopedilum papuanum*, a species from New Guinea. The karyomorphological studies of Karasawa & Saito (1982) also show a close relationship to the plants of the *P. violascens* complex.

DESCRIPTION

Paphiopedilum mastersianum is a perennial, herbaceous plant with short stems. The leaves are narrowly oblong, up to 22 cm long by about 4.5 cm wide, and deep green with pale green tessellations. They are obtuse and have a three-toothed apex. The inflorescence is 30 to 40 cm high, deep purple, very hairy, and usually one-flowered. The bract is ovate, 2 to 2.5 cm long, and acute. The flower is 10 to 12 cm wide when measured across the petals and about 7.5 cm high. The dorsal sepal is broadly ovate, obtuse, ciliate along the margins, and bright green with a broad yellow-white border and darker green veins. It is 3 to 4 cm long by 3 to 4.5 cm wide. The lateral sepals are united into a synsepal, which is up to 3 cm long, pale green, ovate, acute, and much smaller than the dorsal sepal. The petals are horizontally spread. They are 4.5 to 6 cm long by 1.2 to 2



PAPHIOPEDILUM MASTERSIANUM

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

cm wide, spatulate with ciliolate margins. They are brownish-red but paler toward the base where there are numerous, small, black-purple warts along the superior margin and along the mid-vein. The lip is trilobate, 4.5 to 5.5 cm high by about 2.5 cm wide. The main lobe is shaped like an inverted helmet, pale reddish-brown, and yellowish around the rim. The infolded side lobes are greenish-brown with dull purple spots. The staminodal shield, which is horseshoe-shaped with cusps that are acutely curved inward and a blunt middle tooth on the apical side, is greenish-brown with a yellow margin. The texture of the entire flower is very glossy (a feature that *P. mastersianum* shares with *P. mohrianum*). This texture seems to be dominant as it is passed on to the progeny. For this reason, hybridisers like to use *P. mastersianum* to impart a glossy shine to hybrids.

DISTRIBUTION AND HABITAT

The Molucca islands in Indonesia. Plants have been found on Ambon, Buru and Flores. Some writers report that *Paphiopedilum mastersianum* also occurs on Ceram Island. Thus, the indication of “Sunda Islands” as the place of origin of the original collection may have been a transmission mistake or an attempt (not at all unusual) to mislead commercial collectors.

Plants usually grow in pockets of humus on steep cliff faces at about 900 to 2,000 m. *P. mastersianum* is found most often in moderate shade in areas where mist and condensation are common and provide moisture, even during the dry season.

FLOWERING

Paphiopedilum mastersianum has been reported to flower year round with the exception of September and October. Most plants flower between January and May.

MISCELLANEOUS NOTES

The mitotic chromosome counts are $2n = 32$ (Duncan, 1947; Duncan & MacLeod, 1950a); and $2n = 36$ (Karasawa, 1979).

VARIETIES AND FORMS

PAPHIOPEDILUM MASTERSIANUM VAR. MOHRANIMUM

(BRAEM) KOPOWITZ

ORCHID DIGEST, 64: 169 (2000)

Braem described *Paphiopedilum mohrianum*⁹ as an autonomous species in 1989 (Orchid Digest, 53 (2):72-75). Koopowitz (1995, 2000) moved the concept into synonymy with *P. mastersianum*. Cribb takes a completely different approach and suggests that *P. mohrianum* may be a natural hybrid between *P. bullenianum* var. *celebesense* and *P. javanicum*. However, he does not provide any evidence to support this position. Superficially, one can indeed see a certain overall similarity of *P. mohrianum* with the general features of plants of the *P. bullenianum* complex, but an even more striking resemblance can be observed when one compares *P. mohrianum* with *P. mastersianum*.

The intermediate nature of the plant is not denied. Indeed, Braem, in his original description, made the following observation:

“according to its flower morphology, the species could be considered an intermediate form between the sections *Spathopetalum* [which includes *P. bullenianum*] and *Blepharopetalum*, [which includes *P. mastersianum*]”.

⁹ Named *mohrianum* for Hartmut Mohr of Gemünden (Hunsrück), Germany, pharmacist and botanical illustrator.



PAPHIOPEDILUM MASTERSIANUM VAR. *MOHRIANUM*
 WATERCOLOUR PAINTING BY FARADINA ELMAHDA
 COURTESY OF FARADINA ELMAHDA

There is no evidence, however, that could support the influence of *P. javanicum* or that would warrant accepting a hybrid status for this taxon.

Gruß (2014) argued that *Paphiopedilum mohrianum* may well be identical with the plant Asher introduced in an 1981 article (ORCHID DIGEST, 45:20) as *Paphiopedilum x bundtii*. Although Asher presented two colour photographs of the plant, he did not in any way render a description. For that reason, *Paphiopedilum x bundtii* must be regarded as a *nomen nudum*.

PAPHIOPEDILUM PAPUANUM

(RIDLEY EX RENDLE) L.O. WILLIAMS

BOTANICAL MUSEUM LEAFLETS, HARVARD UNIVERSITY, 12(5): 149 (1946)

BASIONYM

Cypripedium papuanum Ridley ex Rendle

THE GARDENERS' CHRONICLE, 3rd series, 58: 131 (1915)

SYNONYM

Paphiopedilum zieckianum Schoser

DIE ORCHIDEE, 18(1): 1-7 (1967)

ETYMOLOGY

Named *papuanum* for Papua, the native name for New Guinea, the natural habitat of this species.

DISCUSSION

Paphiopedilum papuanum was discovered by Cecil Boden Kloss (1877-1949), the botanical collector of the Wollaston expedition to New Guinea, around 1913. The collected materials were dried and sent to Ridley, who was appointed to classify the botanical specimens of the expedition. Among the collections, Ridley found a slipper orchid which he named *Cypripedium papuanum*. Live plants were also collected for Baron Rothschild, one of the sponsors of the expedition. The first plant of *P. papuanum* flowered in the Rothschild greenhouses in the summer of 1915. The species was officially described as *C. papuanum* by Rendle in THE GARDENERS' CHRONICLE for 1915 together with a diagnosis rendered by Ridley and a photograph of the plant and flower. The transfer to the genus *Paphiopedilum* was done by L.O. Williams in 1946 (*loc. cit.*). Ridley's Latin diagnosis compared the new taxon with *P. violascens*, another species from New Guinea described by Schlechter a few years earlier. This may have been the reason why many plants of *P. violascens* were erroneously brought into cultivation as *P. papuanum*.

In 1967, the true *Paphiopedilum papuanum* was rediscovered by Zieck and his co-travellers in the Arfak Mountains of Irian Jaya (West New Guinea). Schoser, who did not recognise the plant's true identity, described it as a new species, naming the taxon *P. zieckianum*. *Paphiopedilum papuanum* was generally cultivated under that name since 1967, and quite a few plants of *P. papuanum* still are being grown as *P. zieckianum*, even though the two concepts were proven to be identical many years ago.

The American Orchid Society has awarded several plants under the designation of *P. papuanum*; among the awards there is *P. papuanum* 'Penn Valley' JC/ AOS which in reality is a *P. javanicum*. The identity of the plants awarded under the designation "*Paphiopedilum papuanum*" (and many others) should be re-examined.

In 2003 the Orchid Registrar of the Royal Horticultural Society considered *P. papua-*



PAPHIOPEDILUM PAPUANUM
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC



PAPHIOPEDILUM PAPUANUM

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

num conspecific with *P. violascens*, an error obviously originating from the misinterpretation of the original description. As a result, at least some of the hybrids showing *P. violascens* as a parent in SANDERS' LIST OF ORCHID HYBRIDS were probably produced with *P. papuanum* and vice versa. In the meantime, the RHS lists *P. papuanum* and *P. violascens* as separate species. The chaos in respect to hybrid parentage has, however, never been corrected, and most probably never will.

DESCRIPTION

Paphiopedilum papuanum is an herbaceous plant growing to an overall height of 22 to 25 cm. The leaves, usually four to six per growth, are oblong, leathery, and generally 7 to 10 cm long by up to 2.5 cm wide. They are more or less acute with a minutely tri-cuspidate tip and pale green with darker green tessellations on the upper surface. The inflorescence is 15 to 25 cm high and deep crimson with numerous stiff hairs. The floral bract is ovate, similarly hairy, and up to 1.4 cm long. The pedicel and dark green ovary are hairy also, and about 5 cm long. The dorsal sepal is broadly ovate with a short, abrupt, acute apex. It is green with five to six somewhat obscure, deep crimson, unbranched veins on either side of the mid-vein. The dorsal sepal is barely 2.6 cm long by about 2 cm wide. It is hirsute on the back and ciliate along the margins. The lateral sepals are united, forming a synsepal which is elliptic-lanceolate, subacute, and about 2 cm long by up to 1 cm wide. The synsepal is also hirsute on the back and has about seven raised veins. The petals are oblong, broadening toward the apex, obtuse, and up to 4.3 cm long by about 1.3 cm wide. They are glabrous except for the ciliate margins and show multiple veins. The petals are dull crimson with scattered darker spots and a greenish-yellow tinge. The lip is up to 4 cm long including the broad claw, which is about equal in length to the pouch, and has somewhat obtuse, minutely pubescent lateral lobes and a deeply saccate main lobe. It is dull crimson as in the petals and the lobes are tinged with greenish-yellow. The lunate-reniform staminodal shield is notched above. It has blunt lobes and an obtuse median tooth.

DISTRIBUTION AND HABITAT

Irian Jaya (West New Guinea). Plants have been collected at 800 to 1,050 m near Mt. Carstensz and in the Arfak Mountains just south of Manokwari. In addition, a single collection has been reported in the Southern Highlands Province of Papua New Guinea, where plants were found at an elevation of about 1,700 m. Plants were found in light shade from trees and ferns and in sunny spots, growing on yellowish loam among large boulders. Plants of this species were also found by Zieck and Mattes, probably near the site where the type specimen was found on the northern slopes of the Arfak Mountains. The plants were growing at an elevation of about 1,000 m, somewhat above Ngabret Lake along a tributary of the Warmolpi Marveni River about 30 km to the south of Manokwari.

FLOWERING

Plants have been reported to flower between March and April and between July and November.

THE PAPHIOPEDILUM VIOLASCENS COMPLEX

Three taxa belonging to the *Paphiopedilum violascens* complex have been described at the species level. They are *P. violascens* (Schlechter, 1911), *P. wentworthianum* (Fowlie, 1968) and *P. bougainvilleanum* (Stiles & Fowlie, 1971). The latter two concepts are very closely related to *P. violascens*. Braem (1988) treated *P. bougainvilleanum* as well as *P. wentworthianum* as synonyms of *P. violascens*, whereas Koopowitz (1995, 2000, 2018) considers *P. bougainvilleanum* a variety of *P. violascens* and *P. wentworthianum* as a separate species. Karasawa & Saito (1982) and Cribb (1987, 1998) treat the three taxa as separate species.

Cribb's arguments for considering the three taxa as separate species are rather inconclusive. In discussing *Paphiopedilum bougainvilleanum*, he stated that the populations are "distinct in several, albeit minor, features" but wrote that "the morphological similarity does perhaps suggest that it merits no more than infraspecific recognition within *P. violascens*." He also stated that the populations of *P. bougainvilleanum* are "well separated geographically from those of *P. violascens* on mainland New Guinea" but geographic separation is not justification for species status. At the same time, he places *P. wentworthianum* taxonomically close to *P. bougainvilleanum*, indicating that the differences are merely in the "more spreading, glossier petals, undulate on their upper margin." Howcroft (1970), who studied *P. violascens* populations from various parts of the New Guinea mainland, reports that he found at least one plant of *P. wentworthianum* among his collections made near Garaina in Papua New Guinea. It is therefore possible, that the habitats of *P. violascens* and *P. wentworthianum* and possibly also of *P. bougainvilleanum* overlap in at least some areas.

It may be said that it is at least doubtful whether these three taxa deserve autonomous species status. If one examines differentiating characteristics among the three concepts, it would be easy to conclude that *Paphiopedilum bougainvilleanum* is intermediate between *P. violascens* and *P. wentworthianum*. *Paphiopedilum bougainvilleanum* shares the drooping petals with *P. violascens*, and the lateral teeth of its staminodal shield are acute although less acute than in *P. wentworthianum*. On the other hand, the karyomorphological data, as presented by Karasawa (1979) and Karasawa & Saito (1982), does show clear differences among the three taxa, although the chromosome numbers of *P. bougainvilleanum* and *P. wentworthianum* are the same.

Plants have been awarded under all three designations by the American Orchid Society judging system, but the three taxa are treated as synonyms by the Orchid Registrar of the Royal Horticultural Society. We have decided to treat all three taxa as autonomous species, giving *P. bougainvilleanum* and *P. wentworthianum* the benefit of the doubt.

Key to the Taxa Belonging to the *Paphiopedilum violascens* complex

- 1. Petals predominantly green, generally only flushed with purple toward the apex.
Dorsal boldly green-striped *P. bougainvillleanum*
- 1a. Petals not predominantly green 2
- 2. Petals distinctly drooping. Staminode with blunt lateral teeth *P. violascens*
- 2a. Petals not drooping. Staminode with acute lateral teeth *P. wentworthianum*



PAPHIOPEDILUM VIOLASCENS
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM VIOLASCENS

SCHLECHTER

FEDDE, *REPERTORIUM SPECIERUM NOVARUM REGNI VEGETABILIS*,
BEIHEFTE, 1: 2-3 (1911)

SYNONYMS

Cordula violascens (Schlechter) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum violascens var. *gautierense* J. J. Smith

NOVA GUINEA, 12: 175 (1915)

ETYMOLOGY

Named *violascens*, referring to the main colour of the flower in the type specimen.

DISCUSSION

Paphiopedilum violascens was discovered in 1907 by Rudolf Schlechter, a German botanist, who described the plant a few years later (*loc. cit.*) in his comprehensive treatise of the orchids from German Irian Jaya, now the northern part of New Guinea. *P. bougainvilleanum* Fowlie (1971) and *P. wentworthianum* Schoser & Fowlie (1968) are closely related to *P. violascens* and have often been treated as synonyms or varieties of the latter species. *P. bougainvilleanum* can be differentiated by its predominantly green flower, and *P. wentworthianum* can be identified by its spreading (not drooping) petals.

Paphiopedilum violascens has often been confused with *P. papuanum*, and some plants of *P. violascens* are still in cultivation under the latter designation. (See also the discussion under *P. papuanum*).

DESCRIPTION

Paphiopedilum violascens is a perennial herbaceous plant, growing in decaying vegetable debris. The stems are very short and bear up to six leaves. The leaves are oblong-lanceolate, finely three-toothed at the apex, up to 22.5 cm long by 2.5 to 4 cm wide, and deep green tessellated with grey-green. The inflorescence is erect, up to 30 cm high, dark brown to near-black, downy, and usually bears a single flower. Overall, blossoms are about 7 cm wide. The white dorsal sepal is broadly ovate, acute, and symmetrically striped with magenta, green and black. Its margins are pink to white, the inner surface is smooth and the outer surface is more green and brown. It is slightly keeled and ciliate. The concave dorsal sepal is about 3.2 cm long by approximately 2.8 cm wide. The lateral sepals are united into a synsepal which is nearly 2.5 cm long by about 1.5 cm wide. It is oblong-ovate, acute, and paler in colour than the dorsal sepal. The petals are 3.8 to 4.6 cm long by about 1.6 cm wide. They are oblong-linear to ligulate, drooping, crescent-like, more or less deflexed, and ciliate. The basal part of the petals is purple, but they are whitish toward the apex and have purple veins over their whole length. The



PAPHIOPEDILUM VIOLASCENS
WATERCOLOUR BY IRENE NG
COURTESY OF IRENE NG

shiny lip is three-lobed and about 4.5 cm long by somewhat more than 2.6 cm wide. The saccate main lobe, which is shaped like an inverted helmet, is olive-green to brown and has very distinct veining on the outer surface. The side lobes are folded inward to form a tube. The staminodal shield, which is cream-yellow with a green pattern in the centre area, is more or less kidney-shaped to crescent-shaped, somewhat cleft at the top. It has three apical teeth and the middle one is distinctly shorter than the outer ones.

DISTRIBUTION AND HABITAT

Northern New Guinea. *Paphiopedilum violascens* grows in Irian Jaya, Papua New Guinea, and adjacent offshore islands. Plants are found in a variety of habitats at 200 to 1,200 m. They have been collected in wet, shady places and grow in volcanic soils intermixed with plant debris, in cracks and crevices of limestone outcrops where the roots can embed in humus and acid moss.

FLOWERING

In cultivation, plants generally flower in the spring. In its natural habitat, however, *Paphiopedilum violascens* usually flowers between May and July and often blooms a second time between October and December.

MISCELLANEOUS NOTES

The mitotic chromosome counts hitherto reported are $2n = 32$ (Birk, 1983) and $2n = 38$ (Karasawa, 1979). Birk reports the count of $2n = 32$ without giving any evidence or reference. On the other hand, the plant from which Karasawa (*loc. cit.*) obtained the count of $2n = 38$ can be positively identified as *P. violascens*.

VARIETIES AND FORMS

Paphiopedilum violascens is quite variable both in flower colour and leaf tessellation. As discussed, it can very well be argued that *P. bougainvilleanum* and *P. wentworthianum* are varieties of this species. The plant described as *P. violascens* var. *gautierense* by J. J. Smith (1915), based on a collection from the Gautier Mountains of western New Guinea, is within the normal range of the species. Therefore the variety was reduced to a synonym of *P. violascens* (Braem, 1988). The plant described as *Paphiopedilum violascens* var. *saskianum* (Gruß & Röth) Koopowitz (ORCHID DIGEST, 64: 176 [2000]) falls within the concept of *P. bougainvilleanum*.



PAPHIOPEDILUM BOUGAINVILLEANUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM BOUGAINVILLEANUM

FOWLIE EX STILES & FOWLIE

ORCHID DIGEST, 35(4): 119-122 (1971)

SYNONYMS

Paphiopedilum violascens var. *bougainvilleanum* (Fowlie ex Stiles & Fowlie) Koopowitz
ORCHID DIGEST, 59(3): 115-147 (1995)

Paphiopedilum violascens var. *saskianum* (Gruß & Röth) Koopowitz
ORCHID DIGEST, 64(4): 176 (2000)

ETYMOLOGY

Named *bougainvilleanum* for the island of Bougainville, the place of origin of the type specimen.

DISCUSSION

Paphiopedilum bougainvilleanum was discovered by McKillop, the owner of a plantation on the island of Bougainville and described by Fowlie in an article co-authored by Allan Stiles. The concept, which was based on a plant collected by Clayton B. Wentworth, flowered in Los Angeles in 1969.

Paphiopedilum bougainvilleanum is closely related to *P. violascens* and *P. wentworthianum*. From the former it can be more or less differentiated by the predominantly green colour of the flower, with purple occurring only in the marginal areas of the petals and the dorsal sepal.

Fowlie differentiated his new taxon from *Paphiopedilum wentworthianum* by the "fine hair on the petal margin" and "the different petals and semi-lunate (not narrowly incised) staminode." He was mistaken in respect to the marginal hairs on the petals, as this also occurs in *P. wentworthianum*. The staminode is somewhat different from that of *P. wentworthianum* in that the lateral teeth are not as acute. However, the staminodal form is variable and, as discussed above, is best characterised as being somewhat intermediate between the staminodes of *P. violascens* and *P. wentworthianum*.

The best way to differentiate *Paphiopedilum bougainvilleanum* from *P. wentworthianum*, if one does not want to rely on flower colour, is the form of the petals. Whereas they are distinctly drooping in the former, they are straight and more spreading in the latter. Fowlie also stated that there is a difference in the form and marmoration of the leaves between *P. violascens* and *P. bougainvilleanum*. Those of the latter taxon are said to be narrower, and "transversely banded with darker green marks" whereas those of *P. violascens* are said to be "checkerboard-patterned". As the mottling of the leaves is quite variable in many *Paphiopedilum* species, this should not be over-emphasised.

McKillop has been quoted to say in respect to *Paphiopedilum bougainvilleanum* that "the *Paphiopedilums* were variable in colour in their habitat, some being green, some yellow, and occasionally a white one could be found". Whereas the rather unlikely occurrence

of white-flowered specimens within a pure population of *P. bougainvilleanum* could be explained, the alleged presence of yellow-flowered specimens remains an enigma and requires further study of the populations in their native habitat.

Paphiopedilum bougainvilleanum has been considered conspecific with *P. violascens* (Braem, 1988), a variety of *P. violascens* (Koopowitz, 1995, 2000, 2018) and as a separate species (Stiles & Fowlie, 1971; Karasawa & Saito, 1982; Cribb, 1987, 1998). There are valid arguments for each of these points of view.

DESCRIPTION

Paphiopedilum bougainvilleanum is an herbaceous plant. Each growth carries five to seven leaves which are narrowly elliptic, 14 to 25 cm long by 2.5 to 4.5 cm wide, and have a minutely tricuspidate apex. They are pale green and finely lined and mottled with dark green. The inflorescence generally bears a single flower. The peduncle is 9 to 25 cm long, pale green, and covered with purple hairs. The pedicel and ovary together are about 4 cm long, green, and covered with purple hairs. The dorsal sepal is ovate, acuminate or acute, and 3.1 to 3.8 cm long by 3.2 to 4.1 cm wide. It is white, boldly striped with dark green, and the basal margins are sometimes marked with a purple flush. The lateral sepals are united into a synsepal which is concave, ovate, acute, 2.5 to 2.8 cm long by 1.5 to 1.8 cm wide, and white with green stripes. The petals are falcate, narrowly elliptic, obtuse, 4.5 to 5.2 cm long by 1.5 to 2 cm wide, and ciliate. They are white with green veins and have a purple flush on the apical margins, sometimes on the entire apex. The lip is three-lobed, 4 to 5 cm long by 1.7 to 2.7 cm wide, and green with darker veins. The main lobe of the lip is shaped like an inverted helmet, narrowing toward the apex. The staminodal shield, which is half-moon-shaped, is about 8 to 10 mm long by 11 to 14 mm wide, minutely pubescent, green with a darker green pattern, and has subacute lateral teeth.

DISTRIBUTION AND HABITAT

Bougainville Island. Plants are endemic to this island. They grow near Kieta, usually in very wet mountain forests at elevations of around 1200 m, but plants have been found at elevations up to 1,850 m. The plants usually grow on trees with their roots embedded in loose, thick moss, or on the ground with their roots in leafy humus or thick layers of decomposing forest debris.

FLOWERING

Paphiopedilum bougainvilleanum usually flowers from September through December in cultivation. In their natural habitat, plants bloom in late spring and again in late autumn.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 40$ (Karasawa, 1979).

PAPHIOPEDILUM WENTWORTHIANUM

SCHOSER & FOWLIE EX FOWLIE

ORCHID DIGEST, 32(9): 282-285 (1968)

SYNONYM

Paphiopedilum "denisii" Schoser (1971), *nomen nudum*.

ETYMOLOGY

Named *wentworthianum* for Clayton B. Wentworth.

DISCUSSION

Paphiopedilum wentworthianum is said to have been discovered in 1961 by McKillop and Hermon on the island of Bougainville. A few years later, Wentworth collected some plants and subsequently introduced them into cultivation in the U.S.A. The species was described by Schoser & Fowlie and published in an article authored by Fowlie (*loc. cit.*).

There can be no doubt that *Paphiopedilum wentworthianum* is a close relative of *P. violascens* and *P. bougainvilleanum*, although Schoser & Fowlie placed it close to *P. mastersianum* and *P. papuanum* [as *P. zieckianum*]. From *P. bougainvilleanum* it can be easily differentiated by the flower colour, which is predominantly green in *P. bougainvilleanum* and predominantly reddish in *P. wentworthianum*. From *P. violascens* it can best be differentiated by the form of the petals, which are drooping in the latter species but non-drooping and more spreading in *P. wentworthianum*. In addition, the staminodal shield of *P. wentworthianum* has acute lateral teeth, while the teeth of the staminodal shield of *P. violascens* are blunt.

Paphiopedilum wentworthianum is described from the island of Bougainville where it grows sympatrically with *P. bougainvilleanum*. Howcroft (1970) reported that at least one plant collected within a population of *P. violascens* from the New Guinea mainland matched the description of *P. wentworthianum*.

Paphiopedilum wentworthianum also occurs on the island of Guadalcanal and possibly on other islands of the archipelago. The plants from Guadalcanal have narrower, more lanceolate petals, but otherwise they correspond to the description of the typical *P. wentworthianum*.

Paphiopedilum wentworthianum has been considered conspecific with *P. violascens* (Braem, 1988) and as an autonomous species (Fowlie, 1968; Karasawa & Saito, 1982; Cribb, 1987, 1998; Koopowitz, 1995, 2000, Braem et al., 1999). Both views can be argued, but in this work, *P. wentworthianum* is treated as an independent species. See also the discussion of the *P. violascens* complex.



PAPHIOPEDILUM WENTWORTHIANUM
COURTESY OF LOURENS GROBLER (AFRI ORCHIDS)

DESCRIPTION

Paphiopedilum wentworthianum is an herbaceous plant producing up to six leaves which are narrowly oblong to elliptic-oblong and have a sub-acute, tricuspidate tip. They are 12 to 26 cm long by 3.5 to 4.7 cm wide and are mottled light and dark green. The inflorescence generally bears a single flower. The peduncle is 10 to 28 cm long, terete, purple, and covered with short hairs. The bract is ovate-elliptic, obtuse, 1.5 to 2.5 cm long, boat-shaped, and pubescent. Together, the pedicel and ovary are about 5 cm long. Both are densely covered with hairs. The flower is up to 8.5 cm across. The dorsal sepal, which is concave, is broadly ovate, obtuse, and 2.8 to 3.3 cm long by 2.5 to 3.5 cm wide. It is cream-coloured with a green centre and green veins, but the margins and the apex are often suffused with purple. The lateral sepals are united to form a synsepal, which is ovate, acute, 1.7 to 2.5 cm long by about 2.5 cm wide, cream-coloured, and veined with green. The petals are spreading, not drooping, and stand at an angle about 20 degrees below horizontal. They are oblong-elliptic, obtuse, 4.1 to 4.5 cm long by 1.5 to 2.5 cm wide, ciliate, and the upper margin is undulate. Petals are glossy purple above whereby the purple merges into brown and green toward the base. The lip is three-lobed, 4 to 4.5 cm long by 2 to 2.3 cm wide, yellowish-green, and flushed with reddish-brown. The lateral lobes are folded inward to form a tube. The saccate main lobe is shaped like an inverted helmet. The staminodal shield, which is half-moon-shaped with acute, lateral teeth that are curved inward, is yellowish-green with a darker green centre pattern, 8 to 10 mm long by about 12 mm wide, and covered with short hairs.

DISTRIBUTION AND HABITAT

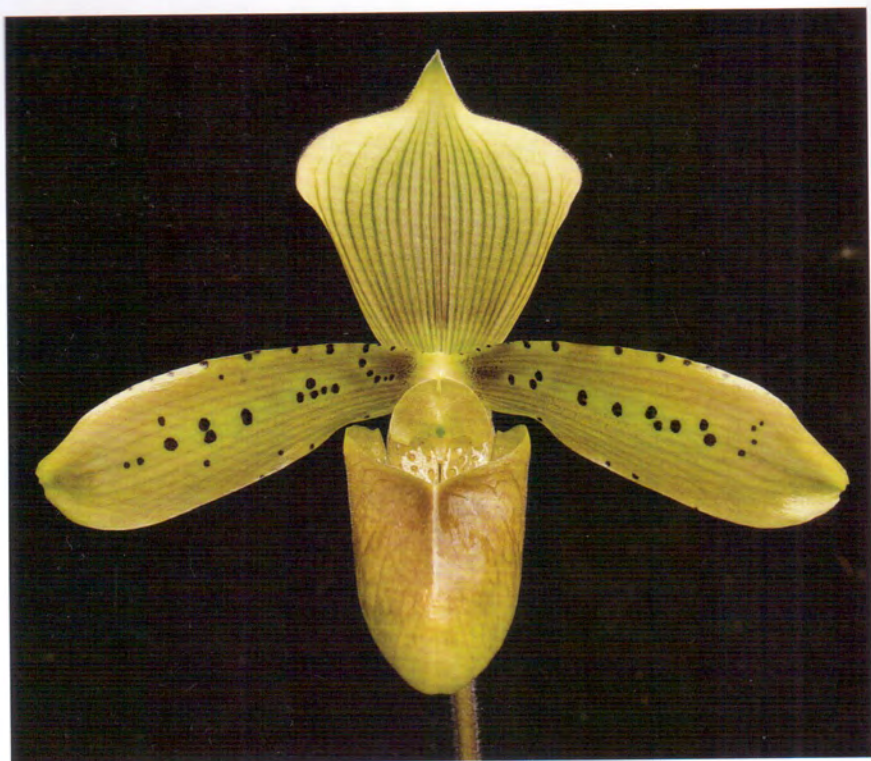
Guadalcanal and Bougainville (Solomon Islands). Plants are found near Kieta on Bougainville at 900 to 1,800 m. *Paphiopedilum wentworthianum* grows in dense, dark forest with the roots embedded in very deep layers of humus and mosses. Continuous leaf fall raises the level of the fibrous compost, and the plants must grow upward in order to thrive. They seem to grow best in recently decomposed humus, not in newly fallen leaves, but the roots are then usually dead further down into the compost. Plants are also found on Guadalcanal, growing in deep leaf litter in the shade of 10 to 15 m tall trees on ridge tops and in moss under lower shrubs on the steeper slopes near the ridge tops. The soil of the Guadalcanal habitats is volcanic and landslides are common.

FLOWERING

The few plants of *Paphiopedilum wentworthianum* that were or are in cultivation have been reported to flower in January and February.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 40$ (Karasawa, 1979).



PAPHIOPEDILUM TONSUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM TONSUM

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH: 488 (1892)

BASIONYM

Cypripedium tonsum Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 20: 262 (1883)

SYNONYM

Cordula tonsa (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Named *tonsum*, meaning shaven, glabrous, referring to the fact that the petals and warty structures on the flower are not ciliate or hairy.

DISCUSSION

The discovery of this species is credited to Charles Curtis who found these plants in 1882 together with *Paphiopedilum curtisii* in Sumatra while employed as a plant collector by Veitch & Sons of Chelsea, England. The plant flowered in the Royal Exotic Nursery (Mr. Veitch's company) late in the summer of 1883, and material was forwarded to the younger Reichenbach who described the new taxon as *Cypripedium tonsum*. The transfer to the genus *Paphiopedilum* is now generally credited to Stein. *Paphiopedilum tonsum* is very distinct and cannot be mistaken for any other species. It is rather consistent in flower colour, and only a few varieties have been described. The only one considered important, however, is the albino (see below). *Paphiopedilum braemii* Mohr has been considered to be a variety of *P. tonsum*, but, as we have stated before, it is a good species in its own right.

Paphiopedilum tonsum is very common in cultivation, and numerous plants have been awarded by the judging systems of orchid societies all over the world.

DESCRIPTION

Paphiopedilum tonsum is an herbaceous plant with short stems that bear three to eight leaves each. The leaves, which are elliptic-oblong and about 20 cm long by nearly 5 cm wide, are deep green, marbled and blotched with pale greyish-green above, and heavily mottled with dull purple beneath. The erect inflorescence is terete, up to 40 cm high, dark green with purple blotches, and usually bears a single flower. The hairy bract is up to 2 cm long, which is about one-third as long as the ovary. The flower is about 10 cm across when a live blossom is measured across the petals in their natural position. The dorsal sepal is about 5 cm long by up to 4 cm wide, broadly cordate, and acuminate. The margins are ciliate. It is whitish-rose with green and purple-brown longitudinal stripes. The lateral sepals are united into a synsepal, which is about 4 cm long, oblong-elliptic,

acuminate, and pale green with dark green veins. The petals are spreading, sub-spathulate, ciliate along the margins, and about 6.5 cm long by up to 2 cm wide. The basal portions of the petals are green with deep green veins and have some almost hairless, near-black warts near the margins and on the mid-vein. Their apical portions are dull purple shaded with brown. The lip is three-lobed, and about 5.6 cm long by 3.5 cm wide. Its main lobe is distinctly saccate, shaped like an inverted helmet, pale green tinged with rose, and has green veins and reticulations. The side lobes are folded inward to form a tube. They are tawny-yellow and covered with small warts. The staminodal shield is kidney-shaped. At its lower end, it has a wide incision and a small green centre tooth.

DISTRIBUTION AND HABITAT

Northern and central Sumatra. *Paphiopedilum tonsum* grows in moderately bright areas at 1,000 to 1,800 m on the western slopes of the Barisan Mountains from Padang northward. Plants usually grow in leafy humus on the forest floor or in humus-filled cracks in limestone rocks and cliffs. They are, however, also found in moss-filled cracks and near water seepages. The species sometimes grows together with *P. superbians* var. *curtisii* and *P. chamberlainianum*.

FLOWERING

Paphiopedilum tonsum usually blooms from late September through December, but plants have been reported to bloom all year round in cultivation.

MISCELLANEOUS NOTES

The mitotic chromosome counts are $2n = 32$ (Karasawa, 1979) and $2n = 34$ (Duncan, 1947; Duncan & MacLeod, 1950a).

VARIETIES AND FORMS

Paphiopedilum tonsum is not particularly variable. Two varieties, var. *cupreum* and var. *superbum* were listed in the LINDENIA without any description. Reichenbach fil. described *Cypripedium tonsum* var. *superbiens* in THE GARDENERS' CHRONICLE for August 31st, 1895. These three variants are merely aberrant or geographical forms and do not merit further discussion. The only variant that deserves taxonomic recognition is the true albino:

PAPHIOPEDILUM TONSUM FORMA ALBOVIRIDE

BRAEM

ORCHIDÉES. CULTURE ET PROTECTION, NO. 36: 35-38 (1998).

Paphiopedilum tonsum forma *alboviride* is a typical albino, and is, therefore, devoid of any red pigmentation. The dorsal sepal is greenish-white near the base, white in the upper part, and has longitudinal green striations throughout. The petals and pouch are yellowish-green, and the petals have a few darker green spots.

PAPHIOPEDILUM BRAEMII

H. MOHR

ORCHIDEEËN, 51(6): 175-176 (1989)

SYNONYM

Paphiopedilum tonsum var. *braemii* (H. Mohr) Größ
CAESIANA, 3: 27 (1994)

ETYMOLOGY

Named *braemii* for Prof. Dr. Guido Jozef Braem (1944-), German biologist, taxonomist, anglicist, and art historian of Belgian (Ghent) descent.

DISCUSSION

Paphiopedilum braemii plants were first collected by German tourists in the northern part of the Indonesian island of Sumatra. The plants were cultivated in Germany and flowered for the first time in late spring of 1989. Material was forwarded to the pharmacist and botanical illustrator H. Mohr who published the taxon in December of the same year (*loc. cit.*).

Although some authors considered *Paphiopedilum braemii* a variety of *P. tonsum*, the two taxa differ considerably. Whereas red dominates in the flower of *P. tonsum*, the blooms of *P. braemii* are predominantly green and have shorter, narrower segments with a lip that is 30 to 50 % smaller than the labellum of *P. tonsum*. The most important taxonomic marker, however, is the difference in the column structure. In addition, the shapes of the two staminodal shields are distinct. It has also been suggested that *Paphiopedilum braemii* is an albinistic form of *P. tonsum*. This suggestion may be dismissed as the albino of *Paphiopedilum tonsum* is pure yellow.

DESCRIPTION

Paphiopedilum braemii is an herbaceous plant growing in leafy humus. Plants are about 23 cm high. The leaves are oblong-ovate, acute or subacute, up to about 15 cm long by about 4 cm wide, distinctly keeled, and have margins that may be entire to serrulate. The underside is uniformly greyish-green. The upper surface is grass-green and irregularly mottled with dark green. The inflorescence usually bears a single flower. The peduncle is terete, greyish-green, and densely covered with white hairs. The bract is leek-green, small, folded, acute, pilose, and covers only 1/3 of the ovary. The ovary is green and pilose. The flower is up to 9.5 cm high by about 11 cm across. The dorsal sepal is broadly ovate, acuminate, distinctly keeled, and curved inward on the upper part of the margin. It is white with green in the centre of the base, has green longitudinal veins, and all surfaces are covered with white hairs. The dorsal sepal is about 4.6 cm high by up to 3 cm wide. The lateral sepals are united to form a synsepal which is narrowly ovate, acute, about 3 cm long by up to 1.8 cm wide, and is coloured similarly



PAPHIOPEDILUM BRAEMII
WATERCOLOUR PAINTING BY ADELIA KUSUMAWARDHANI
COURTESY OF ADELIA KUSUMAWARDHANI



PAPHIOPEDILUM BRAEMII
COURTESY OF DAVID BANKS

to the dorsal sepal. The petals are linear to narrowly spathulate, acuminate, about 5.5 cm long by up to 1.8 cm wide, and have pilose margins. Petals are pale moss-green but are sparsely covered with minute, deep brown, shiny, glabrous dots. The trilobate lip is overall about 3.8 cm long by 2 cm wide by about 2.4 cm deep. The lateral lobes are curved inward to form a tube and are covered by soft hairs. The main lobe is shaped like an inverted helmet, has distinct lateral appendages, and is pale olive-green with the front suffused with brown and the back, especially on the inside, covered with purple spots. The entire pouch has purplish venation and is sparsely covered by short white hairs, except at the rim of the aperture which has reddish bristles. The petiolate staminode is pale yellowish-green and is 1 cm high by 1.4 cm wide. The shield is shaped like a half-moon and has a narrow incision at the top and a wide incision at the bottom. In the centre of that bottom incision, there is a moss-green boss.

DISTRIBUTION AND HABITAT

Northwest Sumatra. No further information has hitherto become available.

FLOWERING

In cultivation, *Paphiopedilum braemii* blooms from April through August.

PAPHIOPEDILUM LUNATUM

METUSALA

EDINBURGH JOURNAL OF BOTANY, 74(2): 169-178 [170-172] (2017)

ETYMOLOGY

Named *lunatum* in reference to the shape of the staminode which is like a crescent moon.

DISCUSSION

This recent addition to the genus was discovered in the northern part of Sumatra and described by the Indonesian botanist Destario Metusala. The plant was originally thought to be a reddish form of *Paphiopedilum tonsum*, and there was some suggestion that the new taxon represents a natural hybrid between *Paphiopedilum tonsum* and *P. javanicum*. Metusala put the species in the close vicinity of *Paphiopedilum javanicum* but differentiates it from that species by the morphology of the petals, sepals, and staminode.

DESCRIPTION

Paphiopedilum lunatum is an herbaceous plant with its roots embedded in vegetative litter and sphagnum moss. The stem is short. The roots are reddish-brown and hairy. The leaves are greyish-green, with the upper surface mottled with darker green and with dark venation. The under surface is light greyish-green to whitish. Each growth generates 4 or 5 oblong-elliptic, coriaceous, glabrous leaves which are to up to 17 cm long by up to 4.5 cm wide. The upper surface is somewhat velvety, the under surface is waxy and more or less shiny. The apex is obtuse to acuminate, with a minutely tridenticulate tip. The leaf margins are minutely and irregularly dentate. The inflorescence generally bears a single flower, is erect to arcuate, to about 28 long. The peduncle is cylindrical, brown to purplish-brown; the indumentus is white. The floral bract is green suffused with purple toward the base, covering about one-third of the ovary. It has a prominent dorsal rib and is pubescent on the outside, 1.5 to 2.4 cm long by 1 to 1.5 cm wide. It is ovate with an obtuse apex and ciliate margin. The flower is large, 9 to 10.5 cm from top to bottom, spreading to about 8 to 10 cm wide in its natural position. The pedicel and ovary are 4 to 6.5 cm long, green to purplish-green with purplish-brown ribs, covered by white pubescent hairs. The dorsal sepal is erect to slightly hooded, yellowish-white with green to purplish-brown longitudinal veins, the veins sometimes branching near the apex, 4.3 to 6 cm tall by 2.8 to 4 cm wide, broadly elliptic with an obtuse to slightly acute apex. The basal half of the margin is often reflexed, the inner surface glabrous, the outer surface pubescent and the margin ciliate. The synsepal is yellowish green with darker green or purplish green venations, 3 to 4.5 cm long by 1.4 to 1.8 cm wide. It is oblong-elliptic with an obtuse apex. Its inside surface is glabrous, the outside surface



PAPHIOPEDILUM LUNATUM
COURTESY OF TEERAPHAN TOTERAKUN

pubescent, and their margin minutely ciliate. The petals are 6.3 to 8 cm long by 1.3 to 2 cm wide. They are oblong-elliptic to oblong-spathulate with an obtuse apex, spreading and held at a downward angle of about 45 degrees. The margins are ciliate, sometimes slightly undulate, and sometimes with a reflexed and/or slightly upward twisted apical third. The petals are green to yellowish green at their basal half to two-thirds and turning purplish pink toward the apex, with darker longitudinal venation and usually spotted dark brown to deep purple on their basal half to two-thirds. The labellum (lip) is greenish-brown with darker venation, sometimes suffused with purplish pink, 4 to 4.5 cm tall by 2.4 to 2.7 cm wide, deeply saccate, glabrous on the outside; the side lobes are cream or pale yellow, incurved, and bearing some raised wartlike structures. At the front of the labellum aperture (mouth) there is a triangular sinus. The column is 1 cm long. Staminode is greenish yellow to sage green, 8 to 11 mm tall by 10 to 13 mm wide, lunate, the surface minutely pubescent, the base shortly bilobed, the apex trilobed. The apical lateral lobes are strongly falcate, incurved, and acute. The apical central tooth is very small, short triangular, obtuse, slightly raised and tinged green.

DISTRIBUTION AND HABITAT

Indonesia: Sumatra: Aceh Province. The plants grow in shaded conditions in open, flat areas dominated by ferns, low shrubs and grasses to somewhat open forests on sloping hills at altitudes between 1,300 to 1,600 metres.

FLOWERING

In its natural habitat, *Paphiopedilum lunatum* has been observed in flower in October and November.



PAPHIOPEDILUM PURPURATUM IN SITU
COURTESY OF DR. PANKAJ KUMAR

PAPHIOPEDILUM PURPURATUM

(LINDLEY) STEIN

STEIN'S ORCHIDEENBUCH, 481 (1892)

BASIONYM

Cypripedium purpuratum Lindley

EDWARDS'S BOTANICAL REGISTER, 23: t. 1991 (1837)

SYNONYMS

Cypripedium sinicum Hance ex Reichenbach fil.

Walpers, ANNALES BOTANICES SYSTEMATICAE, 3: 602 (1853)

Paphiopedilum sinicum (Hance ex Reichenbach fil.) Stein

STEIN'S ORCHIDEENBUCH: 481 (1892)

Cordula purpurata (Lindley) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum aestivum Z.J. Liu & I.Y. Zhang

ACTA PHYTOTAXONOMICA SINICA, 39(6): 568, fig. 1 (2001)

ETYMOLOGY

Named *purpuratum*, referring to the predominant colour of the flower.

DISCUSSION

Little is known about the discovery of *Paphiopedilum purpuratum*. Plants of this species, whose origin was unknown at the time, were grown by the English nurseryman Joseph Knight (1778-1855), owner of the Royal Exotic Nursery before Veitch. This species was known as *Cypripedium sinicum* and was cultivated by Knight as early as 1836. About the same time, plants of the same species were under cultivation at the nursery of Loddiges. It was a drawing of one of these plants that was used to illustrate Lindley's 1837 description (*loc. cit.*). The transfer of the taxon to the genus *Paphiopedilum* is now generally credited to Stein (*loc. cit.*).

Paphiopedilum purpuratum is a very distinct species and easily recognised when in flower. It is possible that Reichenbach fil. was not aware of Lindley's description in 1853 when he described *Cypripedium sinicum* as a separate species (*loc. cit.*). However, his type specimen is mounted on the same sheet as a specimen clearly hand-labelled as *C. purpuratum* by Lindley, but this may have been done at a later date. Some confusion occurred among the early authors, because Wight, in his *ICONES PLANTARUM INDIAE ORIENTALIS* (1851), designated a plant of *P. barbatum* as *C. purpuratum*. And indeed, some of the plants of *P. purpuratum* show leaf mottling that is similar to that of *P. barbatum*. *P. purpuratum*, however, is easy to identify by its broader petals with upper margins which lack the large black warts that are typical for *P. barbatum*, by the smaller, ovate, more acuminate dorsal sepal, and by the morphology of the staminode.



PAPHIOPEDILUM PURPURATUM
COURTESY OF DR. HENRY OAKELEY

DESCRIPTION

Paphiopedilum purpuratum is an herbaceous plant that usually grows in humus on the ground in wet forests. The leaves are oblong-elliptic and 7 to 14 cm long by about 4 cm wide. The apex is irregularly three-toothed. The upper surface is variable as leaves of some plants of *P. purpuratum* are tessellated bright and dark green, whereas the leaves of other plants appear evenly coloured. It is not unusual for distinctly tessellated new growths to become nearly uniformly coloured with age. The under surface is bright green and ciliate at the base. The inflorescence is terete, erect, up to 20 cm high, purple, covered by downy white hairs, and generally bears a single flower. The floral bract is about 2.2 cm long, bright green, downy, and about half as long as the ovary. The flower is about 7.5 to 8.5 cm high. The sepals are ciliate. The dorsal sepal is sub-orbicular, 3.8 to 4.6 cm long by 4 to 4.6 cm wide, acute, and the basal portion of the margins is reflexed. It is white suffused with green in the centre and marked with eight to ten symmetrically curving, brown-purple-red longitudinal stripes. The lateral sepals are

united into a synsepal as is typical for the genus *Paphiopedilum*. The synsepal is ovate, acute, about one-third the size of the dorsal sepal, and greenish. The sub-spathulate petals are 5 to 6 cm long by 1.8 to 2.2 cm wide, spread horizontally, and are ciliate. They are purple-crimson with deep purple or green veins and the base is covered with many near-black warts. The three-lobed lip is 4.2 to 4.4 cm long by about 2.5 cm wide. The main lobe is shaped like an inverted helmet and ends in a rounded tip. It is brownish-purple with purple venation. The lateral lobes are folded inward forming a tube, purple, covered with numerous small near-black warts. The inner structure of the lip is fascinating. The side walls are more or less smooth but the bottom and part of the rear wall are warty and densely covered by fine needle-like structures. The staminodal shield is dull green suffused with violet-purple. It is half-moon-shaped with a notch at the top and a distinct tooth in the middle of the bottom margin.

DISTRIBUTION AND HABITAT

Hong Kong and adjacent areas of Guangdong Province in southeast China. Recent collections are reported from Hainan Island. Plants grow at 30 to 700 m on north- and northwest-facing wooded slopes near streams. They may be found with their roots embedded in deep, leafy humus at the base of tall trees, in bamboo thickets along stream banks, and on rock faces covered in moss. In addition, plants sometimes grow directly on steep, rocky slopes in light shade beneath low scrub. The population size is usually reported as small. In the habitats that we have visited the plants were scattered, and the populations consisted mostly of single-growth plants.

Averyanov et al. (2003) report *P. purpuratum* at 1,200 to 1,400 m from Cao Bang in Vietnam, where the plants grow in humus pockets in the holes of the highly eroded crystalline limestone rock formation in broad-leaved forests.

FLOWERING

In cultivation, *Paphiopedilum purpuratum* has been reported to bloom from July through March with a distinct peak in October and November. In Vietnam, plants are reported to flower from September through October.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 40$ (Karasawa, 1979).

VARIETIES AND FORMS

Two varieties and one form have been described. "*Cypripedium purpuratum* var. *de Seeger* & *Tropp* (THE GARDEN [1890]) is said to have had a large, white, purple-striped dorsal sepal and petals that were one-third longer than generally encountered. *Cypripedium purpuratum* var. *kimballianum* was listed without any description by Ballif in the 1887 volume of the LINDENIA. *Paphiopedilum purpuratum* forma *aphaca* "Mark" (Mark, 1982) represented a clone with free lateral sepals (not united into a synsepal) and petals devoid of warty structures. None of these deserves further taxonomic attention.

A true albino of *Paphiopedilum purpuratum* was described by Gruß & Koopowitz in the ORCHID DIGEST (72: 130 [2008]) as *Paphiopedilum purpuratum* forma *album*. Unfortunately, the description is not valid as no type specimen could be produced. The flower is devoid of red pigmentation. The pouch is greenish-yellow with green veins. The sepals and petals are white. The dorsal is striped with green. The petals are equally striped green and suffused with green over their basal two-thirds. A plant of this form received a silver medal under the designation "*album* Misato" from the Japanese Orchid Society.



PAPHIOPEDILUM PURPURATUM FMA. *ALBUM*
COURTESY OF NEBOJSCHA POPOW (POPOW ORCHIDS)

PAPHIOPEDILUM SUKHAKULII

SCHOSER & SENGHAS

DIE ORCHIDEE, 16: 109-110 (1965)

ETYMOLOGY

Named *sukhakulii* for Prasong Sukhakul, a Thai nurseryman.

DISCUSSION

Paphiopedilum sukhakulii was reportedly discovered by the horticulturist Prasong Sukhakul in the northern part of Thailand, but insiders insist that Sukhakul purchased the plants from a local collector. The plants obviously were collected when not in flower and were sold to several orchid nurseries in Belgium and Germany as *P. callosum*. The two species grow together in some of the habitats and appear somewhat similar in their vegetative characteristics.

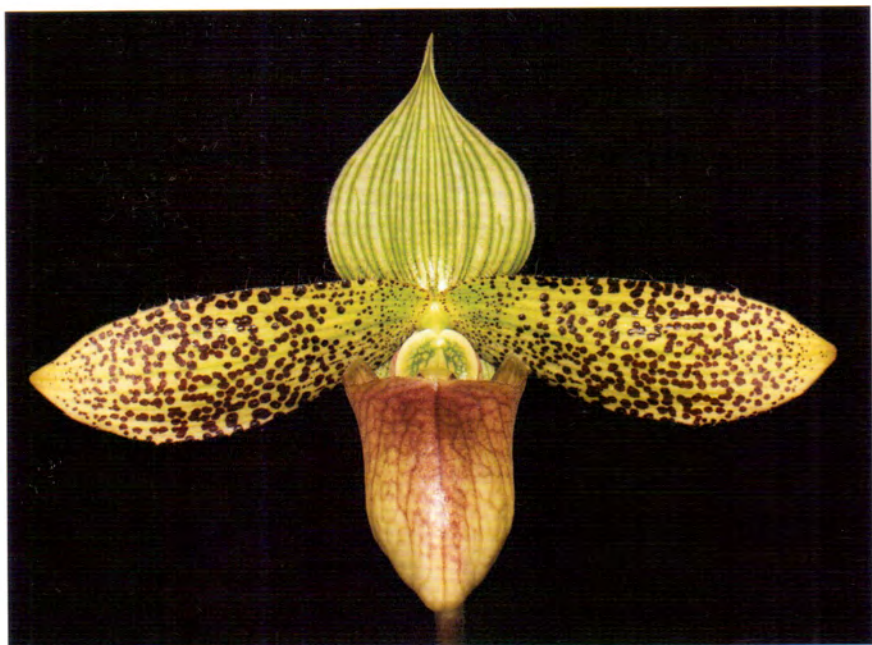
Initially, it was suggested that the plants were specimens of *P. wardii*, a species which was considered lost at the time, as none had been found for many years. However, Schoser & Senghas recognised that the plants represented a different, although more or less closely related, taxonomic entity and described it as a new species (*loc. cit.*). Subsequently, *P. sukhakulii* was introduced into cultivation in extremely large quantities, and the species is now one of the most common *Paphiopedilums* in cultivation, a fact which is also reflected by the numerous awards given to plants under that name.

Cribb (1998) compares *P. sukhakulii* with *P. wardii* and states that the flowers of the former are greener, which is true only of plants in specific populations. He also states that the leaves of *P. sukhakulii* lack any purple spotting underneath, a statement that contradicts the facts as well as the original description. *Paphiopedilum sukhakulii* does differ from *P. wardii* by the mottling pattern of its leaves, the shape and position of its petals, which are more horizontally spread in *P. sukhakulii*, the flower colour, the shape of the staminode, and by a distinct projection over the anther.

Paphiopedilum dixlerianum is said to have been collected in Myanmar in the spring of 1997 and originally described as an autonomous species by Braem & Chiron (RICHARDIANA, 1[4]: 135-139 [2001]). Recent information forces us to doubt the provenance of the material; the plants very probably represent a man-made hybrid with *P. sukhakulii* as one of its parents.

DESCRIPTION

Paphiopedilum sukhakulii has four to eight narrowly elliptic leaves that are up to 25 cm long by 5 cm wide. Leaves are shortly three-toothed at the apex, the upper surface is rather rough and more or less distinctly tessellate, and the under surface has reddish spots only at the base. The purple-brown inflorescence is erect, up to 25 cm high, is



TWO CLONES OF *PAPHIOPEDILUM SUKHAKULII*

TOP: COURTESY OF JASON ONG

BOTTOM: COURTESY OF DOROTHY POTTER BARNETT

densely covered with white hairs, and usually bears one flower, rarely two. The floral bract is 1.5 to 2.5 cm long by 1.2 to 2 cm across, oval, acute, folded, distinctly keeled on the back, and bright green with up to seven darker veins. The under surface is covered by short hairs. The ovary is about 4 to 6 cm long, erect, bluntly triangular with its apex distinctly curved inward, and uniformly densely pilose. Flowers are up to 14 cm wide. The dorsal sepal is broadly ovate, acuminate, 3.2 to 4.2 cm long by 2.5 to 3.2 cm wide, and white with ten to thirteen large, and two to six shorter, dark green veins. The lateral sepals are united into a synsepal which is similar to but smaller than the dorsal sepal, and has nine dark veins. The petals are spreading and are nearly always held horizontally. They are 6 to 7 cm long by 1.2 to 1.4 cm wide, and the margins run parallel for nearly the entire length, becoming acuminate only in the apical one-third. They are bright green with six to eight darker longitudinal veins and a dense covering of brownish-red spots that are never raised or wart-like. The glossy petals are ciliate along the margins, and the hairs at the base are longer and more numerous than those nearer the apex. The three-lobed lip stands at an angle of about 30 to 40 degrees to the shaft of the inflorescence. Overall, it is about 4 to 5 cm long. The saccate mid-lobe is about 3 to 3.5 cm long, moderately pointed, and when viewed frontally, is fairly triangular. The apex is yellowish-green, but the colour changes to brownish or reddish-brown with darker venation toward the aperture. The outside surface is uniformly covered with minuscule hairs. On the inside, the pouch is glossy, intensely wine-red, and the front is glabrous, but the back and bottom are densely covered with long, white, glandular hairs. The staminodal shield is half-moon-shaped, about 11 to 13 mm across, and is whitish-green with a dark green pattern. There is a distinct column projection over each anther.

DISTRIBUTION AND HABITAT

Northeast Thailand. Plants grow at 240 to 1,000 m on Mt. Phu Luang in Loei Province. *Paphiopedilum sukhakulii* grows in sandy loam intermixed with decaying plant debris, usually along mountain streams in the dappled to moderate shade of large trees. At lower elevations, plants may be found near colonies of *P. crossii* (formerly known as *P. callosum*).

FLOWERING

Paphiopedilum sukhakulii has been reported to bloom all year round in cultivation, with a peak season from August through March.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 40$ (Schoser & Senghas, 1965; Karasawa, 1979).

VARIETIES AND FORMS

Paphiopedilum sukhakulii is extremely variable, especially in the mottling of the leaves, the width of the petals, and the flower colour. It is, therefore, rather surprising that no varieties or forms have been described officially, except for forma *aureum*.

PAPHIOPEDILUM SUKHAKULII FORMA AUREUM

VAN DELDEN EX GRUSS

DIE ORCHIDEE, BEIHEFT 6: 15-16 (1999)

The plant is identical to normal specimens of *Paphiopedilum sukhakulii* in all respects except the flower colour. The dorsal sepal is white and longitudinally ornamented by numerous, usually fewer than 20, but sometimes more, dark green stripes. The petals and lip are shiny and yellowish-green with darker green reticulations. The staminodal shield is yellowish-green with a distinct dark green pattern. *Paphiopedilum sukhakulii* forma *aureum* was also described as *P. sukhakulii* var. *album* by Birk (1983). The designation was, however, not validly published.



PAPHIOPEDILUM SUKHAKULII FMA. *AUREUM*

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM WARDII

SUMMERHAYES

THE GARDENERS' CHRONICLE, 3RD SERIES, 92: 446 (1932)

SYNONYM

Cypripedium wardii (Summerhayes) Curtis, non Rolfe

THE ORCHID REVIEW, 41: 2, fig. page 9 (1933) and

THE ORCHID REVIEW, 43: 30 (1935)

ETYMOLOGY

Named *wardii* for Francis "Frank" Kingdon Ward (1885-1958).

DISCUSSION

Paphiopedilum wardii was discovered in 1922 by Francis "Frank" Kingdon Ward, a British army captain. He found the plants in the forests of northern Myanmar, but the flower he took on that occasion was lost. Although Ward searched the same area between Fort Hertz (now Putao) and Nam Tamai during the next few years, it was not until the winter of 1930-1931 that he discovered more plants of the same species near the same location as his 1922 find. Ward published a short account of the discovery, referring to the plant as *Cypripedium* sp. in THE GARDENERS' CHRONICLE for 1932. Using Ward's notes, Summerhayes described the species in detail about six months later in the same periodical and dedicated the species to him.

The area of discovery is well described in Ward's publications PLANT HUNTING ON THE EDGE OF THE WORLD (1930) and BURMA'S ICY MOUNTAINS (1949).

Paphiopedilum wardii Summerhayes should not be confused with *Cypripedium wardii* Rolfe (1913), which is a true *Cypripedium* originating from the upper Salween River in Tibet and from western Yunnan.

Paphiopedilum wardii is still a bit of a rarity in our collections, the reason for this being most certainly the fact that travelling in Myanmar has been very restricted. The more recent political changes in the country may indicate a possible improvement within the future.

DESCRIPTION

Paphiopedilum wardii is an herbaceous plant that usually grows on the ground in decaying leafy debris. Short stems, about 5 cm high, are generated from a fairly short rhizome. Each stem bears three to four leaves arranged in two opposite rows. They are oblong-lanceolate, obtusely three-lobed at the apex, and up to 17 cm long by about 5.5 cm wide. The leaf's upper surface is irregularly mottled with bright and deep-purple, and the under surface is covered with multiple small purple spots. The inflorescence is erect, up to 20 cm high, reddish, densely pilose, and generally bears a single flower.



PAPHIOPEDILUM WARDII
WATERCOLOUR PAINTING BY HEMLATA PRADHAN
COURTESY OF HEMLATA PRADHAN

The bract is lanceolate, acute, shortly three-lobed at the apex, 2 to 3 cm long, and compressed with a distinct keel. The bract margins and keel are hairy. The ovary is 4 to 6 cm long, greenish to reddish, and pilose. The dorsal sepal is narrowly ovate, acuminate, inclined forward, 4 to 5 cm long by 2.5 to 3 cm wide, concave, somewhat hooded at the apex, slightly pubescent, and ciliate. It has numerous parallel green nerves and reddish marginal cilia. The lateral sepals are united into a synsepal which is lanceolate, acute, and 3.5 to 4.5 cm long. It is narrower than the dorsal sepal but similarly coloured. The petals are wide-spreading but are held at somewhat of an angle below horizontal. They are oblong-lanceolate or oblong, acute, narrower toward the apex, 5 to 6.5 cm long by about 1.5 cm wide, and the margins are regularly ciliate. The petals are evenly covered with variable numbers of brown spots on a green or pinkish background. The reddish-pink colour increases toward the apex, and there are two to eight dark green parallel veins. The lip is three-lobed and 5 to 5.7 cm long by 2.2 to 2.8 cm wide. The main lobe of the lip is deeply saccate, and shaped like an inverted helmet with two more or less erect auricles at the base. It is obtuse and about 4 to 5 cm long. The lateral lobes fold inward, forming an almost closed tube which is green to yellowish with red pustulate spots. The entire lip is densely papillose-puberulous on the outside. The outside of the pouch is green with brown veins and numerous small brown spots in front. The inside is evenly covered with chocolate-coloured spots. The staminodal shield is stalked and broadly half-moon-shaped with a short split at the back. The front is three-lobed and scarcely 10 mm long by 1.2 to 1.4 cm wide. The side lobes are broad, slightly curved inward, and distinctly longer than the centre part, which has an acute tip in the centre of the lower margin. The staminode is pale green with darker veins, sometimes deeply tinged with pink in the centre.

DISTRIBUTION AND HABITAT

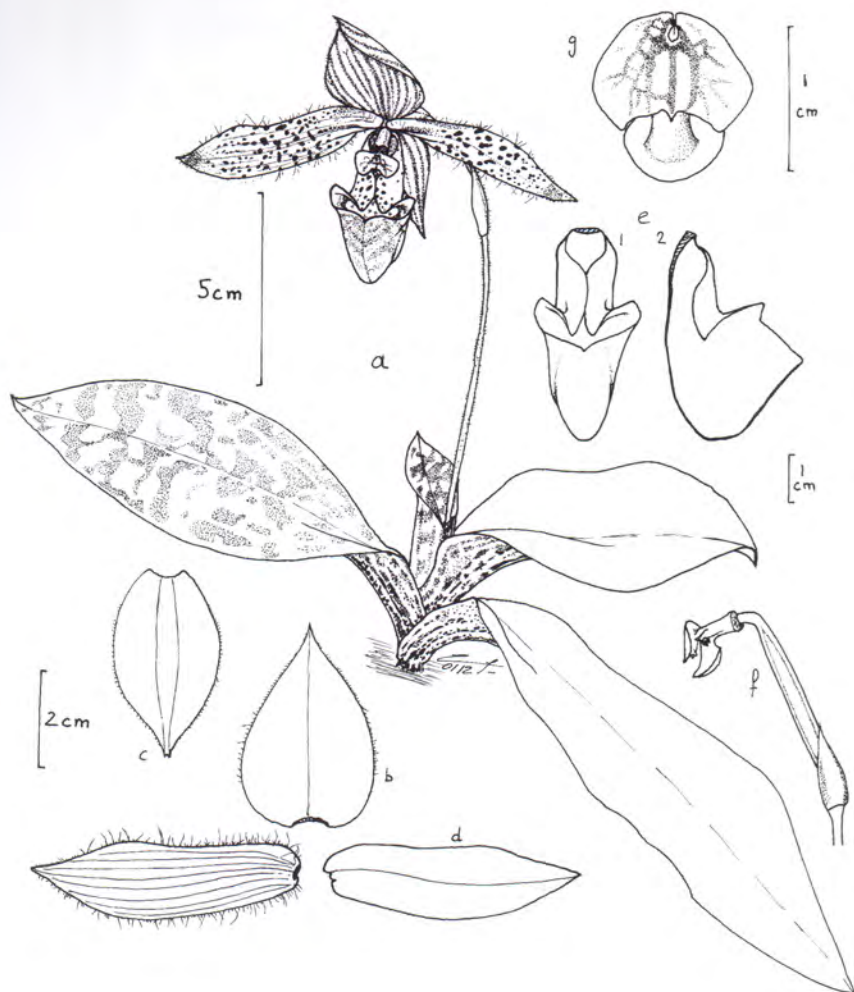
Northeastern Myanmar and southwestern China. Plants are reported from Yunnan Province, China, although information about specific habitat locations has not been given. There is some speculation that plants exported from China were first transported from Myanmar to China and then re-exported. However, it is entirely possible that *Paphiopedilum wardii* does occur along the upper Salween River. In Myanmar, plants are found in the mountains near Putao at elevations between 1,200 and 1,500 m. This orchid usually grows on the forest floor in the shade near the base of trees with its roots buried in deep leafy litter. Plants are also found on cliff faces, where the roots attach to moss-covered rocks with only a few roots holding the plant to the cliff.

FLOWERING

In cultivation, plants of *Paphiopedilum wardii* have been reported to bloom nearly all year round. The main flowering season, however, is in January and February.

MISCELLANEOUS NOTES

The mitotic chromosome counts hitherto reported are $2n = 40$ (Duncan & MacLeod, 1950a); $2n = 41$ to 45 (Duncan, 1945) and $2n = 41$ (Karasawa, 1986).



PAPHIOPEDILUM WARDII

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON



PAPHIOPEDILUM WARDII

COURTESY OF DOROTHY POTTER BARNETT

VARIETIES AND FORMS

Paphiopedilum wardii is quite variable in flower colour and in the mottling patterns of the leaves. This variation, however, is well within the normal range for a species, and only the true albino deserves autonomous taxonomic status.

PAPHIOPEDILUM WARDII FORMA ALBOVIRIDE

(GRUSS & RÖTH) BRAEM

ORCHIDEES. CULTURE ET PROTECTION, NO. 36: 35-38 (1998)

This typical albino was originally described as *Paphiopedilum wardii* var. *alboviride* by Gruss & Röth in *DIE ORCHIDEE*, 49(3): 141-143 (1998). It has no red pigmentation. The flowers are yellowish-green to apple-green on a white background with darker green striations on the dorsal sepal and on the petals. Also, there are reticulations of the same darker green colour on the pouch. Several different clones of this albino are known.



PAPHIOPEDILUM WARDII FMA. ALBOVIRIDE

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM ARGUS

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH: 453 (1892)

BASIONYM

Cypripedium argus Reichenbach fil.

THE GARDENERS' CHRONICLE, 1st Series, 33: 608 (1873)

SYNONYMS

Cypripedium barbatum var. *argus* hort.

LA BELGIQUE HORTICOLE, 25: 57 (1875)

Cypripedium pitcherianum W. A. Manda

AMERICAN FLORIST, 3: 178 (1887)

Paphiopedilum argus Kerchove de Denterghem

LE LIVRE DES ORCHIDEES: 455 (1894)

Cordula argus (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum sriwaniae Koopowitz

THE AMERICAN ORCHID SOCIETY BULLETIN, 60(8): 781-784 (1991)

Paphiopedilum argus var. *sriwaniae* (Koopowitz) Gruf

CAESIANA, 3: 23 (1994)

Paphiopedilum usitanum Gruf & Röth

DIE ORCHIDEE, 50(1): 4-6 (1999)

ETYMOLOGY

Named *argus* in reference to the numerous eye-like spots on the petals. Reichenbach borrowed the name from Greek mythology, where *Argus* is a multi-eyed, giant monster, guard of *Io*, the daughter of *Inachos*, the river god of *Argos*.

DISCUSSION

Paphiopedilum argus was discovered in 1872 by Gustav Wallis, who found the plants on the Philippine island of Luzon while collecting for the British Nursery of Messrs. Veitch & Sons. The first plants of his initial shipment to England flowered there in April of 1873. Later in that year, the species was described by H. G. Reichenbach (*loc. cit.*), who, at first, considered the plant to be intermediate between *P. barbatum* and *P. purpuratum* as it resembles the former in general appearance and has its dorsal sepal shaped like the latter. Obviously the younger Reichenbach did not think very highly of the species as he wrote: "It is not a grand Orchid, but it is a very curious addition to this lovely genus ...".



PAPHIOPEDILUM ARGUS

COURTESY OF DOROTHY POTTER BARNETT

Although rather variable, *P. argus* is a unique species and can hardly be mistaken for any other species. It is easily recognised and distinguished by the obliquely positioned, heavily spotted, untwisted petals that point downward at an angle of about 20 to 30 degrees.

There can be no doubt that *Paphiopedilum argus* is most closely related to *P. barbatum*, *P. crossii*, *P. hennisianum*, and *P. lawrenceanum*.

The plant described as *Paphiopedilum sriwaniae* by Koopowitz in 1991 (*loc. cit.*) was based on a first flowering of a wild-collected plant with undefined growth problems. The type specimen proved to be a normal plant of *P. argus* when it flowered again the next year. The transfer to the variety level by Gräß in 1994 (*loc. cit.*) was obviously based on Koopowitz's description only and proved to be superfluous.

DESCRIPTION

Paphiopedilum argus is an herbaceous plant generally growing on the forest floor in leafy debris or moss. Each growth generates up to five elliptic to oblong-lanceolate, acute leaves that are minutely tridentate at the apex and finely serrated along the margins. The leaves are 9 to 25 cm long by 2 to 4.5 cm wide. They are pale green, tessellated, with dark green, oblong spots on the upper surface. The under surface is green, with a purple suffusion near the base. The erect inflorescence is 30 to 45 cm high, purple or green with purple mottling and shortly pubescent. It usually bears a single flower, rarely two. The flower bract is elliptic, acuminate, very occasionally sub-acute, and 2 to 4.5 cm long by 1.5 to 2 cm wide. It is green with a purple mid-vein, and pubescent with ciliate margins. The pedicel and ovary are 5 to 8 cm long, green, and pubescent. The flower is 6 to 8 cm wide. The dorsal sepal, which has minutely ciliate margins, is ovate to cordate, acute, white with alternately longer and shorter longitudinal veins. Sometimes these are all green, at times the longer ones are purple and the shorter ones green. Near its base, the dorsal sepal is often spotted with blackish purple. It is 3.4 to 4.8 cm long by 3 to 4.8 cm long. The lateral sepals are united into a synsepal which is similar to the dorsal sepal but only 4 to 4.5 cm long by 1.7 to 2.2 cm wide. It is acute with a notched tip, white, and veined green. The veins of the synsepal are paler and more uniform than those of the dorsal sepal. The petals are deflexed and recurved. They are undulate, ligulate, acute, ciliate along the margins, and 4.5 to 6.5 cm long by 1 to 2 cm wide. The petals are white with pale green veins that extend for two-thirds of the petal length, the apical third is pale purple, and the entire inner surface is more or less heavily spotted with blackish-maroon. The lip is shaped like an inverted helmet, 4 to 4.5 cm long by 2 to 2.5 cm wide. The main lobe or pouch is dull brownish-purple above, pale greenish-brown beneath, glandular pubescent inside. The infolded lateral lobes are narrow and pale purple with deep purple spots. The staminodal shield is half-moon-shaped to nearly horseshoe-shaped, with two acute cusps that are curved inward. It is 7 to 9 mm long by about 1.1 cm wide, pubescent, and pale brownish-green with green venation.

DISTRIBUTION AND HABITAT

The Philippine Islands. *Paphiopedilum argus* is endemic to northern Luzon Island where it grows on east- and west-facing slopes in mountain forests. It is usually found at 1,200 to 2,000 m, growing just below ridge tops in the thick moss that covers the bases of the stunted trees or in leaf litter in bamboo thickets.

FLOWERING

Paphiopedilum argus usually flowers from January through April, but plants have been reported to flower at other times of the year in cultivation.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 38$ (Tanaka & Aoyama, 1974; Karasawa, 1979). Pancho (1965) reports a count of $2n = 26$. Whereas the plant used by Karasawa can be positively identified as *Paphiopedilum argus*, there is no data about the identity of the plant used by Pancho.

VARIETIES AND FORMS

Paphiopedilum argus is, as we have stated above, quite variable in respect to the appearance of its flowers. Several "varieties" have been published and have since perished. None deserves any further mention.

PAPHIOPEDILUM BARBATUM

(BLUME) PFITZER

PRINGSHEIM, JAHRBÜCHER FÜR WISSENSCHAFTLICHE BOTANIK, 19: 163 (1888)

BASIONYM

Cypripedium barbatum Blume

CATALOGUS, 98 (1823)

SYNONYMS

Cypripedium barbatum Lindley

EDWARDS'S BOTANICAL REGISTER, 27, Misc. No. 110: 53 (1841)

Cypripedium purpuratum Wight, non Lindley

ICONES PLANTARUM INDIAE ORIENTALIS, t. 1710 (1851)

Cypripedium biflorum B. S. Williams

THE ORCHID-GROWER'S MANUAL, ed. 3: 109 (1868)

Cypripedium nigratum Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 18: 102 (1882)

Cypripedium orbum Reichenbach fil.

THE GARDENERS' CHRONICLE, 3rd series, 2: 778 (1887)

Paphiopedilum nigratum (Reichenbach fil.) Pfitzer

Engler, BOTANISCHE JAHRBÜCHER, 19: 40 (1894)

Paphiopedilum barbatum Kerchove de Denterghem

LE LIVRE DES ORCHIDÉES, 453 (1894)

Cypripedium barbatum var. *biflorum* (B. S. Williams) B. S. Williams

THE ORCHID-GROWER'S MANUAL, ed. 7: 233 (1894)

Paphiopedilum barbatum var. *nigratum* (Reichenbach fil.) Pfitzer

Engler, DAS PFLANZENREICH, IV (50) Heft 12: 92 (1903)

Cordula barbata (Blume) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Cordula nigrita (Reichenbach fil.) Merrill

JOURNAL OF THE STRAITS BRANCH OF THE ROYAL ASIATIC SOCIETY, Nr. 135 (1921)

DISCUSSION

Paphiopedilum barbatum was first mentioned by Blume in his CATALOGUS for 1823. A note on the species was published by Lindley in EDWARDS'S BOTANICAL REGISTER for 1841 (*loc. cit.*) after the first plants of this species had flowered at the Loddiges nursery at Hackney (now London). The plants had been collected by H. Cuming for



PAPHIOPEDILUM BARBATUM

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

Loddiges on the slopes of Mount Ophir, in Johore, Malaya, about 160 km west of Singapore.

Lindley's first description was very brief but one year later a coloured plate of the species, painted by Sarah Anne Drake (1803-1857), who was a friend and schoolmate of John Lindley's sister Anne and who lived in the Lindley household, was published in EDWARDS'S BOTANICAL REGISTER (28, t. 17 [1842]) together with a more detailed description.

In CURTIS'S BOTANICAL MAGAZINE (72, t. 4234 [1846]) another coloured plate of the species was published, this time painted by the famous Walter Hood Fitch, together with a discussion by W. J. Hooker. Hooker wrote:

"It is with no small reluctance that I represent this as a species distinct from *Cypripedium venustum* ... or even from the *Cypripedium purpuratum* ... the only distinguishing character being in the purple hairy warts which border the upper edge of the petals in our present plant."

This view was most certainly due to the relatively little experience Dr. Hooker had with the genus of which only few species were known at the time. Today, there is general agreement regarding the validity of *Paphiopedilum barbatum* as a good and autonomous species. It has, nevertheless, often been confused with *P. crossii* (alias *P. callosum*) in horticulture, and a number of hybrids have been registered listing the wrong parent species.

Paphiopedilum barbatum is closely related to *P. argus*, *P. crossii*, *P. lawrenceanum*, *P. henisianum* and *P. fowliei*. Its closest relative obviously is *P. crossii*. Cribb (1987, 1998) writes:

"and a case could be made for considering them [*P. barbatum* and *P. crossii*] as infraspecific taxa of one variable species".

However, the mitotic chromosome counts for the two taxa (*P. barbatum*: $2n = 38$ and *P. crossii*: $2n = 32$) as well as their karyotypes are very distinct, and therefore, we see no reason to consider them to be conspecific.

Paphiopedilum nigrutum was described in 1882 (as *Cypripedium nigrutum*) by Reichenbach fil. The description was based on a plant sent to him by an English nursery which claimed that the plant had been imported from Borneo. The description is rather confusing as Reichenbach says that the plant has:

"leaves like those of *Cypripedium virens* The odd sepal [dorsal] is oblong acute, not almost circular, thus coming nearer to that of *C. purpuratum* ... Staminode like that of *C. barbatum*, but with intermediate small teeth in front, and longer angles on both sides of the dorsal sinus. Thus it is near *C. barbatum*, but it appears quite distinct."



PAPHIOPEDILUM BARBATUM
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC

Notwithstanding this inconclusive original description, the type specimen of *C. nigratum* matches the type of *P. barbatum*, and the two concepts are therefore considered to be synonymous, a view also taken by Pfitzer in 1903 (*loc. cit.*).

Reporting Borneo as place of origin may well have been deliberately misleading to confuse competitors. Rolfe (1896), however, considered plants imported from Borneo by the nursery of Low & Co. to correspond to the concept of *P. nigratum*. The herbarium specimens made from plants of that lot, however, show warts on both petal margins, a characteristic that puts them within the scope of *P. lawrenceanum*. The same comment applies to another Bornean plant described by Schoser as *P. nigratum* in DIE ORCHIDEE for 1967.

The description of *Cypripedium biflorum* also matches the concept of *P. barbatum*.

Cypripedium orbum was published by H.G. Reichenbach (*loc. cit.*) as a hybrid of dubious origin. The description was based on “a single flower and some sketches prepared from it”. Although Braem treated this taxon within the synonymy of *P. barbatum* in 1988 it may be better to consider this taxon a questionable entity.

DESCRIPTION

Paphiopedilum barbatum is an herbaceous plant growing in leafy debris on the forest floor or on moss-covered rocks. Individual plants can attain an overall height of about 40 cm and generate five to eight leaves per growth. The leaves are narrowly oblong-elliptic to elliptic, 10 to 20 cm long by 3 to 4.2 cm wide, thin, ciliate at the base. The upper surface is pale dull green, tessellated with deep green. The underside is uniformly pale green. The inflorescence is terete, erect, up to 35 cm high, purple, densely covered with fine purple hairs, and usually bears a single flower. The floral bract is ovate, acute, 1.5 to 2.5 cm long by about 1.5 cm wide. The pedicel and ovary are 5 to 6.5 cm long, pale green, tinged with purple on the ribs, and covered with fine purple hairs. The flower is 8 to 9.5 cm across. The dorsal sepal is sub-orbicular to ovate, apiculate, about 4 to 5 cm long by 4.3 to 5.5 cm wide, folded at the mid-vein, pointed, green at the base, the remainder white, more or less stained with vinous purple. The dorsal sepal has prominent deep purple veins, while the central ones are green at the base. The synsepal is much smaller, about 3 to 3.5 cm long by about 1.5 to 2 cm wide, narrowly ovate, obtuse to acute, and pale green with deep green and purple veins. The petals are linear-oblong to ligulate, spreading, slightly deflexed, more or less straight, obtuse, and 4 to 6 cm long by 1 to 1.6 cm wide. They are pale green to brownish-green at the base and purple toward the apex. The petal margins are ciliate, and the superior margin is ornamented with small, near-black maroon spots. The lip, which is distinctly saccate and trilobed, has a main lobe shaped like an inverted helmet. Overall, the lip is 4 to 4.5 cm long by 2 to 2.5 cm wide. It is deep brown-purple, paler beneath. The side lobes are folded inward, purple with deeper purple spots and covered with small warty spots. The staminodal shield is horseshoe-shaped, 1 to 1.5 cm long by more or less 1 cm wide, and green with a reddish-brown or purple pattern. The apex shows lateral, falcate, acute teeth and at the centre of the apical margin there is a third, much smaller tooth.

DISTRIBUTION AND HABITAT

Malaya. Plants grow in scattered locations throughout peninsular Malaysia and on Penang Island. They usually are found at 650 to 1,300 m in the shade of small trees, growing either on moss-covered granite boulders or on well-drained slopes with roots buried in leaf litter. On Penang Island, which is just off the northwest coast near the border with Thailand, plants grow as low as 200 m in gullies covered with mossy boulders under a high forest canopy.

FLOWERING

Plants of *Paphiopedilum barbatum* have been reported to bloom all year round. The main flowering season, however, is from April through August.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 38$ (Francini, 1934; Mehlquist, 1947; Duncan, 1947; McQuade, 1949; Duncan & MacLeod, 1950a; Karasawa, 1979).

VARIETIES AND FORMS

About 50 varieties of *Paphiopedilum barbatum* have hitherto been published. The great majority of these taxa were published without any useful or conclusive description and many of them without any description at all. In as far as descriptions are available that can be interpreted properly, a few are now generally recognised as autonomous species, and some have to be put into the synonymy of other species. The remaining taxa differ more or less from the type in the coloration of their flowers. These "variants" usually were described on the basis of a single plant that had been presented at a meeting of one of the horticultural societies. Many of them hardly deserve to be considered as separate entities and some of them were never validly published. All of them have been described within the genus *Cypripedium* and none deserves to be transferred to *Paphiopedilum*.

PAPHIOPEDILUM CROSSII

(E. MORREN) BRAEM & SENGHAS

SIDA, 19(2): 249-255 (2000)

BASIONYM

Cypripedium crossii E. Morren

LA BELGIQUE HORTICOLE, 15: 226, t. 17 (1865)

LA BELGIQUE HORTICOLE, 33: 96-98 [97-98], t. 7 (1883)

SYNONYMS

Cypripedium barbatum var. *warnerianum* T. Moore

Warner, SELECT ORCHIDACEOUS PLANTS, 3rd. series, t. 11 (1877-1891 [probably 1880])

Cypripedium barbatum var. *warneri* hort.

JOURNAL OF HORTICULTURE AND PRACTICAL GARDENING, 4: 115 (1882)

Cypripedium callosum Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 26: 326 (1886)

Cypripedium barbatum var. *crossii* hort. ex Kent

Veitch, A MANUAL OF ORCHIDACEOUS PLANTS, 4: 12 (1889)

Paphiopedilum callosum (Reichenbach fil.) Stein

STEIN'S ORCHIDEENBUCH, 457 (1892)

Paphiopedilum reflexum hort. ex Stein

STEIN'S ORCHIDEENBUCH, 482 (1892)

Paphiopedilum regnieri hort. ex Stein

STEIN'S ORCHIDEENBUCH, 457 (1892)

Cypripedium schmidtianum Kraenzlin

BOTANISK TIDSSKRIFT, 24: 13 (1901)

Paphiopedilum callosum var. *schmidtianum* (Kraenzlin) Pfitzer

Engler, DAS PFLANZENREICH, IV. 50. Orchidaceae-Pleonandrae: 93 (1903)

Cordula callosa (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum callosum var. *angustipetalum* Guillaumin

BULLETIN DE LA SOCIETE BOTANIQUE DE FRANCE, 4th series, 24: 551 (1924)

Paphiopedilum sublaeve (Reichenbach fil.) Fowlie

ORCHID DIGEST, 43 (6): 224 (1979)

Paphiopedilum viniferum Koopowitz & Hasegawa

ORCHID DIGEST, 64 : 150 (2000)

Paphiopedilum birkii Fowlie, *nomen nudum*

Paphiopedilum thailandense Fowlie, *nomen nudum*



PAPHIOPEDILUM CROSSII

PLATE 17 OF VOLUME 15 OF LA BELGIQUE HORTICOLE (1865)

THE PAINTING IS BY FRANÇOIS DE TOLLENAERE

ETYMOLOGY

According to the original publication of E. Morren, the plant was named in honour of its discoverer, Mr. Cross, about whom we found no further information.

DISCUSSION

Until the appearance of the study by Braem & Senghas (*loc. cit.*), all authors have addressed this taxon as *Paphiopedilum callosum*. Braem & Senghas revealed that the publication of this species as *Cypripedium crossii* Morren takes priority over the publication as *C. callosum* by the younger Reichenbach. Morren published his concept of *C. crossii* in 1865 (*loc. cit.*) and writes that the plant originated from Peru (*sic*) and was discovered there by Mr. Cross⁹. The note, however, is accompanied by an excellent colour plate which leaves not a trace of doubt that the concept of *C. crossii* is absolutely identical with Reichenbach's concept of *C. callosum* published 21 years later.

As the Morren publication, no matter how short and incorrect the text may be, is accompanied by an illustration from which the various characteristics of the plant can be distinctly identified, the name *C. crossii* is by no means to be regarded as a *nomen nudum*.

Unfortunately, up to this day, this issue remains controversially discussed, for reasons that vary from ignorance, illiteracy, refusal to search for or and read pertinent literature, or professional jealousy. We have therefore decided to include here the pertinent parts of the Braem & Senghas 2000 article from SIDA.

Cypripedium crossii was first mentioned by Morren (1865) in a short article in volume 15 of LA BELGIQUE HORTICOLE, 21 years before the publication of *Cypripedium callosum* (Rchb.f. 1886). In his 1865 article, Morren simply states that the *Cypripedium* originates from Peru and that it carries the name of its discoverer, Mr. Cross. No description or any further information is made available. However, plate 17, which is part of the article, shows a plant labeled as *Cypripedium crossii*. This illustration leaves no room to doubt that the taxon published by Morren as *Cypripedium crossii* is identical with the plant described as *Cypripedium callosum* by the younger Reichenbach in 1886. The Morren "note" has been interpreted as insufficient to be regarded as a valid and effective publication of *Cypripedium crossii* as an autonomous taxon, an interpretation generally based on article 42.3 of the INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (ICBN) generally referred to as the "CODE".

Article 42.3 (taken from the Saint Louis Code [Greuter *et al.* 2000], which was the effective version at the time of the SIDA publication) reads,

"Prior to 1 January 1908 an illustration with analysis, or for non-vascular plants, a single figure showing details aiding identification, is acceptable, for the purpose of this article, in place of a written description or diagnosis."

9. We know, however, that Eduard Morren based his publication on material provided by Jean Jules Linden and the origin of the erroneous provenance may already have existed in the Linden establishment in Brussels.



PAPHIOPEDILUM CROSSII
COURTESY OF JERRY LEE FISHER (ORCHIDS LIMITED)

And article 42.4 clarifies what is to be understood as an analysis,

“For the purpose of Art. 42, an analysis is a figure or group of figures, commonly separate from the main illustration of the plant (though usually on the same page or plate), showing details aiding identification, with or without a separate caption.”

The Morren note was accompanied by a color plate of *Cypripedium crossii*. There can be no doubt about the identity of the plant published as *Cypripedium crossii* by Morren in 1865; it is identical with the taxon we have hitherto referred to as *Paphiopedilum callosum* (Rchb.f.) Stein. The plate contains details that allow for the identification; two flowers are shown. The color plate clearly depicts the different aspects of the plant and flower such as shape and tessellation of leaves, shape and color of all parts of the flower from the front as well as from the back, detailed shape of staminodal shield, the ovary, and the floral bract. In other words all aspects relative to the identification of a slipper orchid. Thus the plate satisfies the requirements of Art. 42.4, especially as that article clearly states (see above) that the “figure” or “group of figures” do(es) not necessarily have to be “separate from the main illustration of the plant.” If this were not so, the inclusion of the word “commonly” in article 42.4 would make no sense.

It is ludicrous to disqualify the publication of *Cypripedium crossii* by Morren in the scientific journal LA BELGIQUE HORTICOLE knowing that the valid code accepts publication in trade catalogues or non-scientific newspapers before 1 January 1953, and in seed-exchange lists before 1 January 1973 (see CODE, Article 30.3). As every botanist knows, a publication in a seed list generally means simple mention of the botanical (Latin) name. Thus, *Cypripedium crossii* is, for all purposes, to be regarded as validly and effectively published in 1865.

In 1883, in volume 33 of the same journal (LA BELGIQUE HORTICOLE), Morren wrote an extensive article entitled “*Cypripedium barbatum*, Lindl. and its major varieties, *crossii* [sic], *warnerianum*, etc.” This article was illustrated with a colored plate.

The plate reveals that the plant Morren described is identical with the plant he had depicted in 1865, and thus is the plant we have hitherto generally addressed as *Paphiopedilum callosum* (Rchb.f.) Stein. Morren writes,

“*Cypripedium crossii* [sic] has a very wide, somewhat trilobed dorsal sepal which is white, veined with green and crimson. It is transversally divided in the middle by a crimson stripe. The petals are half-green and half-white with green veins and rose extremities. The lip is dark rose-brown.”

Thus, in 1883, Morren published a description of *Cypripedium crossii*, although he considered this plant to be a variety of *Paphiopedilum barbatum* Lindley.



PAPHIOPEDILUM CROSSII
COURTESY OF SAM TSUI (ORCHID INN LTD.)

CONCLUSIONS

In view of the facts delineated above, there is no reason to deny *Cypripedium crossii* Morren full taxonomic validity. Both Morren publications predate the publication of *Cypripedium callosum* by the younger Reichenbach and therefore, *Cypripedium crossii* Morren is to be given priority in accordance with the rules of nomenclature. The taxon is to be transferred to the genus *Paphiopedilum*. The authors are well aware of the fact that conservative growers and hybridizers will argue that the name "*Paphiopedilum callosum*" should be retained because a multitude of hybrids has been registered indicating "*Paphiopedilum callosum*" to be part of their ancestry. This argument must be rejected. The registration of orchid hybrids (and any other hybrids for that matter) is of no concern to botanical taxonomy. Furthermore, the registration authority for orchid hybrids (Royal Horticultural Society, London) is by no means a taxonomic ruling body. Furthermore, if the horticultural argument were to be followed, the name "*Cypripedium*" would have to be re-instated for the genus *Paphiopedilum* (and other genera), etc. Last, but not least, the identity of (at least) some of the hybrids must be questioned. If we would reject a valid name because its use is considered to be inconvenient to horticulture, it would, indeed, be best to ignore all rules of botanical taxonomy."

Paphiopedilum crossii is generally believed to have been discovered in Thailand and brought to Europe by the French collector Alexandre Regnier, who also sent material to the younger Reichenbach. Reichenbach fil. duly described it as *C. callosum* (*loc. cit.*) overlooking and/or ignoring the earlier publications of Morren. *Paphiopedilum crossii* is closely related to *P. barbatum* and has been described as a variety of that latter species. It differs from the latter by its larger dorsal sepal, its longer, sub-sigmoid petals that are pendent or nearly so and by its chromosome count (see the discussion under *P. barbatum*).

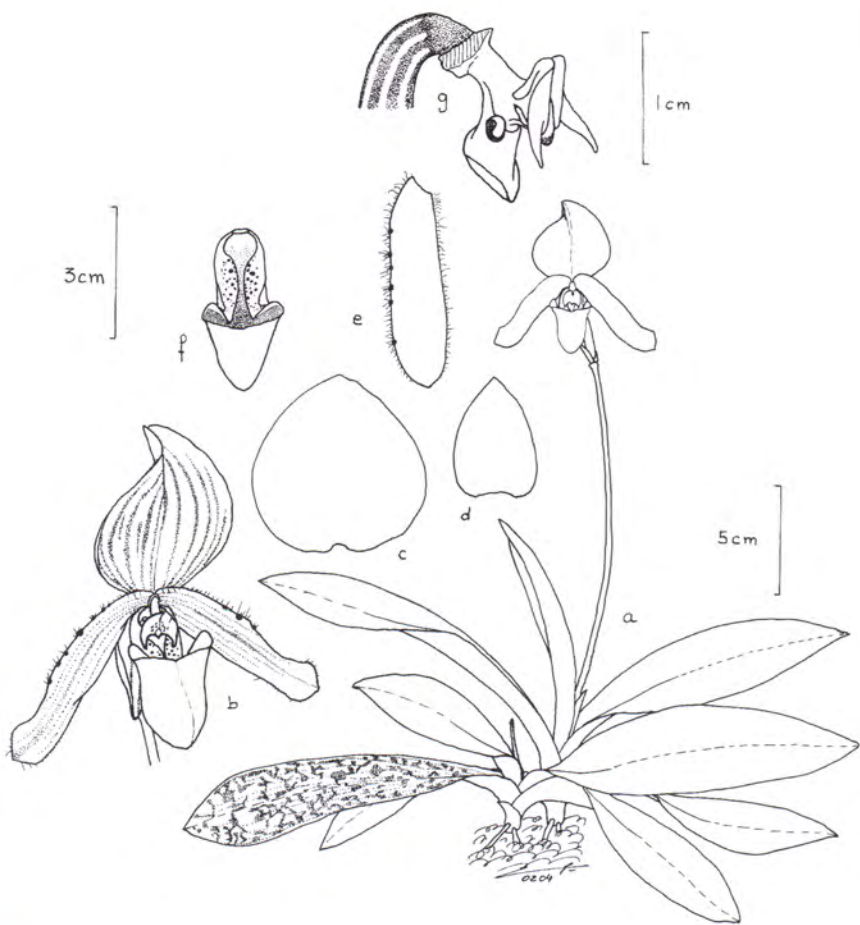
In A MANUAL OF ORCHIDACEOUS PLANTS, (4: 16 [1889]), Kent suggests that *P. crossii* is intermediate between *P. barbatum* and *P. lawrenceanum*.

The concept of *Cypripedium schmidtianum* was published by Kraenzlin in 1901. It was based on "3 flowers preserved in alcohol" collected by the Danish botanist Ernst Johannes Schmidt (1877-1933) on the island of Koh Chang off the coast of Thailand in the spring of 1900. One of these flowers constitutes the type specimen and is kept at the Botanical Museum of Copenhagen. It is identical with a flower of *P. crossii*.

Some commercial orchid growers erroneously consider "*P. schmidtianum*" to be an autonomous species of the *P. appletonianum* complex or as a natural hybrid of *P. crossii* with *P. appletonianum*. If that were so, "*P. schmidtianum*" would be identical with *P. x siamense*, which is not the case.

The concepts of *Paphiopedilum birkii* and *P. thailandense* were never validly published. They are to be regarded as *nomina nuda*.

Cypripedium crossii Morren is not to be confused with *Paphiopedilum Crossianum* (described as *Cypripedium Crossianum* by Reichenbach fil. [1873], based on a plant from



PAPHIOPEDILUM CROSSII

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON

Lady Ashburton). The latter concept represents a man-made hybrid between *P. insigne* and *P. venustum*.

DESCRIPTION

Paphiopedilum crossii is an herbaceous perennial plant, usually growing in humus. Each growth produces 3 to 6 leaves. The leaves are elliptic, oblong-elliptic, obovate, or oval-oblong, acute with a tridenticulate tip. They are 10 to 25 cm long by more or less 3.2 to 5 cm wide, variable in colour, usually bright green, with very dark green, hieroglyphic markings and tessellations above, but often much paler; grey-green and keeled beneath, the basal part slightly pilose. The base is sometimes purple on the lower surface. The inflorescence is erect, up to 40 cm high, deep violet, downy, usually bearing a single flower, sometimes two. The floral bracts are about 2.2 cm long, covering only one-third of the ovary. The flower is up to 10 cm wide. The dorsal sepal is broadly cordate, more or less 5 cm high by up to 7.5 cm wide, folded at the midvein and undulate in the apical half, white with numerous alternately longer and shorter veins that are green at the base and deep vinous purple above. The synsepal is much smaller than the dorsal sepal, about 3.5 cm long, ovate to lanceolate, more or less blunt, white with pale green longitudinal veins. The petals are ligulate, up to about 5.5 cm long by about 1 cm wide, drooping at an angle of 45 degrees or even closer to the lip, the margins ciliate with up to five near-black warts on the upper one, pale green with darker veins and tinted with pale rose-purple in their apical one-third. The lip is deeply saccate, shaped like an inverted helmet, up to 4.7 cm long by about 2.2 cm wide, deep bronze-brown, greenish beneath; the infolded lobes green, spotted with deep purple. The staminodal shield is rather variable, rounded horseshoe-shaped to nearly quadrangular, distinctly cleft at the top, the lower end with three teeth, the lateral two much longer than the middle one.

DISTRIBUTION AND HABITAT

Central and eastern Thailand, Cambodia, Laos, and continental Malaysia. Plants are most common in Thailand where they grow at 300 to 1,300 m in cool, mist-shrouded forests with their roots embedded in the moss, detritus, and leafmould on the forest floor.

FLOWERING

Paphiopedilum crossii generally flowers between March and July, but plants have been reported to flower throughout the year.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 32$ (Mehlquist, 1947; Duncan, 1947; McQuade, 1949; Duncan & MacLeod, 1950a; Kamemoto et al, 1963; Tanaka, 1965; Tanaka & Aoyama, 1974; Karasawa, 1979).

VARIETIES AND FORMS

Paphiopedilum crossii is a rather variable species and a vast number of varieties (all as *Cypripedium callosum* var.) have been described. With the exception of those listed below, none differs enough from the type to be recognised as an autonomous entity.

PAPHIOPEDILUM CROSSII VAR. SUBLAEVE

(REICHENBACH FIL.) BRAEM & SENGHAS

SIDA, 19(2): 249-255 (2000)

This entity is based on *Cypripedium callosum* var. *sublaeve* Reichenbach fil. (1888). Plants that correspond to this taxon have been marketed as *Paphiopedilum callosum*, *P. callosum* var. *sublaeve*, *P. sublaeve*, *P. thailandense* and *P. barbatum*.

The differentiation between the type variety and *Paphiopedilum crossii* var. *sublaeve* consists merely in var. *sublaeve* having somewhat smaller flowers with a smaller dorsal (cfr. Cribb 1987, 1998). Reichenbach fil. (*loc. cit.*), in his original publication, simply notes that the plant came out of a batch of "*Cypripedium callosum*," and that "it might be supposed to be a natural hybrid". In his 1998 book, Cribb states that the petals of var. *sublaeve* "usually bear warts only on the upper margin." This, however, also applies to the plant he depicts as *Paphiopedilum callosum* var. *callosum* on page 333 of his book.

PAPHIOPEDILUM CROSSII VAR. POTENTIANUM

(GRUSS & RÖTH) BRAEM & SENGHAS

SIDA, 19(2): 249-255 (2000)

Although originally described as an autonomous species by Gruss & Röth (1995), var. *potentianum* differs merely by the lack of the marginal warts on the upper margin and its narrower dorsal sepal.

PAPHIOPEDILUM CROSSII FORMA VINIFERUM

(KOOPOWITZ & HASEGAWA) BRAEM & CHIRON

BRAEM & CHIRON, PAPHIOPEDILUM: 261 (2003)

This plant, known as *Paphiopedilum callosum* 'Jac', has deeply vinous-coloured flowers with dark spotting on the petals. It is said to have been noticed by the California nurseryman Norris Powell while visiting a nursery in the Netherlands. A similar plant was known as *P. callosum* 'Ebon' but this plant, which was cultivated by Emerson 'Doc' Charles, had its petals borne at an angle of about 45 degrees from the horizontal. Another plant, cultivated in Japan by Mr. Muramatsu, has similar flower colour and has been given the cultivar name 'Quintessense'. The correct provenance of these three clones has never been disclosed. These clones were elevated to species status and named *P. viniferum* (Koopowitz & Hasegawa, 2000). The arguments used by Koopowitz & Hasegawa are by no means convincing. Indeed, basing a taxon at the species level



PAPHIOPEDILUM CROSSII FMA. *VIRIDIFLORUM*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

on “pattern and placement” of the petal spots and on the overall flower colour cannot survive scientific scrutiny. The plants are best regarded as a very dark red colour form of *P. crossii*.

PAPHIOPEDILUM CROSSII FORMA VIRIDIFLORUM

(HORT. EX LINDEN) BRAEM & CHIRON

BRAEM & CHIRON, *PAPHIOPEDILUM*: 262 (2003)

This variant has greenish-white flowers without any red pigmentation. It therefore is a true albino. Although the albino of *Paphiopedilum crossii* is generally referred to as var. *sanderæ*, the publication as “*Cypripedium* var. *viridiflorum*” by Linden has priority because it was published in 1893, thus preceding the publication as var. *sanderæ* by Sander in THE GARDENERS’ CHRONICLE for 1894.

PAPHIOPEDILUM FOWLIEI BIRK

ORCHID DIGEST, 45(2): 63-64 (1981)

SYNONYM

Paphiopedilum hennisianum var. *fowliei* (Birk) Cribb

THE GENUS PAPHIOPEDILUM: 190 (1987)

ETYMOLOGY

Named *fowliei* for Dr. Jack Fowlie (1929-1993), late editor of ORCHID DIGEST.

DISCUSSION

Paphiopedilum fowliei was published by Lance Birk in 1981. The concept was based on plants collected by Paul Mattes (then president of the Austrian Orchid Society) and Lance Birk on the Philippine Island of Palawan. Mattes undertook his search inspired by a publication made by Ames in 1924 in which reference was made to a plant collected on Palawan Island, above the falls near Victoria Peak, by Foxworthy. The plant had been labelled as *Cordula barbata* (a synonym for *P. barbatum*). Originally, *P. fowliei* had not generally been accepted as an autonomous species. Cribb (1987) regarded it as a variety of *P. hennisianum*, and Braem (1988) (not accepting *P. hennisianum* as a separate entity) treated it within the synonymy of *P. lawrenceanum*. In 1993 Braem recognised *P. fowliei* as a separate species and described the albino as *P. fowliei* var. *sangianum* (see below). Koopowitz (1995, 2000, 2012, 2019) and Cribb (1998) followed Braem in that they now also recognise *P. fowliei* as a separate entity at the species level.

DESCRIPTION

Paphiopedilum fowliei is an herbaceous plant, generally growing in pockets of leafy humus. Each growth produces 4 to 6 leaves which are narrowly elliptic to elliptic, acute to sub-acute and minutely three-toothed at their tips. They are 10 to 15 cm long by 2.5 to 3.5 cm wide. The upper surface is bluish-grey and obscurely to distinctly mottled with a darker bluish grey-green. The margins are sparsely ciliate. The inflorescence is 20 to 30 cm long and about 5 mm in diameter, erect, and generally bears a single flower. It is covered with short hairs. The flower bract is ovate, about 1.5 to 2.5 cm long, green, and pubescent. The pubescent ovary is about 3.5 to 6.5 cm long, and green flushed with dull purple toward the apex. The dorsal sepal is white with green and purple veins, 4 to 6 cm long by 3 to 4 cm wide, concave, broadly ovate, obtuse, and bent forward over the aperture of the pouch. The lateral sepals are united into a synsepal and coloured like the dorsal sepal. The synsepal is concave, elliptic, 2.8 to 3 cm long by 1.2 to 2 cm wide. The narrowly ligulate, obtuse petals are white flushed with green near their base and purple toward the tip. They are 4.6 to 6 cm long by 1 to 1.5 cm wide and deflexed at about 40 degrees from the horizontal and somewhat sigmoid in their apical part. Their margins are ciliate and ornamented with near-black warty spots, while the lower margins are less intensely spotted than the upper ones. The apical half of the petals is reflexed.



PAPHIOPEDILUM FOWLIEI
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM FOWLIEI FMA, CHRISTIANAE
COURTESY OF RON PARSONS

They have green veins, and along the midvein there is a line of near-black longitudinal spots. The lip is three-lobed. The main lobe is shaped like an inverted helmet and the side lobes are folded inward, forming a tube, and covered with warts. The lip is 4.5 to 5 cm long by 2.3 to 2.8 cm wide and green to ochre with a purple flush. The staminodal shield is about 1 to 1.5 cm long by about the same width and ochre-green with darker green veins. It is obovate and the base is often angled. Apically there are 3 teeth, the side teeth distinctly elongated and falcate.

DISTRIBUTION AND HABITAT

The Philippine Islands. Plants are found on the southeast side of Palawan Island near Brooke's Point at 600 to 950 m. They grow in leaf mould and detritus on limestone rocks. *Paphiopedilum fowliei* often grows in bright light, but plants are seldom found in direct sunlight.

FLOWERING

Paphiopedilum fowliei generally flowers from January through April, but the odd plant has been reported to flower at different times of the year.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 36$ (Karasawa, 1986).

VARIETIES AND FORMS

PAPHIOPEDILUM FOWLIEI FORMA CHRISTIANAE BRAEM

ORCHIDEES. CULTURE ET PROTECTION, NO. 36: 35-36 (1998)

The plant was originally published as *Paphiopedilum fowliei* var. *sangianum* (Braem 1993) but transferred to the rank of form as *P. fowliei* forma *christianae* (Braem 1998). This was considered as an error by Gruß and Röth who republished the form as *P. fowliei* forma *sangianum* (CAESIANA, 12: 60 [1999]), ignoring the fact that names do not have priority outside the rank in which they have been published (CODE, Article 11.2). Thus the name *P. fowliei* forma *christianae* is to be followed as it was the first validly published designation at this taxonomic level.

Paphiopedilum fowliei forma *christianae* is a true albino. The flowers lack all red pigmentation. The petals and the sepals are white with green veins. The lip is white, almost entirely suffused with yellowish-green and the veins are also green. The staminode is white but the shield has a darker green pattern.

PAPHIOPEDILUM HENNISIANUM

(M. W. WOOD) FOWLIE

ORCHID DIGEST, 41(2): 60-61 (1977)

BASIONYM

Paphiopedilum barbatum subsp. *lawrenceanum* var. *hennisianum* M. W. Wood
THE ORCHID REVIEW, 84(1001): 352 (1976)

ETYMOLOGY

Named *hennisianum* for Mr. Kurt Hennis of Hildesheim, a well-known German orchid grower.

DISCUSSION

The concept of *Paphiopedilum hennisianum* dates back to a lecture at the 6th World Orchid Conference in Bangkok in 1969, when Gustav Schoser, then director of the Frankfurt municipal botanic gardens 'Palmengarten', announced his intention to describe some new species, among which there was a plant of Philippine provenance which he intended to name for his friend, the German horticulturist Kurt Hennis. Schoser, however, never actually did validate the taxa he announced in Bangkok. In 1976, the British horticulturist Mark W. Wood described the taxon as a variety of *P. lawrenceanum*, which at the time he considered to be a subspecies of *P. barbatum*. A year later, the plant was raised to specific rank as *P. hennisianum* by Fowlie (*loc. cit.*).

Whereas Cribb (1987) did recognise *P. hennisianum* as a species, the taxon was considered to be a synonym of *P. lawrenceanum* by Braem in his 1988 treatment of the genus. A review of the karyomorphological data hitherto published (Karasawa, 1979) argues for the acceptance of *P. hennisianum* as a separate species, although closely related to *P. lawrenceanum*.

DESCRIPTION

Paphiopedilum hennisianum is an herbaceous perennial plant growing in humus and leaf litter. The growths are clustered. Each growth generates four to six leaves which are narrowly elliptic to elliptic, obtuse or sub-acute and minutely three-toothed at the apex. They are up to 18 cm long by about 4 cm wide. Their upper surface is obscurely mottled dark and light green and the basal sections of their margins are ciliate. The inflorescence is up to 38 cm long, green, suffused with pale purple, and covered by hairs. It generally bears a single flower. The flower bract is ovate to oblong-ovate, 1.5 to 2.5 cm long, green, and pubescent. The ovary is 3.5 to 6.5 cm long, green, and pubescent. The dorsal sepal is broadly ovate, acuminate to acute, 3 to 4.5 cm long by 3.2 to 4.8 cm wide, and white with green veins. The lateral sepals are united to form a concave synsepal which is also white with green veins, but is only 2.3 to 3.5 cm long by about 1.8 to 2.1 cm wide. The petals are ligulate, acute, and 4.6 to 5.5 cm long by 1 to 1.5 cm wide. They



PAPHIOPEDILUM HENNISSIANUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM HENNISSIANUM FMA. *CHRISTIANSENII*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

are ciliate and white with green veins except for a reddish-purple streak along the mid-vein and near-black warts on both the upper and lower margins. The petals are always curved backward. The lip is 3.8 to 4.8 cm long by 2.2 to 2.7 cm wide, ciliate on the apical margin, and three-lobed. The lip has side lobes that are folded inward forming a tube and a main lobe that is shaped like an inverted helmet. The side lobes are covered with wart-like structures. The staminodal shield is 8 to 10 mm long by about the same width. It is apically three-toothed, the side teeth elongate and falcate.

DISTRIBUTION AND HABITAT

The Philippine Islands. *Paphiopedilum hennisianum* grows on the islands of Negros and Panay as well as other small islands bordering the Visayan Sea. Plants grow in moss, deep leaf litter, or humus on the floor of primary forests at 650 to 1,050 m.

FLOWERING

Paphiopedilum hennisianum flowers January through July with a peak in April and May.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 36$ (Karasawa, 1979).

VARIETIES AND FORMS

Paphiopedilum fowliei has been interpreted as a variety of *P. hennisianum* but is now generally accepted as an autonomous species.

PAPHIOPEDILUM HENNISIANUM FORMA CHRISTIANSENII

(GRUSS & RÖTH) GRUSS & RÖTH

CAESIANA, NO. 12: 57-65 (1999).

This is the albino in which the flowers lack all red pigmentation. As in most cases, the plant was originally described at the varietal level (*Paphiopedilum hennisianum* var. *christiansenii* Gruss & Röth DIE ORCHIDEEN, 47[5]: 234-236 [1996]).

The petals and the sepals are white with green veins. The lip is white, almost entirely suffused and veined with green. The staminode is white, but the shield has a darker green pattern. *Paphiopedilum hennisianum* forma *christiansenii* looks very similar to the albino of *P. fowliei* except for the form of the petals and the shape of the staminode.

PAPHIOPEDILUM LAWRENCEANUM

(REICHENBACH FIL.) PFITZER

PRINGSHEIM, *JAHRBÜCHER FÜR WISSENSCHAFTLICHE BOTANIK*, 19: 163 (1888)

BASIONYM

Cypripedium lawrenceanum Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 10: 748 (1878)

SYNONYMS

Cordula lawrenceana (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum barbatum subsp. *lawrenceanum* (Reichenbach fil.) M. W. Wood

THE ORCHID REVIEW, 84(1001): 350-353 (1976)

ETYMOLOGY

Named *lawrenceanum* for Sir James John Trevor Lawrence (1831-1913), at the time a member of British Parliament and president of the Royal Horticultural Society.

DISCUSSION

Paphiopedilum lawrenceanum was discovered in northern Borneo by Frederick William Burbidge (1847-1905) when collecting for Veitch & Sons. Burbidge found the plants on the left bank of the river Lawas, near Merengit between 300 and 500 meters above sea level. Live material was sent by Veitch to Reichenbach fil. who described the species (*loc. cit.*).

Paphiopedilum lawrenceanum is closely related to *P. crossii*, *P. barbatum*, *P. fowliei*, and *P. hennisianum*. At times it has been argued that these species should be considered varieties of a single entity. On the basis of chromosome numbers and karyotypes (see Karasawa 1979, 1986) it is, however, evident that the five taxa are best treated as separate species.

The type of *Paphiopedilum nigratum* (Reichenbach fil.) Pfitzer was prepared from a plant said to have been imported from Borneo by The New Bulb Company of Colchester, England. The plant had smaller, darker-coloured flowers than those of *P. lawrenceanum* and was very close to *P. barbatum*, and as in this latter species, it had warts only on the upper margins of the petals. The original description of the taxon as *Cypripedium nigratum* by the younger Reichenbach in 1882 is inconclusive, not to say useless, with respect to possible identification of the plant that Reichenbach had at hand. Rolfe (1896) preferred not to make a decision on the matter. Pfitzer (1903), in contrast, treated *P. nigratum* as a variety of *P. barbatum*, and we see no reason not to follow that interpretation (See also under *P. barbatum*).



PAPHIOPEDILUM LAWRENCEANUM

PLATE 6432 OF CURTIS'S BOTANICAL MAGAZINE (VOL. 105 [1879])

THE PAINTING IS BY MATILDA SMITH (1854-1926), SECOND COUSIN OF JOSEPH DALTON HOOKER

LITHOGRAPH WAS MADE BY JOHN NUGENT FITCH (1840-1927), NEPHEW OF WALTER HOOD FITCH

Unfortunately, some introductions of small flowered *P. lawrenceanum* have been labelled as *P. nigratum* and were published as such, for example in ORCHID DIGEST, 32(4): 124-125 (1968), prompting erroneous interpretation in horticulture and in the various orchid judging programmes. And in view of this confusion, it remains to be seen whether the identification of the plants awarded as *P. lawrenceanum* survives scientific scrutiny.

Paphiopedilum lawrenceanum is one of the most important species in breeding. The great width of the dorsal sepal of this species, as well as the dark flower colour are choice characteristics. However, since the designation as *P. lawrenceanum* has often been erroneously applied, the identity of the hybrids made with these plants must be questioned.

DESCRIPTION

Paphiopedilum lawrenceanum is an herbaceous perennial attaining an overall height of about 50 cm. Each growth produces five to six leaves. The leaves are up to 27.5 cm long by about 4 to 6.5 cm wide, oval-oblong to narrowly elliptic, acute to obtuse, and minutely three-toothed at the apex. The upper surface varies from deep grass-green with olive green tessellations to dark green with yellowish-green mottling. The under surface is pale green. The inflorescence is erect, up to 45 cm high and generally bears a single flower, sometimes two. The maroon peduncle is pubescent. The floral bract is ovate to oblong, obtuse to acute, green with maroon veins, about 2 cm long, and covers about one-fourth of the ovary. The ovary is 4 to 6.5 cm long, pubescent, and green with maroon ridges. The flower is about 12 cm wide. The dorsal sepal is 6 to 6.3 cm long and equally wide, broadly ovate-subcircular to nearly orbicular, obtuse, and folded at the middle. Its lateral margins are often slightly reflexed. It is white with broad, alternately longer and shorter veins which are usually green at the base and generally deep vinous purple above. The margins are ciliate. The synsepal is narrowly lanceolate to ovate-oblong, more or less obtuse, about 3.7 to 4 cm long by about 1.5 cm wide. It is white, flushed with green and ornamented with maroon veins. The ligulate petals are green with a purple suffusion near the tip, up to 6.4 cm long by about 1 to 1.2 cm wide, spreading to nearly horizontal, and straight to distinctly curved backward in the apical portion. The margins are ciliate and each margin is adorned with five to ten very dark, near-black warts. The lip is three-lobed, up to 6 cm long by 2.8 to 3.2 cm wide. The side lobes are curved inward to form a tube, and are covered with a few maroon warts. The main lobe is deeply saccate, shaped like an inverted helmet, green, and strongly suffused with maroon. The area around the aperture is usually darker than the apical region, which is sometimes plain green. The staminodal shield is half-moon-shaped, the basal (upper) margin is notched, the apical (lower) margin has two distinct, acute lateral teeth that are bent more or less inward, and three smaller teeth in between, the centre one of these much more distinct than the other two. The shield is 9 to 11 mm long by about 1.5 cm wide, yellowish-green with a purple margin, and has a more or less distinct, darker green pattern.



PAPHIOPEDILUM LAWRENCEANUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

DISTRIBUTION AND HABITAT

Borneo. *Paphiopedilum lawrenceanum* is found in northern Sarawak at 300 to 450 m. Plants have also been reported along the Lawas River near Meringit, North Borneo. They generally grow in small colonies in primary forest in deep leaf litter, layers of humus, or moss that covers the ground. In addition, plants are occasionally found on moss-covered limestone rocks.

FLOWERING

Paphiopedilum lawrenceanum generally flowers from November through January but plants have been reported to flower at other times of the year.

MISCELLANEOUS NOTES

The mitotic chromosome count published for this taxon is $2n = 36$ (Mehlquist, 1947; McQuade, 1949; Duncan & MacLeod, 1950a; and Karasawa, 1979).

VARIETIES AND FORMS

PAPHIOPEDILUM LAWRENCEANUM FORMA HYEANUM

(LINDEN FIL. & RODIGAS) GRUSS & RÖTH

CAESIANA, NO. 12: 57-65 (1999)

The plant was originally published by Linden fil. & Rodigas in the *LINDENIA* (1: 89, plate 42) for 1885 and first shown by Linden's Compagnie Continentale at the meeting of the Royal Horticultural Society in London in April of 1886 where it received a "First Class Certificate" (FCC) as *Cypripedium Hyeanum*.

According to the report in *THE GARDENERS' CHRONICLE* for May 1st, 1886 (page 567), the pouch was grass-green with darker green venation, the petals green, covered with short dark hairs, the dorsal sepal white, striped with green and the peduncle green and hairy. The leaves were described as having the same markings as *Paphiopedilum lawrenceanum*.

Desbois (1888, 1898) gives the following description based on the actual plant, observed in the greenhouses of Mr. Hye [clarifications in brackets by the author]:

"The dorsal sepal is very large, of a very nice and very pure white, intensely striped with dark green. The inferior sepal [synsepal] is very narrow, creamy white with subdued green stripes. The petals are relatively long, horizontal, green, with small apple-green dots on the upper part, finely ciliated with white hairs. The lip is very well developed [large?], very bright olive-green. The staminode is white with a green centre. The surface is waxy. The leaves are green, strongly mottled with large, dull-white plaques."

The painting in the LINDENIA (t. 42) shows two distinct red spots at the lower end of the column, and there is no reason to question the correctness of the illustration. The presence of these red spots disqualifies this variety as an albino; however, there is no mention of said red spots in any former description. Plants with the red spots, however, do exist.

The plant is said to have been discovered among a lot of *Paphiopedilum lawrenceanum* plants purchased by Mr. Linden from a British importer (Maesereel, 1886) and subsequently sold to Mr. Hye. The transfer to the genus *Paphiopedilum* was carried out by Stein in STEIN'S ORCHIDEENBUCH: 474 (1892).

An additional 31 "varieties" of *Paphiopedilum lawrenceanum* have been published. These "variants" were generally described on the basis of a single plant that had been presented at a meeting of one of the horticultural societies, or seemed to be special in some respect. None of them deserves any further mention.



PAPHIOPEDILUM LAWRENCEANUM FMA. *HYEANUM*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM DAYANUM

(STONE EX LINDLEY) STEIN

STEIN'S ORCHIDEENBUCH, 464 (1892)

BASIONYM

Cypripedium spectabile var. *dayanum* Stone ex Lindley

THE GARDENERS' CHRONICLE, 1st series, 20: 693 (1860)

SYNONYMS

Cypripedium dayanum (Stone ex Lindley) Lindley

PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY OF LONDON, 1: 245 (1860)

Cypripedium dayi Stone, MSS

THE GARDENERS' CHRONICLE, 1st series, 20: 693 (1860)

Cypripedium superbiens var. *dayanum* (Stone ex Lindley) Reichenbach fil.

XENIA ORCHIDACEA, 2: 10 (1862)

Cypripedium petri Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 13: 680 (1880)

Cypripedium burbridgei Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 16: 38 (1881)

Cypripedium peteri De Vos

LA BELGIQUE HORTICOLE, 31: 242 (1881)

Cypripedium ernestianum Hort.

JOURNAL OF HORTICULTURE AND PRACTICAL GARDENING, 3rd series, 14: 375, fig. 67 (1887)

Cypripedium peteri D. Dean

THE GARDENERS' CHRONICLE, 3rd series, 1: 577 (1887)

Paphiopedilum burbridgei (Reichenbach fil.) Pfitzer

Engler, BOTANISCHE JAHRBÜCHER, 19: 40 (1894)

Paphiopedilum petri (Reichenbach fil.) Pfitzer

Engler, BOTANISCHE JAHRBÜCHER, 19: 40 (1895)

Cypripedium x petri (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 4: 247-248 (1896)

Paphiopedilum dayanum var. *petri* (Reichenbach fil.) Pfitzer

Engler, DAS PFLANZENREICH, IV(50): 86 (1903)

Cordula dayana (Stone ex Lindley) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Cordula petri (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)



PAPHIOPEDILUM DAYANUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

Cypripedium x petri var. *burbridgei* (Reichenbach fil.) Rolfe
THE ORCHID REVIEW, 20: 247-248 (1912)

ETYMOLOGY

Named *dayanum* for John Day (1824-1888), of Tottenham, England, a Victorian orchid hobbyist.

DISCUSSION

Paphiopedilum dayanum was discovered by Hugh Low on the slopes of Mount Kinabalu in northern Borneo. The whole shipment which he sent back to England was purchased by John Day, whose gardener Stone managed to flower one of the plants shortly after and exhibited the flowering specimen as *Cypripedium dayi*. In a short description, John Lindley (*loc. cit.*) erroneously described the taxon as a variety of the North American species *Cypripedium spectabile* (now generally regarded to be a synonym of *C. reginae*) but shortly after re-described the concept as *Cypripedium dayanum*.

Paphiopedilum dayanum remained rare in cultivation until it was rediscovered at the foot of the "Marie-Parie Spur" of Mount Kinabalu by Peter Veitch and Frederick William Burbidge in 1879. They brought a "considerable number" of plants back to England. Reichenbach was sent a plant of this collection and promptly described it as *Cypripedium petri* (*loc. cit.*). A year later, another plant from the same collection was sent to Reichenbach who described it as a new species again, this time under the name of *Cypripedium burbridgei*.

The differences among the concepts of *Paphiopedilum dayanum*, *Paphiopedilum petri*, and *Paphiopedilum burbridgei* are solely to be found in different mottling of the leaves and in some differences in size and coloration intensity of the flower. This variability can, without doubt, be explained with the different altitudes of the habitats. As we have already discussed, a number of other species of the genus *Paphiopedilum* demonstrate a distinct variability in leaf tessellation (see, for example, under *P. hookerae*, *P. sukhakulii*, and *P. purpuratum*), flower size and flower colour.

In 1896, Rolfe added considerably to the chaos when he expressed the opinion that *Paphiopedilum petri* is a natural hybrid between *Paphiopedilum dayanum* and *Paphiopedilum virens*, and that *Paphiopedilum burbridgei* is a variety of this hybrid. A detailed study of the original descriptions has shown the three taxa (*Paphiopedilum dayanum*, *P. petri*, and *P. burbridgei*) to be identical.

Cribb (1987, 1998) agrees that *Paphiopedilum petri* is identical with *P. dayanum* but considers *P. burbridgei* to be a natural hybrid between *P. dayanum* and *P. virens* (*P. javanicum* var. *virens*). He bases his opinion on the type species of *P. burbridgei* in the Reichenbach herbarium, which he considers to show intermediate characteristics.

DESCRIPTION

Paphiopedilum dayanum is an herbaceous perennial, usually growing in leaf mould on the forest floor. The stems are short and erect, each of them carrying up to six leaves. The leaves are distichous, oblong-lanceolate, up to 21 cm long by about 5 cm wide, folded in the basal area, the margins slightly serrate in the apical part and obtusely bilobed at the end, variable in colour, at times pale green with oblong spots of deep green scattered over the upper surface, sometimes tessellated with deep and light green. The tessellation goes through to the under surface. The leaves last up to four years on the plants. The inflorescence is erect, up to 25 cm high, densely pilose, dull brown-red, bearing a single flower which is up to about 13 cm wide. The floral bract is up to 2.5 cm long, acuminate, lanceolate, pale green covered with reddish hairs. The ovary is similarly hairy, up to 7 cm long, buff green, ridged pale reddish-brown. The sepals are concave at the apex, slightly cucullate, white with numerous parallel green veins, the margins and the outer surface shortly ciliate. The dorsal sepal is narrowly ovate, up to 6 cm long by about 3 cm wide. The synsepal is lanceolate, up to 5 cm long and about 2 cm wide. The petals are spreading, elliptic-spathulate, more or less acute, up to 8 cm long by more or less 1.5 cm wide, dull maroon-pink, with numerous parallel green and maroon-brown veins, the margins evenly ciliate. The lip is deeply saccate, up to 5 cm long, trilobed, the infolded lateral lobes forming an almost closed tube, 2 cm long, dull reddish-green with shiny maroon warts; the mid-lobe is auriculate at the base, purplish-brown, veined deep maroon, glabrous on the outer surface, the inside covered with stiff hairs. The staminodal shield is semi-ovate to reniform, with one to three teeth on the lower edge, more or less bilobed on the upper one, up to 1.3 cm wide, pale green with deeper green marbling toward the central tooth.

DISTRIBUTION AND HABITAT

Borneo. Plants are reported from Sabah on the lower slopes of Mt. Kinabalu at 300 to 1,450 m. They usually grow on northeast-facing slopes in moderately bright light with their roots embedded in moss and leafy humus at the bases of small trees in secondary forest.

FLOWERING

Plants of *Paphiopedilum dayanum* have been reported to flower all year round with a peak blooming season in late spring.

MISCELLANEOUS NOTES

The mitotic chromosome counts published for *Paphiopedilum dayanum* are $2n = 34$ (Duncan, 1947; Duncan & MacLeod, 1950a) and $2n = 36$ (Karasawa, 1979). The plants used by Karasawa can be positively identified.

VARIETIES AND FORMS

Five varieties of this species have been described, four of them as *Cypripedium dayanum* var. None of them differs from the type. Varieties “petri” and “burbridgei” have been dealt with above.



PAPHIOPEDILUM CILIOLARE

By PROF. DR. GUIDO JOZEF BRAEM

PAPHIOPEDILUM CILIOLARE

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 462 (1892)

BASIONYM

Cypripedium ciliolare Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 18: 488 (1882)

SYNONYMS

Cypripedium miteaunum Linden fil. & Rodigas

LINDENIA, 3: 77, t. 146 (1887)

Paphiopedilum ciliolare var. *miteaunum* (Linden fil. & Rodigas) Pfitzer

Engler, DAS PFLANZENREICH, IV(50): 89 (1903)

Cordula ciliolaris (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum superbiens subsp. *ciliolare* M. W. Wood

CURTIS'S BOTANICAL MAGAZINE, 183(2): 52, tab. 803 (1981)

ETYMOLOGY

Named *ciliolare* referring to the large number of hairs on the margins of the petals and sepals.

DISCUSSION

Paphiopedilum ciliolare was discovered in 1882 by William Boxall (1844-1910) when collecting in the Philippines for the British horticultural establishment Low. Within the same year, the plants were described as *Cypripedium ciliolare* by Reichenbach fil. (*loc. cit.*) who distinguished the taxon from *P. superbiens* because of

- [1] the more copious veins of the flower segments,
- [2] the more intense ciliation of the margins of the petals and sepals,
- [3] the shorter lip (pouch), and
- [4] the broader staminode with a blunter tooth in the shield.

All of these "characteristics" are variable in *P. ciliolare* as well as in *P. superbiens* and their ranges of variation overlap. Thus, one could very well argue that the two are subspecies of one single taxon.

On the other hand, the minor differences add up to a phenotype that is quite unique to the trained examiner, and for that reason, we accept *P. ciliolare* as an autonomous entity. In summing up, it may best be stated that *Paphiopedilum ciliolare* differs from *P. superbiens* by

- [a] the petals, spotted only over two-thirds of their length,
- [b] by a smaller pouch, and
- [c] by a protruding centre tooth in the staminodal shield.

DESCRIPTION

Paphiopedilum ciliolare is an herbaceous plant, attaining an overall height of about 45 cm, usually growing in leaf mould. The leaves are narrowly oblong to elliptic-oblong, obtuse, up to 20 cm long by about 4 cm wide, tessellated deep and pale green. The inflorescence is erect, terete, densely downy, up to 40 cm high, usually bearing a single flower. The bract is approximately 1.7 cm long, about one-third the length of the ovary. The flower is up to 10 cm wide. The dorsal sepal is 4.5 to 5 cm long by 3.5 to 4.5 cm wide, broadly ovate, acuminate, ciliolate at the margin, purple at the base, the remainder white, with closely set, alternately longer and shorter veins which are green, sometimes purple toward the lateral margins. The synsepal is about 3 cm long, ovate, acuminate, whitish with green veins. The petals are ligulate, 5.5 to 6.5 cm long by 1.5 to 2.5 cm wide, deflexed and recurved, margins with long black hairs, the basal portion green, densely spotted with near-black warts to two-thirds of the length, the apical portion pale purple. The lip is deeply saccate, shaped like an inverted helmet, about 5.5 cm long, dull purplish-brown, the infolded side lobes pale yellow-green spotted with purple warts. The staminodal shield is reniform, greenish, somewhat suffused with pale rose, with a protruding centre tooth, the basal edge with a notch, the distal margin obscurely five-toothed.

DISTRIBUTION AND HABITAT

The Philippine Islands. *Paphiopedilum ciliolare* grows at 300 to 1,830 m in Surigao province of northeast Mindanao as well as on the small island of Dinagat, which is just off the northeast coast of Mindanao. Plants are also reported at the other end of the Philippines on Luzon Island and the small island of Camiguin, off the north coast of Luzon.

FLOWERING

Paphiopedilum ciliolare has been reported to flower all year round. The peak blooming season, however, extends from March through June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 32$ (Karasawa, 1979).

VARIETIES AND FORMS

The only variety of this species ever to be validly published is *Paphiopedilum ciliolare* var. *miteaunum* (Linden fil. & Rodigas) Pfitzer, a concept that is based on *Cypripedium miteaunum* Linden fil. & Rodigas (see above). The plant was described as having "larger, more brilliantly coloured and more hairy flowers". This taxon is without any doubt situated within the natural variation of the nominal form of the species.

PAPHIOPEDILUM SUPERBIENS

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 487 (1892)

BASIONYM

Cypripedium superbiens Reichenbach fil.

BONPLANDIA, 3: 227 (1855)

SYNONYMS

Cypripedium barbatum var. *veitchii* Van Houtte

FLORE DES SERRES, 2nd series, 4: 161, t. 1453 (1861)

Cypripedium veitchianum Hort. ex Lemaire

L'ILLUSTRATION HORTICOLE, 12, tab. 429 (1865)

Cypripedium barbatum var. *superbum* Morren

LA BELGIQUE HORTICOLE, 33: 97 (1883)

Cordula superbiens (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Named *superbiens* referring to the beauty and size of the flower.

DISCUSSION

Paphiopedilum superbiens was first described by Reichenbach fil. on the basis of a plant brought to England by Rollison and later purchased by Consul Schiller of Hamburg. A second plant was found at Veitch's in 1857 among a shipment of *P. barbatum*. According to Kent (in Veitch, 1889), all plants known to exist in cultivation until 1889 originated from divisions of those two specimens. However, it cannot be ruled out that other specimens were being grown as *Cypripedium barbatum*.

The origin of the plant imported by Rollison remains unknown. It is rather probable that it, just as the one discovered among the plants at Veitch's, originated from the mountainous regions of Sumatra.

In 1882, Charles Curtis, collecting for Veitch & Sons, discovered a population of *Paphiopedilums* in West Sumatra and the plants became quite common in European collections. The close affinity of these plants to *P. superbiens* was noted but the plants found by Curtis happened to have slightly smaller flowers and somewhat shorter petals, which led Reichenbach fil. (*loc. cit.*) to describe them as a separate species under the name of *Cypripedium curtisii*.

Braem (1988) transferred the Reichenbach concept to *P. superbiens* var. *curtisii*, a view followed by Koopowitz (1995, 2000, 2012, 2019) and Cribb (1998).



PAPHIOPEDILUM SUPERBIENS
COURTESY OF DOROTHY POTTER BARNETT

In horticulture, the name of *P. curtisii* has largely prevailed, although renowned commercial growers in discussion freely admit that *P. curtisii* is best considered a variety of *P. superbiens*.

Most of the specimens of *Paphiopedilum superbiens* now in cultivation originate from the area around Lake Toba in the northern part of Sumatra. Some clones with particularly nice green dorsal sepals were collected in the mountains around Gunung (Mount) Kurinchi at about the centre of the mountain chain running parallel to the west coast of Sumatra.

DESCRIPTION

Paphiopedilum superbiens is an herbaceous perennial, usually growing in leafy mould on the ground in forest areas. The plants have short, up to 3 cm long, erect stems bearing four to six leaves. The leaves persist for up to three years. They are up to 20 cm long by about 8 cm wide, elliptic to oblong elliptic, minutely three-toothed at the acute apex, sparsely ciliate on the basal margins, ventrally keeled, pale green tinged with purple below and distinctly tessellated with light and darker green above. The inflorescence is deep purple, shortly pubescent, up to 30 cm high, usually bearing a single flower. The floral bract is about 2 cm long, covering approximately a third of the ovary. The dorsal sepal is up to 6 cm long by more or less 5 cm wide, sub-cordate, acuminate, ciliate, green at the centre, with green and purple longitudinal stripes. The synsepal is up to 3.5 cm long and narrower than the dorsal sepal, ovate, acuminate, ciliate, white with longitudinal green veins. The petals are ligulate, falcate-deflexed, acute, up to 7 cm long by up to 2.8 cm wide, whitish-rose with purple veins and covered with near-black warts that are largest at the upper margin, the margins ciliate. The lip is deeply saccate, shaped like an inverted helmet, up to 6 cm long by about 3.6 cm wide, dark purple, trilobate, the infolded side lobes pale purple covered with purple-black warts. The staminodal shield is about 1 to 1.2 cm high by more or less 2 cm wide, broadly horseshoe-shaped with a distinct indentation at the upper margin and three small teeth at the lower end.

DISTRIBUTION AND HABITAT

North-central Sumatra. *Paphiopedilum superbiens* grows near Padang on wooded mountain slopes at 900 to 1,300 m. Plants grow in relatively bright conditions in the deep humus that overlies crumbling sandstone.

FLOWERING

Paphiopedilum superbiens has been reported to flower nearly all year round, with a peak blooming season in June and July.



PAPHIOPEDILUM SUPERBIENS VAR. *CURTISII*
WATERCOLOUR PAINTING BY HENI SUSANTI
COURTESY OF HENI SUSANTI



TOP: *PAPHIOPEDILUM SUPERBIENS* VAR. *CURTISII*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

BOTTOM: *PAPHIOPEDILUM SUPERBIENS* VAR. *CURTISII* FMA. *SANDERAE*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 38$ (Duncan 1947; McQuade, 1949; Duncan & MacLeod, 1950a; Karasawa, 1979).

VARIETIES AND FORMS

PAPHIOPEDILUM SUPERBIENS VAR. CURTISII

(REICHENBACH FIL.) BRAEM

PAPHIOPEDILUM: 214 (1988)

Although originally described as an autonomous species in THE GARDENERS' CHRONICLE, 2nd series, 20: 8 (1883), this taxon is generally considered to be a variety of *P. superbiens*. Nevertheless, some doubt may be expressed. *Paphiopedilum superbiens* var. *curtisii* not only differs from the "normal" type of *P. superbiens* by its shorter dorsal sepal, the shorter, reflexed petals, a somewhat longer floral bract, minor differences in the tessellation of the leaves and in the coloration of the flower, but it has a different mitotic chromosome count of $2n = 36$ (Mehlquist, 1947; McQuade, 1949; Duncan & MacLeod, 1950a; Karasawa, 1979). It was named in honour of Charles Curtis (1853-1928), collector for Veitch & Sons, who discovered this plant.

Paphiopedilum superbiens var. *curtisii* is found in western Sumatra on wooded mountain slopes between 900 and 1,300 m. Plants grow in relatively bright light with their roots embedded in a deep humus layer that covers the crumbling sandstone. It has been reported to flower all year round with a peak blooming season from April through August.

PAPHIOPEDILUM SUPERBIENS VAR. CURTISII FORMA SANDERAE

(CURTIS) BRAEM & CHIRON

BRAEM & CHIRON, PAPHIOPEDILUM: 302 (2003).

As *Paphiopedilum curtisii* is considered a variety of *P. superbiens*, it was necessary to recombine the albino form accordingly. This beautiful albino was originally described by Curtis himself as *Cypripedium curtisii* var. *sanderiae* in GARDENERS' MAGAZINE, new series 58: 303 (1915), and the plant duly received a First Class Certificate from the Royal Horticultural Society in 1918. Since those days, the taxon has been awarded as *P. curtisii* var. *sanderiae* and as *P. superbiens* var. *sanderiae*.

The plant is without any red pigmentation. The under surface of the leaves is uniformly green. The scape is green. The petals and sepals are white in their ground colour. The dorsal sepal is suffused with green near its base, and ornamented with a multitude of well-developed dark green stripes. The petals are distinctly suffused with green above the median vein over almost their entire length; below the median vein, the suffusion is very limited. The tips of the petals are pure white. The entire lip is green. The staminodal shield is light green with a darker green pattern on the apical half.

PAPHIOPEDILUM ACMODONTUM

M. W. WOOD

THE ORCHID REVIEW, 84(1001): 350-353 [350-351] (1976)

ETYMOLOGY

The term *acmodontum* comes from the Greek. *Acmo* is a Latinized form of the Greek "acme" and means "protruding"; "*dontum*" refers to "tooth." As this species is partly characterised by a prominent apical tooth of the labellum and by the quite distinct staminode showing a central tooth on the distal margin projecting beyond the two smaller lateral teeth, we assume the specific name to be derived from one of those characteristics.

DISCUSSION

This species was first recognised when plants reached Europe from the Philippines in 1968. Gustav Schoser, at the time director of the Palmengarten (the Municipal Botanic Gardens of the city of Frankfurt am Main [Germany]) announced his intention to describe the new taxon as *Paphiopedilum acmodontum* in a lecture delivered at the 6th World Orchid Conference in 1969 in Sydney. When this had not been done by 1976, the British horticulturist Mark W. Wood published the concept (*loc. cit.*) retaining the name suggested by Schoser. The taxon is usually cited as *Paphiopedilum acmodontum* Schoser ex M.W. Wood. Schoser, however, never described the taxon, nor did he ever supply any manuscript or further information regarding the plant. Neither did he have anything to do with its discovery or propagation in cultivation. All he should be given credit for is coining the name for this species.

It is quite interesting to note that there is a dried specimen of this species in the collection at the British Museum of Natural History that had been collected in 1908 by the American botanist Adolph Daniel Edward Elmer on the Island of Negros.

Paphiopedilum acmodontum is fairly common in cultivation and has been awarded quite often by the orchid society judging systems. The first plant under this designation was awarded by the American Orchid Society judging system in 1970, long before the species was formally validated. *Paphiopedilum acmodontum* has often been used in hybridisation.

Both Wood (*loc. cit.*) and Cribb (1981, 1987, 1998) consider *Paphiopedilum acmodontum* to be most closely related to *P. argus*, a view that does not survive scientific scrutiny. The two species differ from each other in flower size, flower colour, lip structure, petal morphology, staminodal shield morphology, chromosome number, and karyotype.



PAPHIOPEDILUM ACMODONTUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

DESCRIPTION

Paphiopedilum acmodontum is a fairly short-stemmed herbaceous perennial. The leaves are up to 18 cm long by 4 cm wide, distichous, oblong-elliptic, with a minutely tridenticulate apex, basal margins sparsely ciliate, tessellated pale and dark green above. The inflorescence is erect, up to 25 cm high, usually bearing a single flower. The scape is sparsely pubescent, green, marked violet-purple. The floral bract is about 3 cm long, ovate, pubescent. The dorsal sepal is white, distinctly suffused with rose-purple and longitudinally striped greenish-purple, up to 4 cm long by about 3 cm wide, ovate, acute. The synsepal is about 3.2 cm long by up to 1.5 cm wide, acutely ovate, white, more or less suffused purple, longitudinally striped green. The petals are up to 4.5 cm long by 1.5 cm wide, the basal portion greenish, veined and spotted deep purple, their apical half uniformly purple, spreading-reflexed, ligulate-ob lanceolate, obtuse, the margins with some hairy warts and sparsely ciliate, the inner surface more or less downy. The lip is up to 4 cm long by 2.3 cm wide, deeply saccate, shaped like an inverted helmet, trilobate, prominently auriculate, dentate or apiculate at the apex, minutely pubescent, olive green, suffused purple-brown. The staminodal shield is obovate, about 1 cm long and nearly as wide, pale green with a deep green pattern, tinged bronze, minutely pubescent, the distal margin with three teeth, the middle tooth longer than the two lateral ones.

DISTRIBUTION AND HABITAT

The Philippine Islands. *Paphiopedilum acmodontum* grows on the Visian Islands. Collectors have not reported specific habitat location, but current literature indicates that this species may occur on Negros Island. Lance Birk (1983) reported that it grows at 1,000 to 1,500 m.

FLOWERING

Paphiopedilum acmodontum generally flowers from March through May but plants of this species have been reported to flower all year round.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 36$ (Karasawa, 1979).



PAPHIOPEDILUM JAVANICUM

PLATE 703 OF THE FLORE DES SERRES (VOL. 7 [6. MAY 1852])

ILLUSTRATION PROBABLY BY LOUIS-CONSTANTIN STROOBANT (1814-1872)

PAPHIOPEDILUM JAVANICUM

(REINWARDT EX BLUME) PFITZER

PRINGSHEIM, JAHRBÜCHER FÜR WISSENSCHAFTLICHE BOTANIK, 19: 165 (1888)

BASIONYM

Cypripedium javanicum Reinwardt ex Blume

CATALOGUS, 98 (1823)

SYNONYMS

Cordula javanica (Reinwardt ex Blume) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum purpurascens Fowlie

ORCHID DIGEST, 38: 153-157 (1974)

Paphiopedilum inamorii Cribb & Lamb

MALESIAN ORCHID JOURNAL, 8: 39-42 (2011)

Papiopedilum agusii Gruß, Cavestro & G. Benk

INTERNET ORCHID SP. PHOTO ENCYCL. NOMENCL. NOTES, 5(1): 1-8 (2017)

ETYMOLOGY

Named *javanicum* for the Indonesian Island of Java where the type material was collected.

DISCUSSION

This species was discovered by the Dutch botanist Reinwardt in 1823 in the mountains of the eastern part of Java and in the same year they were included in the list of the plants cultivated at the Botanical Gardens in Buitenzorg (now Bogor) by Blume.

The plants now known as *P. javanicum* var. *virens* were first collected by Hugh Low on Mount Kinabalu in 1858. Some of the plants brought to England by Low were purchased by John Day, who flowered the first specimen in 1863. As usual, Day sent material to Reichenbach fil., who described it as a separate species, naming it *Cypripedium virens*. (see below). Reichenbach differentiated his taxon from *Paphiopedilum javanicum* by the horizontally spreading petals and the convex staminodal shield. In his 2nd volume of the XENIA ORCHIDACEA, Reichenbach (1870) published a detailed description together with a partly coloured drawing (t. 162). In contrast to Reichenbach, neither Kent (in Veitch [1889]), nor Stein (1892), nor even Kerchove (1896) regarded *P. virens* to be worthy of autonomous species status. Pfitzer (1903), however, does give it species status. Karasawa has established that the mitotic chromosome count for *P. virens* is $2n = 40$ whereas for *P. javanicum*, he counts $2n = 38$ (for both counts see Karasawa 1979). Whereas Karasawa (1982) follows Pfitzer in considering *P. virens* to be an autonomous species, it is not accepted at that level by Braem (1988), Koopowitz (1995, 2000, 2012,



PAPHIOPEDILUM JAVANICUM
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON

2019) nor Cribb (1987, 1997, 1998). However, the differences lead us to the decision to treat *P. virens* as a distinct variety of *P. javanicum*.

Paphiopedilum inamorii is obviously closely related to *P. javanicum* var. *virens* (Reichenbach fil.) Stein. Cribb and Lamb indicate a close relationship to *P. javanicum* var. *virens* (Reichenbach fil.) Stein and *P. sugiyamanum* Cavestro and even suggest, although publishing the taxon at the species level, that *P. inamorii* may well be a mere variety of *P. sugiyamanum* or a hybrid between that entity and *P. javanicum* var. *virens*. One must reserve final judgment on the true taxonomic status of this entity until plant material is found in the wild and reliable habitat pictures become available. Therefore, we tentatively consider it as a variant of *P. javanicum*.

Paphiopedilum agusii as described by Gräß, Cavestro & G. Benk is a simple colour variant of *P. javanicum* and deserves no autonomous taxonomic status.

DESCRIPTION

Paphiopedilum javanicum is an herbaceous perennial attaining an overall height of about 40 cm. The leaves are up to 20 cm long by 5 cm wide, narrowly to oblong elliptic, tessellated pale and dark green, deeply notched at the apex. The inflorescence is up to 25 cm high, green, spotted purple, usually bearing one flower, rarely two. The floral bract is about 2 cm long, covering one third of the ovary. The flower is up to 10 cm wide, all parts except the lip ciliate. The dorsal sepal is up to 4.3 cm long by more or less 2.5 cm wide, cordate, acuminate, green with deep green longitudinal veins, the apical area whitish. The synsepal is about 3.1 cm long, narrower than the dorsal sepal, oblong-ovate. The petals are about 5 cm long by 1.5 cm wide, broadly strap-shaped, more or less deflexed, the apical one-third purple, the basal two-thirds green, spotted with small, very dark warts. The lip is deeply saccate, greenish-brown with a brighter apex. The infolded side lobes are green, spotted purple. The staminodal shield is reniform, the upper margin notched, the lower margin with a distinct sinus.

DISTRIBUTION AND HABITAT

The islands of Java, Bali, Flores, and Sumatra. In Java, plants are found on mountains throughout the island. While they grow in forests at 950 to 2,000 m, *Paphiopedilum javanicum* is found most often at 1,400 to 1,700 m. Plants grow in deep or partial shade, usually in leaf litter among boulders on the forest floor, but they also have been found growing in a mixture of black crumbling lava rock and humus, on boulder-strewn cliff faces and in thick pads of humus on wet, spongy ground.

FLOWERING

Paphiopedilum javanicum generally flowers from March through May but plants have been reported to flower at other times of the year.



PAPHIOPEDILUM JAVANICUM VAR. *VIRENS*
COURTESY OF DAVID BANKS

MISCELLANEOUS NOTES

For *Paphiopedilum javanicum* two different mitotic chromosome counts have been reported. Whereas Duncan (1947) and Duncan & MacLeod (1950a) report a count of $2n = 36$, the chromosome number has been reported as $2n = 38$ by Karasawa (1979). The plant used by Karasawa can be positively identified as *P. javanicum*.

VARIETIES AND FORMS

PAPHIOPEDILUM JAVANICUM* VAR. *VIRENS
(REICHENBACH FIL.) STEIN
STEIN'S ORCHIDEENBUCH: 471 (1892)

SYNONYM

Paphiopedilum sugiyamanum Cavestro
RHÔNE-ALPES ORCHIDÉES, 27: 2-9 (2001)

Paphiopedilum javanicum var. *virens* was originally described as an autonomous species as *Cypripedium virens* by the younger Reichenbach (BOTANISCHE ZEITUNG, 21: 128 (1863). The variety differs from the typical *Paphiopedilum javanicum* by:

- [1] its smaller flowers,
- [2] more spatulate, almost horizontal petals with less intense spotting,
- [3] the glossy dark green ground colour paired with a glossy deep-brown pouch,
- [4] a more pubescent ovary,
- [5] a convex staminodal shield, and
- [6] a different chromosome count (see above).

Paphiopedilum javanicum var. *virens* is found only on the lower slopes of Mt. Kinabalu and the adjacent Crocker Range in Sabah (North Borneo). Plants are found at 900 to 1,650 m on steep, boulder-strewn slopes in primary mountain forests, often above rivers and streams. They normally grow in thick pads of leaf mulch and mosses in bright, filtered light, but plants also are found on moss-covered granite or sandstone boulders in full morning or late afternoon sun. The plants flower in spring.

The plant described as *Paphiopedilum purpurascens* by Fowlie (ORCHID DIGEST, 38: 153-157 [1974]) on the basis of a collection by Mrs. Sheila Collenette on Mount Kinabalu from a colony of *P. javanicum* var. *virens* is without any doubt merely a colour variant thereof.

Paphiopedilum sugiyamanum was described on the basis of a plant said to have been collected in March of 2001 on a hill in Sabah, in the northeastern part of Borneo. The various photographs that are available cause serious doubts as to the taxonomic identity of this concept. Whereas the illustration of the holotype does clearly suggest a very close relationship with *P. javanicum* var. *virens*, other illustrations indicate a close relationship with *P. dayanum*.

PAPHIOPEDILUM JAVANICUM VAR. JAVANICUM FORMA NYMPHENBURGIANUM
(RÖTH & GRUSS) CRIBB

THE GENUS PAPHIOPEDILUM, 2ND EDITION: 371 (1998) (ILLUSTRATED AS FORMA ALBUM [SIC.] ON PAGE 366).

This true albino has been known for quite some time. The plant and flower lack all red pigmentation. The sepals and petals are white, suffused with green over the basal half of their surface. They are ornamented with many dark green longitudinal stripes. The pouch is uniformly coloured green. The staminode is yellowish green, the shield adorned with a more or less distinct, dark green pattern.



PAPHIOPEDILUM ROBINSONIANUM

COURTESY OF NICOLAS BOUGOURD (LA COUR DES ORCHIDÉES)

PAPHIOPEDILUM ROBINSONIANUM

CAVESTRO

RHÔNE-ALPES ORCHIDÉES, 52: 10-15 (2014)

[PUBLISHED BY EXTRACT ON 2 SEPTEMBER 2013]

SYNONYMS

Paphiopedilum anitatum Cavestro

INTERNET ORCHID SP. PHOTO ENCYCL. NOMENCL. NOTES, 6(1) (2017)

Paphiopedilum robinsonianum var. *anitatum* Cavestro & Koopowitz

ORCHID DIGEST, 82(4): 219 (2018)

ETYMOLOGY

Paphiopedilum robinsonianum was named for Mr. Alastair Robinson who discovered the plant during a research trip on 13 August 2013.

DISCUSSION

Paphiopedilum robinsonianum was discovered in the mountains of easterncentral Sulawesi by Alastair Robinson. The plant was described by William Cavestro, a French teacher of economics. Cavestro decided to ignore the recommendations of the CODE OF BOTANICAL NOMENCLATURE and chose a name that will create unnecessary confusion with *Paphiopedilum robinsonii* (Ridley) Ridley and *P. cerveranum* Braem.

P. robinsonianum is obviously closely related to *P. javanicum* or a variety thereof. Indeed, Cavestro, in the original description, puts his taxon in the close vicinity of *P. javanicum*, differentiating his taxon by:

- [1] a different coloration of the dorsal sepal,
- [2] twisted margins of the petals, and
- [3] a transversely elliptic staminode.

Until further data and materials become available, we choose to include *P. robinsonianum* as an autonomous species in this volume.

DESCRIPTION

Paphiopedilum robinsonianum is an herbaceous perennial growing in pockets of leafy humus. The leaves are narrowly oblong-elliptic, obtuse, 13 to 18 cm long by 3 to 4.5 cm wide, green, mottled with darker green on the upper surface. The inflorescence is erect and bears a single flower. The peduncle is 25 to 30 cm long, purple, densely covered by purple hairs. The flower bract is ovate, 2.5 cm long, purple. The flower is overall 11 to 13.5 cm in natural spread. The dorsal sepal is white, striped with green and with a large emerald-green spot in the centre at the base. The dorsal is ovate, ciliate on the outside and on the margins, obtuse at the apex, 5.5 to 6 cm long by 4 to 4.6 cm wide. The

synsepal is white suffused with green at the base, ovate, obtuse at the apex, 3.5 to 4 cm long by 2.5 to 2.7 cm wide. The petals are horizontal or nearly so. They are oblanceolate, twisted and recurved at the apex, their margins covered by long hairs. The petals are 6 to 6.5 cm long by 1.5 to 2 cm wide, clear green striated with darker green in the basal half, and purple near the apex. The labellum is three-lobed, obtuse at the apex, 6.5 to 6.7 cm long by 4 to 4.5 cm wide, with infolded, verrucose lateral lobes that are 3.5 to 3.7 cm long by 1.8 to 2 cm wide, green spotted with brown. The central lobe is shaped like an inverted helmet, 4 to 4.3 cm long by 3.5 to 3.7 cm wide, green, suffused with brown and veined with darker green. The staminode is transversely elliptic forming two distinct rounded sections. It is white, 6 mm long by 10 mm wide. There are two large notches at the base and one notch at the apex, as well as small white crests near the base and on the upper surface.

DISTRIBUTION AND HABITAT

Eastern-Central Sulawesi (Indonesia). The holotype was collected between Buyu Lumut Mountain and Bungkutnyo Borone Mountain between 1,350 and 1,420 m above sea level. The plants grow in pockets of humus that develop between the roots of trees of the species *Gymnostoma rumphianum* and other members of the Myrtaceae-Podocarpaceae. The taxon is also said to occur in the Mount Tambusisi region.

FLOWERING

Plants were encountered in flower on 13 August 2013. We deduce that the flowering time in the natural habitat is between late July and early September.

PAPHIOPEDILUM BUNGEBELANGI

METUSALA

EDINBURGH JOURNAL OF BOTANY: 74(2): 169-178 [173-178] (2017)

ETYMOLOGY

The name *bungebelangi* is derived from the local language of the Gayo tribe, where *bunge* means flower and *belangi* means beautiful, obviously in reference to the beauty of the flower.

DISCUSSION

Paphiopedilum bungebelangi was discovered in the Aceh highlands of Sumatra, Indonesia. The collector of the type specimen as well as the year of discovery are unknown. The plant is generally single-flowered and has distinctly mottled leaves; it finds its place in subgenus *Sigmatopetalum*. Metusala puts this taxon near *Paphiopedilum barbatum* and *P. javanicum*.

DESCRIPTION

Paphiopedilum bungebelangi is an herbaceous plant generally growing in leafy debris or moss. The stems are short, the roots hairy, reddish brown. The leaves are greyish-green, heavily mottled darker green and with dark longitudinal venation above. The underside is whitish to light greyish-green. Each stem generates 4 or 5 leaves, which are up to 23 cm long by up to 6.2 cm wide, spreading, elliptic to oblong elliptic, coriaceous, glabrous, matte to slightly velvety above, waxy and rather shiny below. Their apex is obtuse to shortly acuminate, the tip minutely tridenticulate and the margins minutely irregularly dentate. The generally uniflorous inflorescence is erect to arcuate and up to about 50 cm tall, covered with purplish hairs on the basal half and with white hairs on the apical part. The floral bract is light green, tightly encircling the basal part of the ovary, pubescent on the outside, up to 3 cm long by up to 1.5 cm wide, triangular to lanceolate, margins ciliate. The flower is up to 9 cm tall and spreads to about 7.5 cm wide in its natural condition on the living plant. The pedicel and ovary are up to 3.7 cm long, covered by purple hairs near the base, and by white hairs toward the apex. The dorsal sepal is erect, up to 3.6 cm tall by up to 2 cm wide, ovate with acute apex, usually strongly reflexed and with revolute margins. The dorsal is glabrous on the inside, pubescent on the outside, with ciliate margins. It is white with green longitudinal venation. The petals are up to 5.5 cm long by up to 1.4 cm wide, yellowish-green with darker green longitudinal stripes, sometimes with a purple tinge, spreading, horizontal to downward at a 45 degree angle, oblong with an acute to slightly acuminate apex. The petal margins are strongly undulate, minutely ciliate with some longer and irregular cilia, the apical third sometimes slightly twisted and the apical region reflexed or recurved. The labellum (lip) is greenish-brown to purplish-maroon with darker venation and sometimes with a yellow band around the aperture. The labellum is glossy to matte, up to 5 cm tall



PAPHIOPEDILUM BUNGEBELANGI (INFLORESCENCE – DETAIL)
WATERCOLOUR PAINTING BY RIO ANANTA
COURTESY OF RIO ANANTA



PAPHIOPEDILUM BUNGEBELANGI (FLOWER)
WATERCOLOUR PAINTING BY GRACE SYRIARIEL
COURTESY OF GRACE SYRIARIEL

by up to 2.8 cm wide, deeply saccate, glabrous on the outside with darker venation and yellowish-brown to yellowish-red side lobes that are incurved and show a few small, raised warts. The column is 1 cm long. The staminode is light green to yellowish-green with a darker green reticulate pattern on the front. The base is shortly bilobed; the apex is deeply incised. The apical lateral lobes are sub-falcate or tooth-like, acute. The central lobe is very short and much reduced, sometimes with a marginal lobe on each side.

DISTRIBUTION AND HABITAT

Indonesia, Sumatra, Aceh Province. The type specimen was collected at an elevation between 1550 and 1650 m. The plants grow on the forest floor in thick, leafy debris and *sphagnum* moss on a sloping hillside with a limestone substrate. The plants grow in deep, shady forests with relatively low light conditions. The habitat is said to be critically endangered by industrial deforestation.

FLOWERING

Paphiopedilum bungebelangi has hitherto been found flowering in its natural habitat in October and November, but a longer flowering period is possible, if not probable.

PAPHIOPEDILUM SCHOSERI

BRAEM & MOHR

SCHLECHTERIANA, FASCICLE 2: 15-22 [19] (1988)

SYNONYM

Paphiopedilum baccanum Schoser, *nomen nudum*

PROCEEDINGS OF THE 9TH WORLD ORCHID CONFERENCE: 38 (1980)

ETYMOLOGY

Named *schoseri* for Gustav Schoser (1924-2012), formerly Director of the Municipal Botanic Gardens of Frankfurt, Germany.

DISCUSSION

Paphiopedilum schoseri was first mentioned as "*Paphiopedilum baccanum*" by Gustav Schoser at the 9th World Orchid Conference in Bangkok in 1978 and in the proceedings of that conference, published two years later (Schoser, 1980). Schoser, however, never validated the concept.

Paphiopedilum schoseri is one of only three species of the genus that occur in the Moluccas. It is possibly endemic to the island of Bacan, although we do not want to exclude the possibility that populations will be found on the nearby (larger) island of Halmahera.

DESCRIPTION

Paphiopedilum schoseri is an herbaceous perennial growing in leafy debris on the floor of the forest, in humus-filled crevices, and on moss-covered rocky outcrops. The plants generate up to five leaves per growth. The leaves are oblong-lanceolate, more or less acute, often with a bifid apex. They are 10 to 23 cm long by up to 4.5 cm wide. The upper surface is Hooker's green, irregularly tessellated with cobalt green. The underside is uniformly sap green, distinctly and sharply keeled. The margins are only slightly undulate. The inflorescence is generated from a well-developed, oblong-linear, densely reddish, villose sheath which is up to 10 cm high and more or less 1 cm across. The inflorescence is erect, up to 30 cm long, and generally bears a single flower. As in most single-flowered *Paphiopedilum* species, two-flowered specimens are sometimes found. The floral bract is elliptic, conduplicate and acute, 1.6 to 2.3 cm long by more or less 1 cm wide, ciliate and pubescent on the outer surface. The flower is about 8 cm long by 6 to 7 cm wide. The dorsal sepal is broadly ovate, acuminate, erect, 3 to 4 cm long by up to 3.5 cm wide, white, the lower part often suffused green, with up to 18 dark green longitudinal stripes of variable length, the apical part of the margins somewhat folded inward, ciliate, pubescent on the outer surface. The synsepal is deeply concave, oblong-ovate or oblong-elliptic, obtuse, 2.3 to 4.5 cm long by 1.2 to 2 cm wide, ciliate, coloured like the dorsal sepal, and equally pubescent on the outer surface. The petals are spreading at an angle of about 45 degrees. They are narrowly lanceolate, acute to ob-



PAPHIOPEDILUM SCHOSERI

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM SCHOSERI
WATERCOLOUR PAINTING BY YOFETA DEVY
COURTESY OF YOFETA DEVY

tuse, up to 5.5 cm long by 1 to 1.5 cm wide, ciliate, the margins undulate. The basal area of the petals is olive green, the apical part suffused rose, more or less intensely covered with brown to near-black, irregular spots. The lip is three-lobed, the side lobes folded inward forming a tube, the main lobe deeply saccate, shaped like an inverted helmet. The lip is 4 to 5.5 cm long by about 2.5 cm wide, grass green to brown with indistinct dark veins, densely covered by short hairs over its entire surface, the side lobes with raised brownish warts on the outside. The column is short, about 1 cm long, the stalk covered with short hairs. The staminodal shield is about 1 cm long by about 7 mm wide, yellowish-green to olive green, horseshoe-shaped, with two sharp appendages apically that are distinctly curved inward, and a shorter tooth in the middle of the apical margin.

DISTRIBUTION AND HABITAT

Indonesia. Plants grow on Bacan Island, which is just off the southwest coast of Halmahera Island in the Moluccas. Plants are found at 1,200 to 1,300 m. They may grow in leafy debris on the forest floor, in rock crevices filled with humus, or on moss-covered rocks. They are always found in deep shade.

FLOWERING

Paphiopedilum schoseri is reported to flower all year round. The main blooming season, however, is from May through July.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 35$ (Karasawa *et al.*, 1997). On the basis of their cytogenetic studies, Karasawa *et al.* suggest *P. schoseri* to be a natural hybrid between *P. javanicum* and *P. tonsum* or between undiscovered species. Further study is required. The odd (not even) number of chromosomes may also explain why only very few hybrids have been registered indicating *P. schoseri* as one of the parents.

PAPHIOPEDILUM URBANIANUM

FOWLIE

ORCHID DIGEST, 45(4): 131 (1981)

ETYMOLOGY

Named *urbanianum* for Mrs. Jacinta T. Urban of the Philippines.

DISCUSSION

Paphiopedilum urbanianum was discovered in a shipment of *Paphiopedilum argus* originating from the Philippine island of Mindoro and sold to the American orchid dealer Ray Rands by Mrs. Jacinta T. Urban, the owner of the Tecson Orchid Company. *Paphiopedilum urbanianum* is a unique species that cannot be confused with any other taxon, especially for its distinct, symmetrical dark green pattern on the staminodal shield. Cribb (1987) sets *P. urbanianum* as the closest relative to *P. javanicum* and *P. argus*. In the 2nd edition of his book *Paphiopedilum* (Cribb, 1998), he repeats that statement thus ignoring the results of the study of Cox *et al.* (1997) which he follows conscientiously in all other respects. The fact is that in said study *P. urbanianum* is separated from *P. javanicum* by just about all species of the subgenus and from *P. argus* by 7 species. This indicates that all statements in respect to the affinity of *P. urbanianum* are just as speculative as they are subjective.

DESCRIPTION

Paphiopedilum urbanianum is an herbaceous perennial, growing in leaf-mould. The leaves are up to 20 cm long by up to 4 cm wide, narrowly elliptic, grass-green, tessellated with darker green. The inflorescence is erect, up to 25 cm high by about 5 mm in diameter, densely pilose, bearing one or two flowers. The leafy bract is 2 to 3 cm long by 1 to 2 cm wide. The dorsal sepal is slightly bent forward, 2.6 to 3.4 cm long by up to 3.2 cm wide, broadly elliptic, acute, whitish, with up to thirteen green longitudinal veins, sometimes slightly lilac. The synsepal is up to 3.2 cm long by about 1.8 cm wide, narrowly elliptic, acute, white, with up to 9 green longitudinal veins. The petals are slightly recurved, oblanceolate, more or less rounded at the apex, 5.5 to 6 cm long by 1.2 to 1.5 cm wide, the basal half green with seven or eight dark green longitudinal veins, the apical half purple, covered with sparsely pubescent maroon warts. The lip is deeply saccate, up to 5 cm long by 2.2 to 2.6 cm wide, slightly constricted under the aperture, distinctly auriculate, glossy green, suffused bright leather-brown and with dark greenish-brown venation. The staminodal shield is 1.1 to 1.3 cm high by about 1 cm wide, sub-orbicular, distinctly notched above and below, the lower margin with a small tooth in the middle of the sinus, yellowish-brown with a distinct green pattern, shortly pubescent.

DISTRIBUTION AND HABITAT

The Philippine Islands. *Paphiopedilum urbanianum* has been found only on Mindoro



PAPHIOPEDILUM URBANIANUM

COURTESY OF DOROTHY POTTER BARNETT

Island at 400 to 800 m. Plants grow on northeast-facing slopes. They are usually found on or between rocks on the jungle floor with their roots embedded in thick layers of humus and leaf litter.

FLOWERING

Paphiopedilum urbanianum usually flowers between March and May but plants of this species have been reported to flower at other times of the year.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 40$ (Karasawa, 1982b).

VARIETIES AND FORMS

PAPHIOPEDILUM URBANIANUM FORMA ALBOVIRIDE

BRAEM

ORCHIDEES. CULTURE ET PROTECTION, NO. 36: 35-36 (1998)

This albino is very similar in coloration to *Paphiopedilum wardii* forma *alboviride*. The flowers are apple-green on a white background, with darker green striations in the dorsal sepal and the petals.



PAPHIOPEDILUM URBANIANUM

COURTESY OF DOROTHY POTTER BARNETT



PAPHIOPEDILUM RUNGSURIYANUM
COURTESY OF OLAF GRUSS

PAPHIOPEDILUM RUNGSURIYANUM

GRUSS, RUNGRUANG, CHAISURIAKUL & DIONISIO

ORCHIDEENJOURNAL (INTERNET) 21(1): 1-11 [4] [(28.05.)2014]

ETYMOLOGY

The first part of the name "*rungsuriyanum*" refers to Mr. Niwat Rungruang who made the material available for publication. Furthermore, in Thai, "*rung*" also means "success" and "prosperity", and "*suriya*" means "growing".

DISCUSSION

Plants of this taxon first appeared on the markets near the border of Laos and Thailand. Soon, the first images of this unique plant appeared on the internet, and in view of the "race to fame" among amateur botanists it did not surprise that a description appeared rather quickly. In a fairly chaotic and extremely ill-edited publication, the plant was described in an Internet edition of the German ORCHIDEENJOURNAL by Olaf Gruss, Niwat Rungruang, Yongouth Chaisuriakul, and Ibn Dionisio (*loc. cit.*). However, no matter how confused and dilettantesque the publication may be in its language and format, the description, as far as we can judge, is valid and effective.

This new species from Laos is still an enigma. Although it was placed close to *Paphiopedilum canhii* by the original authors, it has nothing to do with that species except for the fact that the two taxa belong to the same genus. The plants of *Paphiopedilum runsuriyanum* are generally unifloral and have mottled leaves. Therefore, the species finds its place within subgenus *Sigmatopetalum* Hallier fil.

DESCRIPTION

This description is based on information from the original description by Gruss *et al.* (*loc. cit.*) Unfortunately, the German and English versions of the original description do not conform to each other in all parts.

Paphiopedilum runsuriyanum is an herbaceous plant growing in pockets of detritus or decaying vegetation on steep limestone slopes. There are 3 to 5 leaves, generated from a short stem. The stems are close together giving the plants a clustered appearance. The leaves are 10 to 15 cm long by 1.5 to 2 cm wide, narrowly elliptic, rounded or obscurely three-lobed at the apex. They are sharply keeled on the underside, the upper surface clearly marbled dark and pale green, and the underside marbled greyish-green and purple. The inflorescence is erect to slightly arching and generally bears one, rarely two, flowers. It is 5 to 8 cm tall and about 8 mm in diameter, and covered by whitish hairs. The flower bracts are conduplicate, ovate, obtuse, dark purple, pubescent, 1.5 to 2 cm long by 2 to 3 mm wide. The ovary is 1 to 1.5 cm long by 1.5 to 2 mm in diameter, yellowish-green with brown stripes and covered by white hairs. The flower is 4 to 5



PAPHIOPEDILUM RUNSURIYANUM

WATERCOLOUR PAINTING BY KARYONO APIC

COURTESY OF KARYONO APIC

cm in diameter, showy, the exterior hairy. The dorsal sepal is broadly ovate to sub-circular, concave, acute, often standing at an angle over the aperture of the pouch, 2 cm high and nearly equal in width. The outside is distinctly keeled and covered with whitish hairs. The inside is dark violet with broad yellowish-green stripes that show reddish-purple venation. There is a narrow yellowish-green margin around the entire dorsal. The outside is dark reddish-violet, partially showing the yellowish base colour, with darker venation. The synsepal is clearly smaller than the dorsal sepal, but similar in colour and hairiness. It is dark purple on the outside and yellowish-green on the inside, about 1.8 cm long by about 1 cm wide. The petals are ovate, the apex rounded, spreading, 2 to 3 cm long by about 2 cm wide, the edges covered by whitish, translucent hairs, whitish-green in ground colour, the inner as well as the outer surface intensely veined reddish-purple and with a broad reddish-purple margin. The labellum is trilobate. The side lobes are infolded, the main lobe deeply saccate, shaped like an inverted helmet, with a distinct V-shaped cut at the front. Overall, the labellum is 2.3 cm long by about 1.2 cm wide, brownish in the front, yellowish at the back, with a bright green margin around the aperture, the inner surface bright yellow with reddish venation. The sidelobes are yellow spotted with reddish-violet. The column is 5 to 7 mm long by 1 to 2 mm in diameter, brown, covered by whitish hairs. The staminode is transversely half-moon-shaped, the apical margin (bottom edge) with two whitish bulges, the center with a large whitish bulge apically ending in a sharp tip. Overall, the staminode is about 6 mm wide by about 5 mm in height, dark violet, with a distinct, heart-shaped, protruding whitish-purple center. There are 2 or 4 pollinia.

DISTRIBUTION AND HABITAT

Paphiopedilum rungsuriyanum is hitherto only known from northern Laos, where it grows in the region of the border with Thailand on steep limestone slopes. The plants often sit on the naked rock, but the roots are always anchored in the cracks and crevices that are filled with earth and vegetable debris. Sometimes, the base of the plants are embedded in moss.

FLOWERING

Detailed information about the flowering of *Paphiopedilum rungsuriyanum* at its natural habitats has not been reported, but we suspect the flowering period to be from late April through July. From cultivation it has been reported to flower in August, September and October.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Lee et al., 2017).

Some of the plants that hitherto have flowered in cultivation have four pollinia (two on each side of the column). Others, however, have two pollinia (one on each side of the column) as is the “rule” within the genus. The occurrence of plants with four pollinia, albeit extraordinary, is by no means unique and has been observed in other species and hybrids of the genus.



A STUDY OF *PAPHIOPEDILUM CANTHII*
WATERCOLOUR PAINTING BY HENNY HERAWATI
COURTESY OF HENNY HERAWATI

SUBGENUS MEGASTAMINODIUM

BRAEM & GRUSS (2012)

SYNONYMS

Section *Pygmaea* Averyanov

ORCHID PLANET, 24(4): 16-26 [20], 31-44 ([autumn] 2011)

Section *Megastaminodium* Lee *et al.*

BOTANICAL STUDIES, 58 : 16 (2017)

SUBGENERIC CHARACTERISTICS

Leaves tessellated. Inflorescence with a single flower, rarely two. Pouch rounded at apex. Staminode ovate, extremely large, more or less plane, with a distinct, rather symmetrical pattern. Pollen granular, 2 pollinia. Mitotic chromosome count $2n = 26$. Type: *P. canhii*

DISCUSSION

Subgenus *Megastaminodium* is characterised by plants with mottled leaves, generally unifloral inflorescences, narrow petals that are more or less twisted, somewhat undulated, and distinctly spreading, a lip with a rounded apex, no lateral auricula, and an extremely large, more or less plane, oval staminode.

PAPHIOPEDILUM CANHII

AVERYANOV & GRUSS

TURCZANINOWIA, 13(2): 5-98 [92] (2010)

ETYMOLOGY

Paphiopedilum canhii was named in honour of the Vietnamese orchid grower and government official Canh Chu Xuan.

DISCUSSION

Paphiopedilum canhii was first noted when people of the H'Mong (Meo) tribe of the remote mountain areas of northern Vietnam brought some plants to the office of Chu Xuan Canh, the Service Officer at the office for Natural Resources and Minorities in November of 2009. Some of these plants flowered in the care of Mr. Canh in March of 2010 and proved to be different from everything known. Plants were forwarded for taxonomic review and description and duly described by Averyanov *et al.* in ORCHIDS (79[5] 288-290 [2010]). As this publication contained sections that made it invalid in accordance with the INTERNATIONAL CODE OF PLANT TAXONOMY, the species needed to be validly republished.

The main problem with this plant, from the view of a botanist, was its classification within the genus. As *Paphiopedilum canhii* is a unifloral species with distinctly mottled leaves, it is obvious that it does not belong in the subgenera *Cochlopetalum* (multifloral), *Polyantha* (multifloral) and *Paphiopedilum* (leaves not mottled). Since there is no similarity in color and/or shape between petals and sepals, subgenus *Brachypetalum* must also be ruled out, as must subgenus *Parvisepalum* because the dorsal sepal in *P. canhii* is certainly not smaller than the petals.

Thus we are left with subgenus *Sigmatopetalum*, an entity accommodating plants with unifloral inflorescences and mottled leaves. But all species belonging to subgenus *Sigmatopetalum* are also characterised by having distinctly pointed pouches with well-developed lateral auricula, and those features are missing in *P. canhii*, where we find a very rounded pouch without any lateral auricula.

Furthermore, *Paphiopedilum canhii* presents several other characteristics by which it differs from anything hitherto seen within the Asian slipper orchids, but the differences noted in the former paragraph should suffice to understand that there was need to create a new subgenus within the genus *Paphiopedilum* to accommodate this unique species. The new subgenus *Megastaminodium* was published by Braem & Gruss in the ORCHID DIGEST (75[3]: 164-165) on 1 July 2011.

The inclusion of this entity into subgenus *Paphiopedilum sensu* Cribb by Yung-I Lee *et al.* (2017) and others is therefore pure nonsense.



PAPHIOPEDILUM CANHII

COURTESY OF WICHARUJ PAPHIOPEDILUMS

DESCRIPTION

Paphiopedilum canhii is a perennial herb. Each plant produces 2 to 7 elliptic to oblong leaves that grow to be 3 to 8 cm long by 1 to 2.5 cm wide. The leaves are slightly emarginate and shortly apiculate at the apex. Their upper surface is distinctly tessellated light and dark green, their under surface is pale green and heavily marked with dark violet. The inflorescence is erect and generally carries a single flower. The peduncle is terete, 3 to 10 cm long, dark green, sometimes tinted purple, covered by purple hairs. The floral bract is conduplicate, narrowly ovate-elliptic, acute, 0.8 to 1.4 cm long, by 3 to 5 mm wide, green, and covered by short, olive-violet hairs. The flowers are 6 to 8 cm across. The dorsal sepal is ovate to broadly ovate, acute, 1.5 to 3 cm long by 1.4 to 2 cm wide, white, slightly greenish at the base, the lower half veined with 5 to 11 purple nerves. The outer surface is densely covered with short hairs. The synsepal is narrowly

ovate to ovate, acute, 1.4 to 2.2 cm long by 0.7 to 1.4 cm wide, generally uniformly dull green to white, occasionally with 2 purple stripes. The outer surface is hairy. The petals are cuneate, narrowing from the broad base to the elongate, acuminate apex, spreading more or less horizontally. They are 2.8 to 4 cm long by 0.5 to 0.7 cm wide, light green to pinkish-green, bright deep green toward the base, and dull purple-violet nearer to the apex, with 7 to 9 dark purple-violet longitudinal stripes, and long white cilia along the irregularly undulate margin. The basal part of their lower margin is adorned by a dense tuft of long, glassy, pellucid, dark violet papillae. The lip is trilobate. The side lobes are folded to make the usual tube. The main lobe is deeply saccate. The lip is 2 to 3.5 cm long by 0.8 to 1.5 cm wide, light dull green, with a light brownish-purple tint on the smooth and glossy incurved side lobes. The inside bottom of the pouch is densely covered with long, white, glassy, pellucid papillae which are dark violet at their apex. The column is short and broad, 3 to 4 mm long, light greenish to bright green. The stamens have elongate obtuse filament apices. The filaments are greenish to green. The anther is spherical, yellow to orange. The viscid pollen is orange. The staminode is very large, 8 to 14 mm long by 5 to 10 mm wide, broadly ovate to ovate-elliptic, entire, flat, indistinctly emarginate and grooved at the apex, glossy, white to light greenish, with irregular yellowish-green to dark green marks. The pedicel and ovary are 1.5 to 3 cm long, dark green, densely pubescent with olive-violet hairs. The fruit is a dry, narrowly ellipsoid, ribbed, shortly-beaked capsule 2 to 3.5 cm long by about 5 mm in diameter.

DISTRIBUTION AND HABITAT

Paphiopedilum canhii grows in broad-leaved primary forests on rocky limestone at elevations of 900 to 1,200 metres in the Vietnamese Dien Bien Province. The plants grow on vertical shaded limestone cliffs near the tops of ridges, with their roots firmly pressed to the solid rock faces without any soil.

FLOWERING

Paphiopedilum canhii flowers in its natural habitats in March and April. Seed dispersal is in August and September.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Górniak *et al.*, 2013).

SUBGENUS POLYANTHA

(PFITZER) BRIEGER (1971)

SUBGENERIC CHARACTERISTICS

Plants stout. Leaves plain (non-tessellated), fleshy. Inflorescence multifloral, nearly all flowers opening simultaneously. Pouch shaped like an inverted helmet. Pollen granular. Synonym: Section *Polyantha* Pfitzer (1894), Subgenus *Anotopedilum* Pfitzer (1903). Mitotic chromosome count $2n = 26$. Type: *P. lowii*

DISCUSSION

Subgenus *Polyantha* was described by Brieger (1971) on the basis of section *Polyantha sensu* Pfitzer (1894) and corresponds largely to subgenus *Anotopedilum* as described by Pfitzer in 1903.

Whereas Pfitzer included only those plants having a non-auriculate labellum and divided his subgenus into three sections, subgenus *Polyantha sensu* Brieger accommodates all species having uniformly green, thick, fleshy leaves without any tessellations and a multifloral inflorescence on which all, or nearly all, flowers open simultaneously.



TOP: *PAPHIOPEDILUM HAYNALDIANUM*
COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

BOTTOM: *PAPHIOPEDILUM HAYNALDIANUM* FMA. *ALBUM*
COURTESY OF DOROTHY POTTER BARNETT

PAPHIOPEDILUM HAYNALDIANUM

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 470 (1892)

BASIONYM

Cypripedium haynaldianum Reichenbach fil.

XENIA ORCHIDACEA, 2: 222-223 (1874)

SYNONYM

Cordula haynaldiana (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

ETYMOLOGY

Named *haynaldianum* in honour of Cardinal Lajos Haynald (1816-1891), Archbishop of Kalocsa-Bács, Hungary, who was a keen amateur botanist.

DISCUSSION

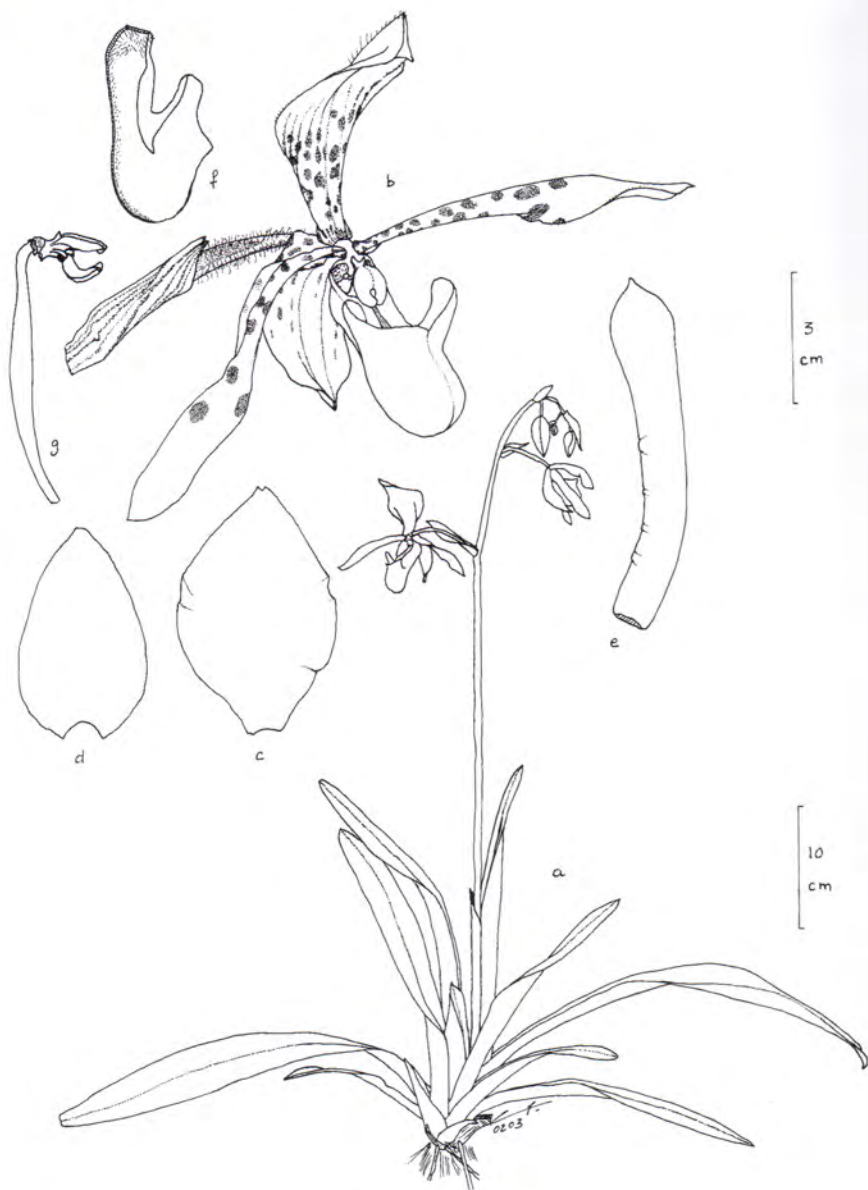
Paphiopedilum haynaldianum was discovered in 1870 by Gustav Wallis at San Isidro near Manila on the main Philippine Island of Luzon. It was introduced to Europe by Veitch. Plant material was sent to H. G. Reichenbach, who described the species in the second volume of his XENIA ORCHIDACEA.

Paphiopedilum haynaldianum is very closely related to *P. lowii*, but it differs by having a more elongated, differently shaped staminodal shield; broader, spotted sepals; different coloration on the basal parts of the petals; larger, in-folded lateral lobes on the lip; and more leathery leaves. There also is a difference in the position of the lip relative to the axis of the inflorescence. Whereas the lip of *P. lowii* clearly is directed forward, the pouch of *P. haynaldianum* is pointed distinctly downward.

Paphiopedilum haynaldianum is known only from the Philippines, but its closest relative, *P. lowii*, occurs in Borneo, Sulawesi, the Malay Archipelago, and peninsular Malaysia.

DESCRIPTION

Paphiopedilum haynaldianum is an herbaceous plant, with leaves up to 30 cm long by about 4.5 cm wide. They are strap-shaped to narrow-elliptic, dull green, more or less erect, bluntly two-lobed at the apex, and have sharp, hard, rough edges that are increasingly serrated toward the apex. The underside is sharply keeled. The inflorescence is up to 75 cm long, brown, and covered with long hairs. The floral bracts are about half as long as the ovary which is 4 to 6 cm long. The bracts and ovaries are hirsute. The inflorescence generally bears two to eight, exceptionally up to twelve, flowers, which usually have a natural spread of up to 13 cm. Exceptional clones can well have a span



PAPHIOPEDILUM HAYNALDIANUM
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON



PAPHIOPEDILUM HAYNALDIANUM
COURTESY OF DOROTHY POTTER BARNETT

of up to 16 cm. The dorsal sepal is elongate-ovate, 6 cm long and approximately 4 cm wide, acuminate, marginally curved to the rear for about 2/3 of its length, and yellowish-green with large brown spots along the veins. The synsepal is broadly ovate, whitish with green longitudinal veins, and double-keeled. Petals are spatulate and measure up to 9 cm long. They generally are about 1.5 to 2 cm wide. They spread sideways in a downward curve, the distal part sweeps up again, and the lower margin twists forward. Petals are yellowish-green on the basal half which is marked with up to twelve large, dark brown bars, spots, or dots. The broadened distal half is purple. The lip, which points downward, is shaped like an inverted helmet. It is up to 5 cm long by 2.7 to 3.9 cm wide, with a large mouth. The lip is greenish with a purple-brown suffusion. The side lobes are infolded and glossy ivory-white. The staminodal shield is elongate-ovate with a hairy basal tooth. The deeply notched apical part is green, marbled with darker green around the notch.

DISTRIBUTION AND HABITAT

Paphiopedilum haynaldianum is found in the Philippines on Negros Island and on Luzon Island in Tarlac, Mountain, and Rizal Provinces. It grows from sea level to 1,400 m on rocks, granite boulders, limestone hills, or in the crotches of larger trees where leafy debris accumulates.

FLOWERING

Plants of *Paphiopedilum haynaldianum* have been reported to flower all year round. The peak season, however, is from February through April. Plants usually bloom on two- to three-year-old growths.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan, 1947; Duncan & MacLeod, 1949; Pancho, 1965; Tanaka & Aoyama, 1974).

VARIETIES AND FORMS

PAPHIOPEDILUM HAYNALDIANUM FORMA ALBUM

(ASHER) BRAEM IN BRAEM, BAKER & BAKER

THE GENUS PAPHIOPEDILUM - NATURAL HISTORY & CULTIVATION, 1: 112 (1998)

Originally described at the varietal level by Asher in the ORCHID DIGEST for 1980, this is a true albino. The flowers and inflorescence are uniformly bright green, with the exception of the white apices on the petals and the upper margin area of the dorsal sepal.

PAPHIOPEDILUM HAYNALDIANUM VAR. LAURAE

GOLAMCO

WALING WALING REVIEW, 10(1): 36-39 [38] (2002)

This interesting variant has its natural habitats on Cebu and the Visayas Island in the Philippines. It differs from the “normal” form of *Paphiopedilum haynaldianum* by a distinctly shorter inflorescence (25 to 35 cm long), and by its drooping petals. The petals are also less spotted and the pouch is shorter and rounder as compared to the “normal” *P. haynaldianum* forms. The pouch margins at the aperture do not bend toward the outside and the base colour of petals, sepals, and pouch is yellow-bronze to orange-tan. The two apices of the staminode overlap.



PAPHIOPEDILUM HAYNALDIANUM VAR. *LAURAE* IN SITU
COURTESY OF DR. MIGUEL DAVID DE LEON



PAPHIOPEDILUM LOWII

WATERCOLOUR PAINTING BY HENNY HERAWATI

COURTESY OF HENNY HERAWATI

THE PAPHIOPEDILUM LOWII COMPLEX

The *Paphiopedilum lowii* complex consists of *P. lowii*, originally described by Lindley in 1847; *P. richardianum*, described by Asher & Beaman in 1988; and *P. lynnianae*, published by Garay in 1996.

The discussion about the taxonomical status of the two latter taxa is ongoing, and indeed, many arguments can be found to justify treating both *P. richardianum* and *P. lynnianae* as varieties of *P. lowii*. On the other hand, differences clearly exist, and it is a matter of opinion what rank should be assigned to the plants described.

Gruß (1997) and Cribb (1997) consider *P. richardianum* and *P. lynnianae* to be varieties of *P. lowii*. Koopowitz, in his 1995 checklist, also considered *P. richardianum* as a variety of *P. lowii*, but considers it as an autonomous species in his 2012 (and 2018) checklist. The differences among *P. richardianum*, *P. lynnianae*, and *P. lowii* are at least as important as those, for example, between *P. hookerae* and *P. volonteatum* or between *P. praestans* and *P. wilhelminiae*. We, therefore, treat *P. lynnianae* and *P. richardianum* as separate species in this book.



PART OF AN INFLORESCENCE OF *PAPHIOPEDILUM LOWII*
WATERCOLOUR PAINTING BY HERVINA DYAH APRILIA
COURTESY OF HERVINA DYAH APRILIA

PAPHIOPEDILUM LOWII

(LINDLEY) STEIN

STEIN'S ORCHIDEENBUCH, 476 (1892)

BASIONYM

Cypripedium lowei (sic.) Lindley

THE GARDENERS' CHRONICLE, 1st series, 7: 765 (1847)

SYNONYMS

Cypripedium cruciforme Zollinger & Morren

De Vriese, ILLUSTRATIONS D'ORCHIDEES DES INDES ORIENTALES NEERLANDAISES, t. 4 (1854)

Cordula lowiana (Lindley) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

ETYMOLOGY

Named *lowii* in honour of Sir Hugh Low (1824-1905), British colonial administrator and naturalist.

DISCUSSION

The first plants of *Paphiopedilum lowii* were discovered by Hugh Low, a British Colonial Civil Servant, who sent plant material to the nursery of his father in upper Clapton (London). The plants were collected on an expedition to Mount Kinabalu in northern Borneo. Low reported finding the plants as epiphytes in leafy debris "growing high up in the branches and forks of tall trees in thick jungle". A plant in the collection of Archibald Kenrick Esq. of West Bromwich, a customer of the Low nursery, was the first to flower, and was used by John Lindley to describe the species in honour of its discoverer. The site of the original habitat on the Pinosok Plateau was destroyed in 1984 when a large area was removed from the Kinabalu Park to allow exploitation.

DESCRIPTION

Paphiopedilum lowii is an herbaceous plant that usually grows in leafy debris. Leaves are uniformly green, sub-erect, strap-shaped, obtuse, leathery, somewhat serrated at the margins, and folded at the base; their upper surface is somewhat grooved, and the underside is distinctly keeled. Leaves are up to 40 cm long by about 5.5 cm wide. The first and last leaves of a growth are markedly smaller than the others. The leaf tip is unequally two-lobed with a blunt, variably shaped, apical tooth. The flower scape is up to 1 m tall, erect, bright green to brownish-purple, and densely hirsute. It carries about six flowers, rarely even more. The floral bracts cover 1/3 to 1/2 of the 6.5 to 8.0 cm long ovary, which is yellowish-green to purple and distinctly hirsute. Flowers have a natural spread of up to 16 cm, and they are usually up to about 9 cm high. The dorsal sepal is about 4.5 cm long by 3.5 cm wide, broadly ovate, and shortly pointed. The edges of the

basal half are reflexed, and the upper part is concave and curves forward. The yellow to chartreuse-green colour is suffused at the base with more or less intense brown and radiating brown streaks that extend from the base to the dorsal half. The synsepal is about as long as the dorsal sepal but somewhat narrower. It is concave, stands away from the lip, occasionally has a double apex, and sometimes is distinctly divided into two separate lateral sepals. The petals, which are 6 to 9 cm long by about 1.5 to 3 cm wide, are spatulate, extend sideways with a slight downward curve, and are twisted so the front surface faces upward in the apical half. The basal part of the petals is yellowish-green, marked with brown spots that are sometimes eye-shaped. The broader, apical end is violet to rose. The lip, which stands at a 90 degree angle to the ovary, is distinctly saccate, up to 6 cm long by about 3 cm wide at the mouth. It is greenish-brown to dark brown, usually with clearly visible darker veins. The lateral lobes are folded inward, forming a tube. They are lighter in colour and spotted brown. The staminodal shield is an inverted heart-shape, convex, and bordered with purple hairs. There is a small, erect, hairy horn at the base, and a blunt tooth in the sinus of the apical edge. The shield is about 1 cm long by 7 mm wide, cream-coloured to yellow and is suffused with brown from the lower areas to the centre.



PAPHIOPEDILUM LOWII

COURTESY OF DOROTHY POTTER BARNETT



PAPHIOPEDILUM LOWII FMA. AUREUM
COURTESY OF DOROTHY POTTER BARNETT

DISTRIBUTION AND HABITAT

Paphiopedilum lowii is found in Sumatra, the Malay Peninsula, Borneo, Java, and Sulawesi. It usually grows as an epiphyte on trees in thick moss and pockets of leaf litter. It occasionally grows on boulders or cliff faces with the roots buried in moss or humus-filled pockets. Plants grow near water or in areas with heavy rainfall, and they are usually found in bright locations, frequently in full sun for part of the day. They normally grow at 700 to 1,400 m, but they are reported from as low as 250 m and as high as 1,600 m.

FLOWERING

Plants of *Paphiopedilum lowii* have been reported to flower all year round. The peak season, however, is from February through May.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan, 1947; Duncan & MacLeod, 1949; Tanaka & Aoyama, 1974).

VARIETIES AND FORMS

PAPHIOPEDILUM LOWII FORMA AUREUM
(CRIBB) CRIBB

SLIPPER ORCHIDS OF BORNEO, 73 (1997)

This form was described on the basis of a plant with pure yellow flowers. Plants of this colour form are said to have been collected twice from the upper Rajang River (Bakun area) in Sarawak, Borneo. Although Cribb (*loc. cit.*) states that the distribution of this colour form is limited to Sarawak, there is no reason to rule out the possibility of colour variants in *P. lowii* populations from other habitats.

PAPHIOPEDILUM LYNNIAE

GARAY

LINDLEYANA, 11(4): 232-233 (1996)

SYNONYM

Paphiopedilum lowii var. *lynniae* (Garay) Gruß & Röth

DIE ORCHIDEE, 48(2): 72 (1997)

ETYMOLOGY

Named *lynniae* in honour of Mrs. Lynn Wellenstein (1953-), an orchid grower from New York, USA.

DISCUSSION

Paphiopedilum lynniae differs from *P. lowii* by its inflorescence, bracts, ovary, and flowers all being glabrous and by having a double-keeled synsepal and flowers that are somewhat smaller than those of *P. lowii*. Notwithstanding those differences, we do not hesitate to state that this taxon could also be considered a variety of *P. lowii*, as illustrated by the fact that the corresponding transfer to the varietal status was published by Gruß and Röth (*loc. cit.*)

DESCRIPTION

Paphiopedilum lynniae is a relatively large herbaceous perennial. The leaves of the specimen used for the description were 35 cm long by 4 cm wide. Five to seven linear-oblong to oblong-elliptic leaves develop on each fanlike growth. The inflorescence is up to 50 cm long, purple, smooth or hairless, and may be erect or curved. Usually, two or three showy flowers are carried on each inflorescence. The olive-brown floral bracts are somewhat flattened or compressed, keeled on the back side, and about 2.5 cm long. They partially cover the smooth, hairless, spindle-shaped ovaries, which are about 6 cm long by 6 mm wide. The flowers are about 10 to 12 cm from top to bottom and approximately the same size across. The egg-shaped, yellow-green dorsal sepal is heavily marked with dark maroon veins consisting of thickened, disconnected spots at the base. The dorsal sepal is about 4.2 cm long by 3.5 cm wide with a rounded or shortly pointed apex. It is reflexed along the edges of the basal half and the upper part is concave and curves forward with a fairly sharp keel on the back side. The ovate synsepal, which is coloured the same as the dorsal sepal, is about 4 cm long by 2.4 cm wide and rounded at the apex. The linear-oblong petals are about 9 cm long by 1.3 to 1.7 cm wide. Petal margins are curved backward at the base but are widely spread and somewhat undulating on the apical half. Petals are held in a horizontal position at the base, but soon curve gradually downward so that the tips are held in an almost vertical position. The lower two-thirds of each petal is yellow-green, marked with rather large, dark maroon spots. The apical one-third is coloured violet-rose. The fleshy lip, which is up to 4.6 cm long by 2.6 cm wide, is yellow-green and suffused with light brown. The staminodal shield is triangular, smooth, three-lobed, and about 1.6 cm long by 9 mm wide.

DISTRIBUTION AND HABITAT

Paphiopedilum lynniae was discovered in a shipment from Borneo. We have no further information about the natural habitat.

FLOWERING

Paphiopedilum lynniae flowers in cultivation from January through April.



PAPHIOPEDILUM LYNNIAE
COURTESY OF ROBERT C. WELLENSTEIN

PAPHIOPEDILUM RICHARDIANUM

ASHER & BEAMAN

ORCHID DIGEST, 52(2): 61-62 (1988)

SYNONYM

Paphiopedilum lowii var. *richardianum* Gräß

DIE ORCHIDEE, 45 (5), Back of cover (1994)

ETYMOLOGY

Named *richardianum* for Richard Topper, an orchid grower from North Carolina, U.S.A.

DISCUSSION

As is the case with *Paphiopedilum lynniae*, *P. richardianum* could easily be regarded as a variety of *P. lowii* and was, in fact, transferred as such by Olaf Gräß (*loc. cit.*). Nevertheless, there are more or less distinct differences: the flowers of *P. richardianum* are distinctly smaller than those of *P. lowii* and the petals are pendent. Furthermore, the pouch of *P. richardianum* is pointed and has very deep marginal sinuses.

DESCRIPTION

Paphiopedilum richardianum is a perennial herb with up to five leaves per growth. Leaves are linear-oblong, conduplicate, carinate, dark green above, lighter green below, coriaceous, and clearly distichous. They emerge vertically but become more horizontal with age and grow to about 24 cm long by 2.6 to 4.0 cm wide. At maturity, the natural leaf span from tip to tip is 10 to 20 cm. The peduncle is terete, about 4 mm in diameter, uniformly purple-brown, covered with short white hairs, and carries one to five flowers. The floral bract, which is suffused and striped with purple-brown over the basal two-thirds, is yellow-green apically, about 2 cm long by 1.1 cm wide from midvein to margin. It is ovate and strongly folded to surround the pedicel. The ovary is about 3 cm long by 4 mm wide, has a circular cross section, and is covered with purple-brown hairs. Flowers are 10 to 12 cm across, which is distinctly smaller than the flower of a typical *P. lowii*. The dorsal sepal is about 5.5 cm long by 3.5 cm wide, elliptic, obtuse, concave, and is not reflexed but arches forward over the opening of the labellum. The colour of the dorsal sepal is yellow-green, but the basal two-thirds are edged in dark purple-brown. The prominently keeled back of the dorsal sepal is purple-brown along the mid-vein and covered with purple-brown hairs. The front is glabrous and striped with darker green. The synsepal is about 5 cm long by 2.5 cm wide, ovate, and concave, with two prominent keels on the back. The base colour is very pale yellow-green to whitish with indistinct, darker green veins. The synsepal has a purple-brown margin on the basal two-thirds, and on the back, the basal one-third of each keel is lined with darker purple-brown. It is pubescent on the back and glabrous on the front. Petals are horizontal at the base but immediately become pendent and twisted. The upper surface has two or three prominent spots, and the lower surface has about twenty smaller spots

in the basal one-third. Petals are about 9 cm long by 1.3 cm wide, then tapering to a more or less blunt apex. The colour is light yellow-green on the basal one-third, fading to a lighter yellow toward the tip. The apical two-thirds have purple-brown, sparsely ciliate margins. The cilia are more abundant on the basal one-third. The labellum, which stands at a 90 degree angle to the ovary, is about 5.6 cm long by 3.7 cm wide, with a broad, deeply V-shaped marginal sinus in front. The basal edges of the lip are smooth, involute, and enclose the stigma. The labellum is very light yellow-green at the base, grading to a darker shade of yellow-green at the apex, and suffused with purple-brown around the front edge. The staminode is obcordate, and measures about 1.3 cm long, 2 mm wide at the base, and 9 mm wide about 5 mm above the apex, with a small (0.5 mm) umbo above and a sharp 1 mm corniculate protuberance below. It is three-toothed at the apex, and the lateral teeth are curved inward.

DISTRIBUTION AND HABITAT

Paphiopedilum richardianum originates in Sulawesi. It was discovered near Palu Bay and the town of Palu on the northwest coast of the island. Plants were growing at 1,100 to 1,200 m in open grassland, where they received almost full sun throughout the day. Rainfall in the area where the plants were collected is reported to be about 254 cm per year.

FLOWERING

Flowering plants of *P. richardianum* have been reported from January, May, and November indicating that this species can bloom all year round.



PAPHIOPEDILUM RICHARDIANUM
COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)



PAPHIOPEDILUM PARISHII

COURTESY OF JERRY LEE FISHER (ORCHIDS LIMITED)

THE PAPHIOPEDILUM PARISHII COMPLEX

In this complex, three taxa have been described at the species level: *Paphiopedilum parishii*, which was originally described in 1869 by the younger Reichenbach, *P. dianthum*, which was published in 1940 by Tang & Wang, and *P. aranianum*, published in 2009 by Aree Petchleung (Huang Rong Shu).

Paphiopedilum aranianum is identical with *P. dianthum*. The plants of *P. dianthum* differ from those of *P. parishii* by having slightly larger flowers, a perianth which is deeper green and brightly shiny, a distinctly conical lip, and glabrous ovaries. Furthermore, *P. dianthum* has an upright inflorescence of 2-5 flowers, while *P. parishii* seems to have an arched inflorescence of 8-10 flowers, and the two taxa have clearly different karyotypes (Karasawa, 1982b). This strongly supports maintaining both taxa at the species level, and although the Royal Horticultural Society considers the two to be identical for registration purposes, *P. dianthum* is now generally considered to be autonomous.

PAPHIOPEDILUM PARISHII

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 479 (1892)

BASIONYM

Cypripedium parishii Reichenbach fil.

FLORA, 52: 322 (1869)

SYNONYMS

Selenipedium parishii E. André

L' ILLUSTRATION HORTICOLE, 22: 122-123, t. 214 (1875)

Cordula parishii (Reichenbach fil.) Rolfe

ORCHID REVIEW, 20 (1): 2 (1912)

ETYMOLOGY

This species was named *parishii* in honour of the Reverend Charles Samuel Pollock Parish (1822-1897), an Anglican missionary who worked in Myanmar.

DISCUSSION

Credit for the discovery of this species belongs to the Reverend C. Parish, who found the plants growing as epiphytes on decaying fibrous roots of the fern *Drynaria quercifolia* in the Moulmein District of Myanmar in 1859. The first plants reached England in 1868 in a consignment imported by the nursery of Low of Clapton.

It would be difficult to mistake *Paphiopedilum parishii* for any other species within the genus (except *P. dianthum*). It is closely allied to *P. haynaldianum*, *P. lowii*, *P. lynnianae*, and *P. richardianum*, but it is readily differentiated from these taxa by flower colour and morphology, especially by the tapered and twisted petals.

As with most of the Reverend Parish's discoveries, it was described by the younger Reichenbach (*loc. cit.*).

DESCRIPTION

Paphiopedilum parishii is an herbaceous perennial. Leaves are oblong-ligulate, up to 40 cm long by 6.5 cm wide, two-lobed or bifid at the apex, and bright, glossy green. The erect inflorescence is up to 60 cm tall, stout, bright green, and downy. It usually bears four to eight flowers. The bracts are about 4 cm long, ovate, acute, inflated, and cover the hairy ovaries for about 3/4 of their length. The flowers are up to 17.5 cm high and 12 cm across. The dorsal sepal is 3 to 5 cm long and up to 2.5 cm wide, elliptic-oblong, acute, and keeled on the back. The upper half is bent forward and the lateral margins are revolute at the base. It is pale yellow with green veins. The synsepal is similar to the dorsal sepal but is smaller and double-keeled. The petals are linear, twisted, about

12.5 cm long by 1.2 cm wide. They spread horizontally at the base, but quickly curve downward to become quite pendulous. The basal half is green with a few scattered near-black spots and undulate margins. The distal half is near-black-purple with a pale margin. The lip, which is shaped like an inverted helmet and has a large mouth, is up to 4.5 cm long. It is deep green suffused with brownish-purple. The narrow lateral lobes are smooth, folded inward, deep green, and often stained with brownish-purple. The staminodal shield is obovate-oblong with a sinus in the broader front edge and a prominent tooth at the base. It is pale yellow with green mottling.

DISTRIBUTION AND HABITAT

Paphiopedilum parishii grows in the Shan Plateau region of Myanmar and the mountains of neighbouring western and northern Thailand at 1,250 to 1,400 m and has also been reported from southwest Yunnan, China. It is usually found on east-facing slopes where conditions are shady and light is low. It normally grows as an epiphyte in the middle or lower branches of trees, 3 to 5 m above the ground, but plants are sometimes found growing in thick moss on boulders or fern roots.

FLOWERING

Plants of *Paphiopedilum parishii* have been reported to flower nearly all year round. The main flowering season, however, extends from May through July.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan, 1947; Duncan & MacLeod, 1949; Kamemoto *et al.*, 1963; Karasawa, 1979).

VARIETIES AND FORMS

Some years ago, a photograph of a plant of *Paphiopedilum parishii* with broad, untwisted petals was making its rounds among the "*Paphiopedilum* community". In the meantime, we have been able to trace the former owners of the plant who informed us that it since transferred to orchid heaven.



PAPHIOPEDILUM DIANTHUM
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC

PAPHIOPEDILUM DIANTHUM

TANG & WANG

BULLETIN OF THE FAN MEMORIAL INSTITUTE OF BIOLOGY, PEIPING,
BIOLOGICAL SERIES, 10: 24 (1940)

SYNONYMS

Paphiopedilum parishii var. *dianthum* (Tang & Wang) Karasawa & Saito
BULLETIN OF THE HIROSHIMA BOTANICAL GARDEN, No. 5: 1-69 (1982)

Paphiopedilum aranianum Petchleung
DIE ORCHIDEE, 60(4): 436-437 (2009)

ETYMOLOGY

Named *dianthum* which - we assume - is derived from the Greek words *di* (two) and *ánthos* (flower), as an indication that *P. dianthum* was believed to have rarely more than two flowers whereas *P. parishii* usually produces 6 to 8 blooms. However, plants of *P. dianthum* with up to five flowers are known.

DISCUSSION

Paphiopedilum dianthum is very closely related to *P. parishii*. It differs, however, from the latter by having an erect inflorescence with few, widely spaced flowers that are slightly larger than those of *P. parishii*. *P. dianthum* further differs from that species by a papillose peduncle, rhachis and bracts, a glabrous ovary, less heavily spotted petals, a white-margined dorsal sepal, a larger labellum, and a distinct geographical distribution.

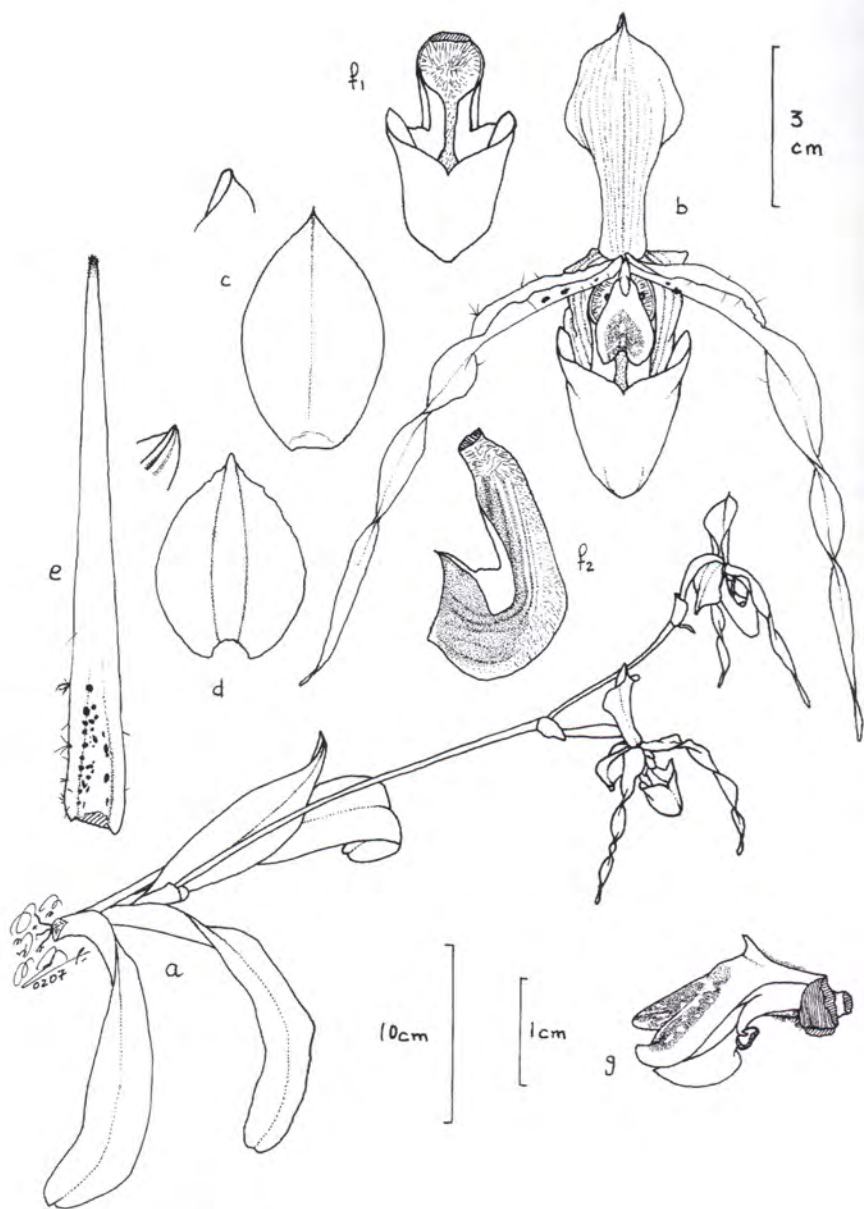
This species was originally described in 1940 on the basis of dried herbarium materials collected by C. W. Wang at Mengtze in Yunnan and a specimen from Chinghsi (Tsingsi Hsien), Guangxi Province in southwest China. The Kew herbarium harbours a specimen collected by W. Hancock in 1894 at Mengtze, and this may well be the earliest specimen of this species collected for science.

Paphiopedilum dianthum is by no means rare in the wild. Cribb (1997) reports having visited localities with populations of "several hundred plants" and "substantial colonies extending over up to 600 square meters".

The plants grow on rock ledges or in cracks and crevices, their roots invariably embedded in leaf litter.

DESCRIPTION

Paphiopedilum dianthum is an herbaceous perennial. It forms clumps of few to several growths. The roots are elongate and pubescent. The stems are short and generate up to six leaves which are often curved upward. They are coriaceous, ligulate, obliquely obtuse at the tip and 20 to 50 cm long by 2 to 5 cm wide, the upper surface dark green, the under surface paler green. There is no mottling. The inflorescence is erect, gener-



PAPHIOPEDILUM DIANTHUM
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON



PAPHIOPEDILUM DIANTHUM

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

ally bearing 2, rarely up to 5 flowers. The peduncle is green, terete, papillose near the base, glabrous near the top. The floral bracts are green and up to 3 cm long, cucullate, elliptic, truncate. The pedicel and ovary are green and glabrous. The flowers are very slightly papillose on the outside of the sepals. The dorsal sepal is white with a green base and green venation, obovate, apiculate, 3.8 to 4.5 cm long by 2.2 to 2.5 cm wide. Its basal margins are reflexed, the apical ones inflexed. The synsepal is white or pale green with darker green venation, ovate and obtuse, 3.5 to 4.0 cm long by about 2.5 cm wide, the margins inflexed apically and reflexed near the base. The petals are greenish-yellow with darker green venation in their lower half, flushed with brownish-purple above. They are falcate, pendent, linear-tapering with a rounded apex, 8 to 9.5 cm long by about 1 cm wide. The basal part of the petals is curved inward over the base of the column. The petals are ornamented with a few raised warts on the inside toward the base and a few hairs marginally. They are, however, not ciliate. Their inner surface is papillose near the base and near the apex. The lip is greenish-yellow flushed with purple and brown, deeply saccate, the apex pointed, overall 4 to 4.5 cm long by 2 to 2.5 cm wide. The sidelobes are triangular and curved to the inside forming a tube. The staminodal shield is whitish with dark green venation, obcordate, with a blunt basal umbo and a two-lobed apex, 9 to 11 mm long by about 7 mm wide, the side margins scarcely papillose.

DISTRIBUTION AND HABITAT

Paphiopedilum dianthum grows on limestone cliffs in southwest China from southern Yunnan Province near Mengtze eastward to western Guangxi Province. Cribb (1987) indicates that plants usually grow on rocky limestone bluffs at 1,800 to 2,100 m. In his 1998 version, Cribb adds that Mark reported plants of *P. dianthum* at 545 m. Fowlie (1992) reported from his habitat visits that plants are found at 1,280 to 1,520 m. It may well be concluded that depending on the geographical and climatological habitat conditions, plants grow at elevations between about 500 and 2,100 metres.

Averyanov *et al.* (2003) also report *P. dianthum* from northern Vietnam (Cao Bang, Ha Giang, Hoa Binh, Lai Chau, Lao Cai and Son La Provinces) where the plants grow at elevations of 600 to 1,450 m in wet mixed forests. The plants root in the humus that collects in the eroded holes of the crystalline limestone rock formations.

Recently, *Paphiopedilum dianthum* has also been reported from northern Laos.

FLOWERING

Paphiopedilum dianthum flowers from September through December in the wild.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa, 1982).

VARIETIES AND FORMS

PAPHIOPEDILUM DIANTHUM FORMA *ALBUM*

HORT EX GRUSS

DIE ORCHIDEE, 54(1): 63 (2003)

The flower is pure green and white without any trace of anthocyanin pigmentation. [again, a misuse of the designation "*album*".]



PAPHIOPEDILUM DIANTHUM FMA. *ALBUM*

COURTESY OF JERRY LEE FISHER (ORCHIDS LIMITED)



PAPHIOPEDILUM ADDUCTUM VAR. *ANITUM*
COURTESY OF DR. J. CIEZKI

PAPHIOPEDILUM ADDUCTUM

ASHER

ORCHID DIGEST, 47(6): 213-236 (1983)

ETYMOLOGY

Named *adductum* for the connection of the staminodal shield to its strap-like support.

DISCUSSION

In 1979, the late Dr. Jack Fowlie's attention was drawn to a slipper orchid in the Ray Rands collection. The plants were ostensibly sent by Mrs. Urban from Palawan Island in the Philippines. Fowlie (1980) wrote that there is "no doubt whatsoever that we are dealing with the real *Paphiopedilum elliotianum* (O'Brien) Fowl., lost these many years". This interpretation was initially supported by J. Asher Jr. (Asher, 1980a). Asher later reconsidered, however, and came to the conclusion that the plants in question represented an autonomous species new to science (Asher, 1983). (See also *P. rothschildianum*.)

In the meantime, it has become evident that the original habitat information was misleading and that the plants originate from the Philippine island of Mindanao.

DESCRIPTION

Paphiopedilum adductum is an herbaceous perennial generally growing in leafy humus. Each growth carries about six leaves, which are oblong-ligulate to slightly oblanceolate or lanceolate, distichous, emerging vertically but becoming horizontal with age, and measure up to 25 cm long by about 3.7 to 4.5 cm wide. They have margins that are narrowly hyaline, eciliate, and slightly uneven, with apices that are equal or sub-equal, obtuse, and notched. Leaves have a prominent midvein that frequently extends to the apex. They are canaliculate and dark green above, but are keeled and lighter green on the under surface. The inflorescence is terete, up to 40 cm tall by about 3 mm in diameter, uniformly purple-brown or purple-brown with short yellow streaks, and pilose with short purple hairs, which are about 1 mm long. It is generally two-flowered but sometimes more blooms are produced. Floral bracts are 3 to 4 cm long by 0.6 to 1.3 cm wide. They are lanceolate, purplish to greenish at the apex, green suffused with purple-brown near the base, and marked with darker purple-brown veins. The ovary is 3.5 to 4.5 cm long by 6 to 10 mm in diameter and broadly obovate in cross section, green, suffused with light purple-brown and with six darker purple-brown stripes, which are up to 2 mm wide. The dorsal sepal is 5.0 to 6.5 cm long by about 3 cm wide, ovate, acuminate, concave, and arches forward over the labellum, with a prominent keel on the backside. It is light green at the base, becoming darker green in the distal three-quarters, glabrous on the outside, and has irregular nectar droplets on the exterior of the apical two-thirds. The basal quarter on the inside is pilose with short purple hairs, and both the inside and outside are variably striped with purple veins, which are 1.5 mm wide. The synsepal, which is often slightly longer than the dorsal sepal, is 5 to 7 cm long by

2.3 to 3.0 cm wide. It is ovate, acuminate, moderately concave at the base, and strongly concave in the apical half. It is similar in colour to the dorsal sepal, and the inside is sparsely pilose. The mid-vein from the fused lateral sepals is apparent but not keeled. Petals are 8 to 15 cm long by 7 to 8 mm wide at the base, tapering to about 2 mm wide at the apex. They curve downward and are mostly glabrous, but the apical part is covered with short, dark, glandular hairs, which are denser adaxially. The basal quarter is light green with purple-brown spots of variable size and shape, which become larger and less distinct toward the apex. The apical three-quarters is suffused with purple and variably striped with fine purple veins, some of which extend over the entire length of the petals. The labellum is shaped like an inverted helmet and juts forward. It is nearly perpendicular to the ovary. The lip is 3.6 to 4.8 cm long by 1.5 to 2.2 cm wide and does not have lateral, ear-like projections. The basal edges, which are rolled inward, are sparsely pilose externally in the region near the pollinia. The bottom of the lip is grooved along the distal half. The lip is light green on the sides and base, and the reticulate upper distal portion is purplish-brown. The interior of the labellum has small purple spots, which become larger and less distinct distally. The staminode, which is a stalked rectangular shield, is T-shaped in cross section. The shield is about 9 mm long by 4 to 7 mm wide, densely hirsute laterally, and glabrous in the centre.

DISTRIBUTION AND HABITAT

Paphiopedilum adductum grows in the Philippines at about 1,300 m near Impasugong in Bukidnon Province, which is in the north-central section of Mindanao Island.

FLOWERING

Paphiopedilum adductum flowers all year round. There must be several growths behind the lead growth for the plants to bloom freely.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa & Aoyama, 1980 [as *P. elliottianum*]).

VARIETIES AND FORMS

PAPHIOPEDILUM ADDUCTUM VAR. ANITUM

(GOLAMCO) KOPOWITZ

ORCHID DIGEST, 64: 157 (2000)

SYNONYM

Paphiopedilum anitum Golamco

WALING WALING REVIEW, 6(2): 9-14 (1998)

ETYMOLOGY

According to Golamco, it was named *anitum* in reference to an entity in Philippine mythology. The explication in the original publication is vague and rather inconclusive.

DISCUSSION

Andres S. Golamco Jr., a Philippine orchid trader, described the taxon as an autonomous species in the journal of the Philippine Orchid Society (*loc. cit.*). He differentiates between *P. adductum* and *P. anitum* by a number of more or less distinct characteristics all in respect to the habitat conditions, flower colour and size, and flowering season. The differences in location (eastern Mindanao vs. northern Mindanao), elevation (220 to 1,000 m vs. 1,250 to 1,350 m), and habitat condition ("very shady with trees 40 to 60 ft tall on heavy [sic] rock formations and on banks topped with leaf, twig and bark detritus mulch" vs. "medium bright, grassy area with short trees 20 to 25 ft tall on fine river rock & sand mixed with humus and plant mulch") are hardly fit to warrant the differentiation between two autonomous species. Neither are the differences in humidity (80 to 100 % versus 75 to 80 %), nor the blooming season (April to September vs. all year round). The plants designated as *P. anitum* are much larger than those designated as *P. adductum*, both in respect to the vegetative parts (leaves) as well as in respect to the generative sections (inflorescence, flowers). This again, is by itself not a differentiating marker that can be used at the species level within the genus *Paphiopedilum*. Neither is the number of flowers produced, as that feature very much depends on habitat or culture aspects. What we are left with is a distinct difference in the colour of the flower and some very subjective differences in the shape of some of the flower parts. Much has been said about flower colour and there is no dissent in viewing this characteristic as variable to extremely variable in nearly all species within the genus and in many other plants within the orchid family. Thus the flower colour of *P. anitum* in comparison to the colour seen in *P. adductum*, as such, does not warrant its treatment as a separate species. And the same must be said for the slight differences that may possibly be extrapolated from the shape of the parts of the corolla and of the staminode.

Golamco writes that *P. anitum* was originally identified by Danilo A. Tiu, a Philippine orchid specialist, as *P. adductum* subspecies *anitum*, but we cannot find any trace of a corresponding publication.

DESCRIPTION

Paphiopedilum adductum var. *anitum* is an herbaceous perennial growing in leafy detritus on the forest floor or in humus-filled pockets and crevices of rocks. The roots are long and fleshy. Each growth generates 7 to 10 erect to sub-erect leaves. The leaves are coriaceous, oblong to oblanceolate, acute to obtuse, and finely tridenticulate at the apex. Generally, they are up to 75 cm long by 5 to 10 cm wide. The upper surface is deep olive-green, indistinctly mottled with very dark bluishgreen. The under surface is light bluish-green to pale green. The inflorescence is 60 to 150 cm long, upright and bears 3 to 7 flowers. Occasionally, there is a leafy bract about one third of the way up from the base. The flower bract is 5 to 6 cm long by 3.0 to 3.5 cm wide. It is olive-green to ochre, flushed and/or veined with near-black-brown or red-mahogany and finely pubescent. The flower is large, much longer than wide, 20 to 30 cm high by 5 to 12 cm wide. The dorsal sepal is 6.0 to 7.5 cm long by 4.0 to 5.5 cm wide. It stands hood-like over the aperture of the pouch. Its upper one-third is yellow-green to yellow-orange. The lower

two-thirds of the dorsal are longitudinally striped with very dark brown (near-black) whereby the stripes are fused to an almost solid area of near-black. The lateral sepals are fused to a synsepal. The synsepal is shaped like the dorsal but it is slightly smaller. It is 4 to 7 cm long by 4 to 5.3 cm wide. The synsepal is yellow-green to yellow-orange striped with a very dark maroon. The petals are arcuate toward the apex, sometimes crossing below the pouch. The petals are linear, narrowly tapered toward the apex, up to 18 cm long by 1.0 to 1.5 cm wide, papillose near the apex, cream-yellow, yellow-green or yellow-orange marked with reddish-mahogany gradually darkening to a near-black mahogany toward the tip. The lip is porrect. The pouch is shaped like an inverted helmet. It has short auricles and a groove at the apex. The lip is 4.5 to 5 cm long by 3 to 4 cm wide, cream to pale yellow or golden yellow, suffused with mahogany-red. The staminodal shield is rectangular. The base is flat with a groove at the centre. The squarish apex is split at the centre, the two apices often, but by no means always overlapping. All around, the margins of the staminodal shield are occupied by glandular hairs. The profile of the staminode is V-shaped, and the staminodal stalk does not cover the stigma. The staminodal shield is 9 to 12 mm long by 6 to 9 mm wide.

DISTRIBUTION AND HABITAT

Paphiopedilum adductum var. *anatum* is found on eastern Mindanao Island somewhat south of Surigao at 220 to 1,000 m. The holotype was collected at 600 m. Plants grow in deep shade where the rainforest canopy is 12 to 18 m above the ground. Much of the forest floor is exposed bedrock covered with a deep layer of leaves, bark, twigs, and other plant debris. The population from which the holotype was taken consisted of "a few thousand" plants.

FLOWERING

In their natural habitat, the plants flower from April through September.

PAPHIOPEDILUM GIGANTIFOLIUM

BRAEM, BAKER & BAKER

ORCHIDÉES, CULTURE ET PROTECTION, NO. 30: 5-12 (1997)

SYNONYM

Paphiopedilum ayubii hort. ex Parnata

AUSTRALIAN ORCHID REVIEW, 62 (4): 9-10 (1997), *nomen illegitimum*

ETYMOLOGY

Named *gigantifolium* in reference to the extraordinary size of the leaves.

DISCUSSION

Paphiopedilum gigantifolium reached the European market in the spring of 1997 in an importation from Sulawesi Island. The plants were allegedly collected in January of that year. The species was published by Braem, Baker & Baker in the French journal ORCHIDÉES, CULTURE ET PROTECTION on May 14th 1997. In August of that year, Ayub Parnata, a Bandung, Java, based nurseryman, published an article in the AUSTRALIAN ORCHID REVIEW proposing his name for the species. Cribb (1997) suggests that the original publication by Braem, Baker & Baker is invalid because "their Latin diagnosis is inadequate to validate the name". Such a statement is pure nonsense. The publication abides by all pertinent rules and delineation of the Code, and the Latin diagnosis, although admittedly not elaborate, is quite adequate to fulfill the requirements set by that Code. The later Australian publication, on the other hand, lacks several aspects of a valid publication (no Latin diagnosis [still required at the time], no type designation), and must therefore be treated as a horticultural mention without taxonomic importance.

Paphiopedilum gigantifolium is closely related to *P. supardii* and *P. rothschildianum*, but *P. gigantifolium* is characterised by the enormous dimensions of the adult leaves. In addition, it is unique in a number of floral characteristics, especially the curiously reflexed petals, the position of the dorsal sepal, and the morphology of the staminode and staminodal shield, and the white ovary which it shares only with *P. sanderianum*.

DESCRIPTION

Paphiopedilum gigantifolium is an herbaceous plant which grows in leaf litter on the floor of the forest. Leaves appear uniformly green, as is characteristic for all species within the subgenus, but show a slight mottling when held against the light. They are up to 60 cm long by about 8 cm wide, fleshy, and rigid, with obtuse apices. The inflorescence is about 60 cm long, terete, about 9 mm in diameter, green, and densely covered with reddish-brown hairs. The floral bracts are large, about 6.5 cm long, green, and distinctly folded, with each side about 2.2 cm wide. Except for the apex, they are densely covered with reddish-brown hairs. The ovary is white. The type specimen carried five flowers, and at the time of description, four were open and one was in bud.



PAPHIOPEDILUM GIGANTIFOLIUM
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC



PART OF AN INFLORESCENCE OF *PAPHIOPEDILUM GIGANTIFOLIUM*
WATERCOLOUR PAINTING BY FARADINA ELMAHDA
COURTESY OF FARADINA ELMAHDA

Since the original description, there have been reports of fourteen flowers on a single inflorescence. It may be assumed that well-established and well cultivated plants will bear more flowers. The flowers are up to 6 cm across by about 6 cm high and 8.5 cm deep. Those on more established and well-grown plants may turn out to be somewhat larger. The extreme depth of the flower results from the distinct reflexing of the petals and the position of the dorsal sepal, which stands at an angle of only 55 degrees to the pouch and thus protects the aperture. The dorsal sepal is ovate, acuminate, 4.8 cm long by 2.4 cm wide, and is green with prominent purple veins on the basal one-third to one-half. The veins are much more distinct on the inside than on the outside. The outer surface is densely covered by dark reddish-brown bristles. The synsepal is narrowly ovate, acuminate, and 4.3 cm long by 1.9 cm wide. It is green, with two major purple veins that extend for about one-third of the length. The veins are most visible on the glabrous inside. The outer surface is densely covered with dark reddish-brown bristles. Petals are elongate-subulate, up to 8 cm long by about 1.1 cm wide near the base, and taper to a more or less blunt apex. They are twisted toward the apex and reflexed at about 55 degrees to the pouch. Petals are yellowish-green covered with multiple, irregular, reddish-brown spots that are largest along the longitudinal middle. In addition, there are a few small tufts of reddish-brown bristles on the upper edge near the base. The labellum is 5.4 cm long. The infolded upper part of the lip is 3 cm long by 0.8 cm wide at the base. The yellowish-green lower part is transformed into a pouch, which is up to 2.4 cm long by about 2.3 cm wide. The pouch and about 1 cm of the infolded upper part are suffused with reddish-brown. The outside is glabrous. The inside is equally glabrous with the exception of the bottom and back where there are some small excrescences. The infolded margins of the upper part of the labellum extend 4 mm into the pouch. The upper margin of the pouch is not indented. The back of the pouch, however, shows an extraordinarily large indentation at the apex. The complex staminode is 2.6 cm long by 1.4 cm wide and 1.2 cm deep. The shield of the staminode is 1.7 cm long by 1.4 cm wide and 0.6 cm deep. Its front part is more or less rectangular, the upper part is rounded, and the glabrous lower margin has a broad isthmus. The staminode is yellowish-white, with a reddish-brown hue near the sides, which are indented and covered with brown bristles.

DISTRIBUTION AND HABITAT

Paphiopedilum gigantifolium was discovered in the northern part of the Indonesian island of Sulawesi, in the vicinity of Donggala. Plants grow in shaded conditions in steep ravines at 700 m. They are always found in the vicinity of running water.

FLOWERING

Paphiopedilum gigantifolium generally blooms from April through July.

PAPHIOPEDILUM INTANIAE

CAVESTRO

RHÔNE ALPES ORCHIDÉES, 25: 2-9 (2000)

ETYMOLOGY

Paphiopedilum intaniae was named in reference to Intan, the daughter of Pak Ayub also known as Ayub S. Parnata, a well-known orchid grower of Indonesia.

DISCUSSION

Paphiopedilum intaniae was discovered in the limestone hills near Gunong Morowali, in the eastern part of Sulawesi in February of 2000.

DESCRIPTION

Paphiopedilum intaniae is an herbaceous perennial. The stem is short, erect, and bears between four and seven coriaceous leaves that are linear, obtuse at the apex, plain green without any tessellation, and up to about 40 cm long by 4.5 to 6 cm wide. The inflorescence is erect, terete, covered with brown bristles, 35 to 50 cm tall. It bears 3 to 8 flowers that are enveloped by large brown floral bracts. These bracts are covered with brown bristles and show maroon venation. They are about 2.5 cm long by 0.8 to 1 cm wide. The ovary is dark maroon, densely covered by short hairs, about 2.5 cm long by 0.6 cm wide. The pedicel is arched, about 1.1 cm long, maroon brown, and covered with hairs. The flowers are 10 to 12 cm across. The dorsal sepal and the synsepal are white with a greenish hue at the base. Both are striped with brown. The dorsal sepal is lanceolate, obtuse at the base, acuminate, finely ciliate at the apex, 4.4 to 4.8 cm long by 1.6 to 1.9 cm wide. The synsepal is ovate-lanceolate, somewhat concave, acuminate, and ciliate at the recurved apex, about 4 cm long by 1.5 cm wide. The petals are white to greenish-white, the basal half spotted brown, the apical half with a brown hue and maroon stripes. The petals are narrow, linear, arched, and untwisted, their margins ciliate in the apical half, 6.5 to 7 cm long by 0.4 to 0.5 cm wide. On the margins of the basal half there are 4 to 7 projecting wart-like structures of about 1 mm in diameter that are covered by blackish hairs. The labellum has three lobes. The main lobe is deeply saccate; the side lobes are infolded underneath the staminode, forming the usual escape tube for the pollinator. The labellum is small, 3 to 3.5 cm long by 1.6 to 1.8 cm wide, pale yellow reticulated with pale brown. The staminode is convex, narrow and ciliate at the base, emarginate, reticulate in the middle, about 9 mm long by 5 to 6 mm wide at the apex, the apical margin with a central 1 mm incision.

DISTRIBUTION AND HABITAT

Paphiopedilum intaniae is endemic to the island of Sulawesi. The holotype was collected in the centre of the eastern region of the island on limestone cliffs on the slopes of



PAPHIOPEDILUM INTANIAE
COURTESY OF LOURENS GROBLER (AFRI ORCHIDS)

Gunong Morowali, about 700 meters above sea level. The plants were found growing in the grass, in fairly open terrain, fully exposed to the sun but protected by the frequent cloudy conditions in the area.

FLOWERING

Paphiopedilum intaniae flowers between March and May.



PAPHIOPEDILUM KOLOPAKINGII
COURTESY OF DOROTHY POTTER BARNETT

PAPHIOPEDILUM KOLOPAKINGII

FOWLIE

ORCHID DIGEST, 48 (1): 41 (1984)

SYNONYM

Paphiopedilum kalopakingii Fowlie, *lapsus calami*

Cribb, THE GENUS PAPHIOPEDILUM, 104-105 (1987)

ETYMOLOGY

Named *kolopakingii* in honour of A. Kolopaking (Liem Khe Wie), a commercial orchid grower in Indonesia.

DISCUSSION

Paphiopedilum kolopakingii was first collected in Borneo, brought to east Java in 1982, and purchased by the orchid dealer Liem Khe Wie (alias A. Kolopaking). Because of vegetative characteristics and because the plants were collected in Borneo with *Phalaenopsis maculata*, a species often growing sympatrically with *P. rothschildianum*, Liem Khe Wie thought that they were plants of this latter species or one of its varieties. However, when the first plants of the collection flowered in his nursery later that same year, they proved to belong to a species new to science.

P. kolopakingii stands out because of its leaves, which are up to 60 cm long by 8 cm wide and thus can only be rivalled in size by those of the more recently described *P. gigantifolium*.

There has been much discussion and some doubt about the origin of these plants. It has even been suggested that *P. kolopakingii* is an artificial hybrid between *P. haynaldianum* and *P. philippinense*. This is by no means the case as this species has repeatedly been collected in the wild.

Within the judging system of the American Orchid Society, twice plants have been awarded as *Paphiopedilum stonei* var. *latifolium* 'Ruth Kennedy' (AM/AOS 1981) and as *Paphiopedilum stonei* var. *latifolium* 'Magnifico' (CCM/AOS 1988). "*Paphiopedilum stonei* var. *latifolium*" has nothing whatsoever to do with *P. stonei* but shows a very close affinity to *P. kolopakingii*. It has been suggested that *Paphiopedilum stonei* var. *latifolium* is a hybrid between *P. kolopakingii* and *P. stonei*, but an examination of the flowers fails to confirm this. Unfortunately, plants of "*Paphiopedilum stonei* var. *latifolium*" have been used for breeding under the specific name "*Paphiopedilum stonei*" and will therefore be the cause of many future misunderstandings and much confusion.

More recently, "*Paphiopedilum stonei* var. *latifolium*" was described as an autonomous species under the name of *P. platyphyllum* (see *P. platyphyllum*).



PART OF AN INFLORESCENCE OF *PAPHIOPEDILUM KOLOPAKINGII* FMA. TOPPERI
 WATERCOLOUR PAINTING BY RIBKA BONITA HUTAGALUNG
 COURTESY OF RIBKA BONITA HUTAGALUNG

DESCRIPTION

Plants grow in leafy debris that has accumulated in rock cracks and crevices on steep cliffs. Rhizomes are short, and growth habit is tufted. Roots are fleshy, generally up to 45 cm long by about 1 cm in diameter. Each growth bears up to twelve leaves. They are 40 to 60 cm long by up to 8 cm wide, narrowly strap-shaped, most often uniformly deep green, but sometimes have a slight marbling. The inflorescence is sub-erect, 40 to 70 cm long by about 1 cm in diameter, and droops under the weight of the up to fifteen flowers, which usually all open at the same time. Each flower is up to 10 cm across. The floral bract is 4.5 to 5.0 cm long by about 1.5 cm wide with a triangular, acuminate apex. The dorsal sepal is narrowly elliptic, acuminate, and 5.0 to 6.5 cm high by 2.2 to 3.5 cm wide. It is whitish, sometimes suffused with green, and marked with nine to fifteen reddish or red-brown longitudinal stripes. Some of these stripes are more prominent and extend nearly the full length of the sepal. They are interspersed with secondary stripes which extend from the base half way to the apex. The synsepal, which is similar to the dorsal sepal but smaller and usually less intensively striped, is 3 to 4 cm long by 2.0 to 2.6 cm wide. The petals are strap-shaped, divaricate at about 45 degrees, and up to 7 cm long by about 8 mm wide. They are pure green with seven to nine reddish longitudinal stripes. The lip is greenish with brownish venation distally, shaped like an inverted helmet, 4.5 to 6.0 cm long by 2 to 3 cm wide, and has a 1.5 to 2.5 cm long claw formed by the inturned side lobes. The base of the labellum is pure white. The staminodal shield is orbicular, 1.0 to 1.5 cm high by about 1 cm across, with copious numbers of twisted hairs along the lateral and superior sides. The apex of the staminode is truncate and minutely sub-acute and turns slightly upward distally.

DISTRIBUTION AND HABITAT

Paphiopedilum kolopakingii grows only in central Kalimantan (Indonesian Borneo) near the headwaters of the Barito River. It inhabits rocky cliffs above gorges at 600 to 650 m.

FLOWERING

Paphiopedilum kolopakingii is known to flower whenever the new growth has fully matured. Generally, however, the flowers open in August and September.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa *et al.*, 1997).



PAPHIOPEDILUM KOLOPAKINGII FMA. TOPPERI
COURTESY OF WERNER MAYER

VARIETIES AND FORMS

PAPHIOPEDILUM KOLOPAKINGII FORMA TOPPERI

(BRAEM & MOHR) BRAEM & CHIRON

BRAEM & CHIRON, PAPHIOPEDILUM: 346 (2003)

BASIONYM

Paphiopedilum topperi Braem & Mohr

SCHLECHTERIANA, fascicle 2: 15-22 (1988)

DISCUSSION

Braem & Mohr originally published *Paphiopedilum topperi* as an autonomous species. After reviewing the pertinent literature and examining a number of plants over the last years, we have come to the conclusion that *P. topperi* should be reduced to a colour variant of *P. kolopakii*. We do not sink the taxon completely into the concept of *P. kolopakii* as breeders have convinced us that hybrids made with forma *topperi* are quite different from those obtained with the nominal form of *P. kolopakii*. The suggestion by Cash (1991) that *Paphiopedilum topperi* is to be considered an albinistic form of *P. kolopakii* is impossible as the flowers of *Paphiopedilum kolopakii* forma *topperi* are adorned by dark brown stripes and spots of that same colour.

PAPHIOPEDILUM KOLOPAKINGII FORMA KATHERINAE

KOPOWITZ

ORCHID DIGEST, 71: 137 (2007)

This is the albino. The flower is green and white with a yellow staminode.



PAPHIOPEDILUM OOI
COURTESY OF MICHAEL OOI

PAPHIOPEDILUM OOII

KOPOWITZ

ORCHID DIGEST, 63(2): 106-107 (1999)

ETYMOLOGY

Named *ooii* for Michael Ooi (1951-), Malayan plant collector and commercial grower; managing director of Ooi Leng Sun Orchid Nursery & Laboratory, owner and curator of Gunung Jerai Botanical Park.

DISCUSSION

Paphiopedilum ooii is one of several exciting additions to the genus *Paphiopedilum* that were described in 1999. Koopowitz compares it with *P. glanduliferum* (meaning *P. praestans*) but conclusive statements about the relationship of *P. ooii* in respect to the other species of the subgenus must wait until further information becomes available.

DESCRIPTION

Paphiopedilum ooii is a stately herbaceous plant that generally grows in leafy humus. The type specimen has three pairs of plain green, unmottled leaves that are folded over the entire length of the mid-vein. The leaves are 54 to 71 cm long by 6 to 7 cm wide. Mature leaves are oblong-lanceolate with rounded, equally bilobed tips. The inflorescence is up to 2 m long by up to 1.5 cm in diameter. Each inflorescence generates 4 to 12 flowers. The flowers have a natural horizontal spread of 3 cm and measure 8.5 cm tall from the tip of the erect dorsal sepal to the tips of the petals. The broadly egg-shaped dorsal sepal, which has slightly undulate margins, is 3 cm long by 2.9 cm wide near its middle. The background colour is ivory-green but it is marked with 15 to 17 dark purple-brown longitudinal veins that are approximately 1 mm wide. These stripes begin about 0.5 cm from the base of the dorsal sepal and curve to follow the outline of the lateral margins. The pendulous petals are about 6.2 cm long by 0.7 cm wide at the base. They do not have wart-like structures along the margins, but the lower margin is strongly crisped whereas the upper margin is smooth. The petals have an ivory-cream primary colour that merges to ivory-green and then becomes a strong green toward the tip. They have maroon-purple margins with one or two darker but less distinct, longitudinal, purple streaks in the centre. The synsepal, which is hidden behind the pouch, is 3.5 cm long by 3 cm wide with a pair of longitudinal keels. It is light green with fine longitudinal purple stripes. The pouch is ivory-green. The bone-white staminode is 1.4 cm long by 0.9 cm wide with a flat, egg-like shape that terminates in a sharp tip that is bisected by a narrow notch. The base of the staminode has a very narrow rim of short brown hairs on the margin.

DISTRIBUTION AND HABITAT

Northern Borneo. Plants were found at two sites on the lower slopes of Mt. Kinabalu at 600 to 1,200 m. They grow in leafy humus on ledges of steep, northeast-facing cliffs and slopes of eroded serpentine. Plants are normally found 6 to 12 m above running water and apparently thrive in both high light and shady situations.

FLOWERING

Paphiopedilum ooi has hitherto been reported to flower between January and March. As for other species belonging to subgenus *Polyantha*, it may be assumed that plants will flower all year round upon maturation of the growths.

THE PAPHIOPEDILUM PHILIPPINENSE COMPLEX

In this group, four taxa have been described at the species level, these being *Paphiopedilum philippinense* and *P. roebbelenii* by the younger Reichenbach in 1862 and 1883 respectively, *P. laevigatum* by Bateman in 1865, and *P. cannartianum* by Linden fil. in 1888. Bateman's concept corresponds completely with Reichenbach's *P. philippinense*, and there is no doubt that the two represent the same species.

P. roebbelenii was based on a collection by Röbbelen, a Swiss plant collector for the Sander nursery. In his original publication, Reichenbach states:

"The marks on which I rely in adopting Mr. Röbbelen's view about the distinction are the following: The leaves are narrower. The peduncle is more hairy... The staminode is light ochre without the least vestige of those longitudinal and transverse green markings which look so charming in *Cypripedium philippinense*."

Reichenbach himself was not sure about the correct taxonomic status for this newcomer. This becomes evident by his statement, again in the original description,

"The fresh plant (species or very aberrant variety - we know not which). ..."

Cribb (1987, 1998) indicates that the original publication of *P. roebbelenii* states that it has longer, more pendent petals when compared to *P. philippinense*. In spite of an intense review of Reichenbach's publication, we have not been able to locate such statement.

Most authors, among them Kent (in Veitch, 1889), Stein (1892), Cribb (1987, 1998), Braem (1988), Cash (1991), and Koopowitz (1995, 2000, 2012, 2018), consider *P. roebbelenii* to be identical with or a variety of *P. philippinense*.

Under plate 141 of the LINDENIA, a plant is described as *Cypripedium cannartianum* by Linden fil. In the subtitle, however, it is designated as *C. roebbellinii* [sic.] var *cannartianum*. The plate shows a plant with free lateral sepals and only slightly twisted petals. It is quite clear that this taxon represents an aberrant form of *P. roebbelenii*.

On the other hand, *P. roebbelenii* was recognised by Pfitzer (1903) as a separate entity and this view was supported by Schoser (1971), Asher (1980), and Braem (in Braem, Baker & Baker, 1998), Braem & Chiron (2003) and Braem, Chiron & Öhlund (2016).

For some time, a plant was offered by various nurseries under the name of *P. palawense*, but it has proven to be a geographical variant of *P. philippinense*. The taxon *P. palawense* was never described validly and is therefore a *nomen nudum*.



PAPHIOPEDILUM PHILIPPINENSE
COURTESY OF DOROTHY POTTER BARNETT

We have to admit, however, that horticultural practices have a considerable impact on the identity of plants in our collections. In view of a plant protection legislation that isn't worth the paper it is printed on as our tropical forests (and other habitats) have been and are increasingly being sacrificed to capitalistic and political egocentricity and national chauvinism, CITES, for example, has become a farce. It is more or less generally illegal to "trade" slipper orchids collected in the wild, where the term "trade" is used for any cross-border movement of said plants, no matter what the purpose is, but at the same time the "objects to be protected" are decimated and destroyed by war, illegal deforestation by various means, and by the "legal" clear-cutting for agriculture and mining.

Science has developed methods of artificial propagation. In the case of slipper orchids, this is done by seed propagation. In general, two parent plants are selected and one is pollinated with the pollen of the other. The result is a seed capsule that will yield (if all goes well) a number of plants of the same species. But here other problems arise.

Species are described and types are established (see our comments in the general section of this book), but to recognise these types one needs to read and understand the descriptions. And one must not rely on secondary literature when the original descriptions are available, even when they are, admittedly, not always readily obtainable, and not always in one's mother tongue. Many horticulturists have no training in botany and have little or no incentive to question the identification the plants obtained by their suppliers; in most cases they rely on one or two articles written for their local orchid society, very often by people who have no botanical training either.

When selecting the illustrations for the *Pahiopedilum philippinense* complex, we had to accept the fact that most of the pictures from cultivated plants showed intermediate characteristics, leading us to assume that the seedlings (as most of these plants, if not all, were obtained as seedlings) had been the result of crossing two plants of philippinense of different types. Upon questioning several well-known commercial growers, all of them confirmed our assumption and all admitted that they had never even thought of looking for the original publications.

This, however, means that commercial practices have "overruled" botanical principles. John Lindley, most certainly, was right when he said that the "creation of orchid hybrids" would drive the botanists mad, but he could not have known that the same objective can be obtained by artificial propagation using a badly identified parental generation.

From the viewpoint of a botanist, the dilemma of whether to accept *P. roebbelenii* as a separate species must be reconsidered. If *P. philippinense* and *P. roebbelenii* are different species, most of the cultivated plants designated as *P. philippinense* are de facto hybrids. And this will cause even further chaos. If, however, we accept *P. roebbelenii* as a variety of *P. philippinense*, the seedlings are also "valid" *P. philippinense*, albeit of a new "type".

Although this is a somewhat unsatisfactory compromise, we have decided to proceed in that direction in this book, very well knowing that we cannot solve the problems of differentiation between taxa at the species level without a set of generally acceptable rules, and equally knowing that the coming into existence of such a workable, generally acceptable set of rules will remain a difficult goal for many generations to come.

PAPHIOPEDILUM PHILIPPINENSE

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 480 (1892)

BASIONYM

Cypripedium philippinense Reichenbach fil.

BONPLANDIA, 10: 335 (1862)

SYNONYMS

Cypripedium laevigatum Bateman

CURTIS'S BOTANICAL MAGAZINE, 91: t. 5508 (1865)

Selenipedium laevigatum (Bateman) May

REVUE HORTICOLE, 301 (1885)

Paphiopedilum laevigatum (Bateman) Pfitzer

Engler, DIE NATÜRLICHEN PFLANZENFAMILIEN, 2(6): 84 (1888)

Cordula philippinensis (Reichenbach fil.) Rolfe

ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Named *philippinense* for one of the plant's main habitats.

DISCUSSION

The younger Reichenbach described this taxon on the basis of an herbarium specimen of unknown origin in 1862. Two years later, J. G. Veitch found plants of this species growing on the roots of *Vanda batemanii* on the Philippine island of Guimares. Some of that material was passed on to Bateman, resulting in the description of *Paphiopedilum laevigatum* in 1865. The concepts of *P. philippinense* and *P. laevigatum* are identical, and the latter species is considered a synonym of *P. philippinense* by almost all authors.

DESCRIPTION

Paphiopedilum philippinense is an herbaceous perennial. Leaves are ligulate-oblong and up to 30 cm long by about 4 cm wide. They are coriaceous with a polished surface, uniformly green, distinctly keeled underneath, and obtuse or unequally two-lobed at the apex. The inflorescence is up to 50 cm long, downy pubescent, green with purple-brown streaks, and generally bears three to five flowers. The boat-shaped floral bracts are reddish-brown, hairy, and about two thirds as long as the ovary. Flowers are up to 20 cm high, including the long, pendulous petals, and 8 cm across. The dorsal sepal is up to 5 cm long by 2 to 3 cm wide, broadly ovate, and pointed. It is whitish with purple-brown veins and downy pubescent margins. The ovate synsepal is similar to the dorsal sepal but is somewhat narrower. It is approximately 4 cm long and whitish with green veins. Petals are ribbon-like and twisted, 12 to 18 cm long (occasionally longer), pendulous,



PAPHIOPEDILUM PHILIPPINENSE
COURTESY OF DOROTHY POTTER BARNETT

and have hairy wart-like structures along the basal margins. They are yellowish at the base, shading gradually to dull reddish-purple along most of their length, with pale green at the apex. The lip, which is shaped like an inverted helmet, is up to 3 cm long by about 1.7 cm wide. It is buff-yellow with faint brown striations. The staminodal shield is sub-cordiform, emarginate, and has black hairs on each side.

DISTRIBUTION AND HABITAT

Paphiopedilum philippinense grows in leafy debris on the forest floor, in moss on trees, and on moss-covered rocks. Plants normally are found in bright places. They are widespread throughout the Philippine Islands from Luzon southward to northern Mindanao and westward to Palawan. Plants usually grow on limestone cliffs and boulders, often in fairly open and exposed locations, from sea level to about 500 m. Plants also were collected on a small island between southern Palawan Island and Sabah and a small colony has been found on mainland Sabah.

FLOWERING

Paphiopedilum philippinense has been reported to bloom almost all year round. The main flowering season, however, is from April through June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan & MacLeod, 1949; Pancho, 1965; Tanaka & Aoyama, 1974; Karasawa, 1979).

VARIETIES AND FORMS

PAPHIOPEDILUM PHILIPPINENSE VAR. ROEBBELENII¹⁰

(REICHENBACH) CRIBB

THE GENUS PAPHIOPEDILUM: 111 (1987)

BASIONYM

Cypripedium roebbelenii Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 20: 684 (1883)

SYNONYMS

Cypripedium cannartianum Linden fil.

LINDENIA, 3: 93, t. 141 (1888)¹¹

¹⁰ The spelling of *roebbelenii* varies considerably in the literature. One can find the name with various combinations of one or two Bs and one or two Ls. The original spelling by Reichenbach was *roëbbelenii* according to Mr. Carl Röbelen's correctly spelled name. The use of the German "ö" in scientific plant names is, however, no longer accepted by the rules of nomenclature, and the name is now written as *roebbelenii*.

¹¹ Linden fil. used both designations. According to modern (unsatisfactory) practice where the sole mention of a taxon may be regarded as a valid publication, we must include both mentions no matter how ridiculous this interpretation may be.



PAPHIOPEDILUM PHILIPPINENSE FMA. ALBOFLAVUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

Cypripedium roebellini [sic] var. *cannartianum* Linden fil.
LINDENIA, 3: 93, t. 141 (1888)

Paphiopedilum philippinense var. *cannartianum* (Linden fil.) Pfitzer
DAS PFLANZENREICH. Orchidaceae-Pleonandrae, 62 (1903)

Paphiopedilum roebbelenii (Reichenbach fil.) Pfitzer
BOTANISCHE JAHRBÜCHER, 19: 41 (1894)

Variety *roebbelenii* differs from the nominal form in having narrower leaves, a higher density of hairs on the peduncle, and by the lack of green markings on the staminodal shield. Furthermore, the petals of variety *roebbelenii* are longer, more pendent, and distinctly more twisted than those of the nominal form. *Cypripedium cannartianum* Linden fil. is an aberrant form in which the lateral sepals are not united into a synsepal. *Paphiopedilum philippinense* var. *roebbelenii* is reported from the vicinity of Antipolo on Luzon Island in the Philippines.

PAPHIOPEDILUM PHILIPPINENSE FORMA ALBOFLAVUM

GRUSS

DIE ORCHIDEE, 51[3]: 354-355 (2000)

SYNONYM

Paphiopedilum roebbelenii forma *alboflavum* (Gruß) Braem & Chiron
PAPHIOPEDILUM, 1. Edition: 354 (2003)

This taxon was described on the basis of a plant in cultivation at the Popow nursery in Wolfsburg, Germany. The flowers have been described as being white and yellow without any trace of anthocyanin pigmentation. It must be noted, however, that many albinesque forms of *Paphiopedilum philippinense* do show traces of reddish colouration in their flowers.



FLOWER AND BUD OF *PAPHIOPEDILUM PRAESTANS*
WATERCOLOUR PAINTING BY EUNIKE NUGROHO
COURTESY OF EUNIKE NUGROHO

THE PAPHIOPEDILUM GLANDULIFERUM/ PRAESTANS COMPLEX

Within this group *Paphiopedilum gardineri*, *P. glanduliferum*, *P. praestans*, *P. striatum*, and *P. wilhelminiae* have been described at the species level. Two other designations found in the literature - *P. bodegomii* and *P. bodegomensis* - are horticultural names, which have never been validated by scientific description.

There is widespread disagreement about the correct classification of the remaining taxa. The main problem arises from the unsatisfactory nature of the original descriptions of *P. glanduliferum* (Blume, 1848) and *P. gardineri* (Guillemard, 1886, 1889). This, in turn, resulted in a number of publications which are based on assumptions, guesswork and personal preference for one or another earlier author. The latest confusion arises from an article by Garay, published as a companion to the Koopowitz checklist in 1995 (see below). A copy of the Garay article is now on the internet and will lead to further misunderstandings.

In view of this confusion, we have gone back to the original publications of each taxon, in order to develop a treatment based on facts.

1. PAPHIOPEDILUM GARDINERI

The taxon is based on the following text passage by Guillemard in *The Cruise of the Marchesa* (vol. 2: 309 [1886]):

"A *Nepenthes*, which grew in some abundance, with dwarfed and ungraceful shaped pitchers, was, however, new to us, as was also a *Cypripedium*, of which we found a single specimen only, growing at the bottom of a large tree. This latter orchid was very handsome both as regards shape and colouring, the flower stalk bearing three or four blossoms with pendulous ribbon-shaped petals, twisted into a graceful spiral, and tinged with purple. The dorsal sepal was marked with alternate stripes of dark brown and yellow, while the lip was of a paler shade of the same colour, less distinctly striated."

At the bottom of the page, Guillemard has added the following footnote:

"This orchid, which I have since learnt to be a species new to science, is allied to *Cypripedium philippinense* (Reichb.), figured in the 'BOT. MAG.' pl. 5508, but the twisted petals are very much shorter, being only twice the length of the lip, and the colouring of the sepal of a far brighter yellow. I have named it *Cypripedium gardineri* after my friend Mr. Walter Gardiner of Clare College, Cambridge. The genus *Cypripedium*, I believe, has not been previously recorded from New Guinea."

As becomes very clear by reading the original description, nothing whatsoever can be said about the staminode of *P. gardineri*, and de facto, the plant described by Guillemard can be anything within the *P. glanduliferum*/*P. praestans* complex. To deduce anything from the drawing that was rendered in Guillemard's book and reproduced in the Garay article in respect to staminode would have to be compared with the deduction of the name of a Captain's mistress from the width of said Captain's ship! In other words, all descriptions and identifications of "*P. gardineri*" are of secondary nature, mainly based on guesswork, and may or may not correspond to the plant collected by Guillemard. No specimen that can in any way be linked to the Guillemard collection has survived. To illustrate the confusion surrounding this taxon it may suffice to note that following Garay's identification key, the plant figured under *P. wilhelminiae* in Cribb 1987 [page 111] and Cribb 1998 [page 157] must be classified as *P. gardineri* as the petals are distinctly twisted. On the other hand, the plant figured as *P. gardineri* in Garay's own article has a typical *P. wilhelminiae* staminode and only very slightly twisted petals. Another noteworthy fact is that Pfitzer, although having transferred the taxon to the genus *Paphiopedilum* in 1894, does not even mention the taxon in his later work. Koopowitz (2000) found a solution that may appear, at first sight, to be elegant indeed. He lists the taxon within the synonymy of both *P. praestans* and *P. wilhelminiae*. But where are the facts supporting that decision? The best solution in respect to the taxonomy of the Guillemard plant is simply to say that we don't know what it was or is. And in that way, the discussion about whether the description rendered by Guillemard is to be considered valid or not becomes moot.

2. PAPHIOPEDILUM GLANDULIFERUM

The case of *P. glanduliferum* does present itself quite differently. The plant was described elaborately by Blume in 1848 and the drawings that go with the description are quite explicit. And there is a specimen (now at Leiden) that can be linked directly to the Blume description. The problem here is that ever since the original description of this taxon in 1848, no plant has ever been collected that matches it. Until a few years ago, all authors considered the well-known taxon *P. praestans* identical with *P. glanduliferum*, simply ignoring the distinct differences in staminode morphology. Cribb (1998) considers the plants collected on Waigeo Island by van Royen in 1955 as well as those said to have been collected on Tapak Reng Island by Liem Khe Wie (Kolopaking) in 1970 to belong to *P. glanduliferum*, without presenting any proof. For the van Royen collection, Cribb fails to present a reference. The Kolopaking publication is without any illustration that would allow the faintest guess regarding the identity of the plants collected. Kolopaking, however, referred to these plants as "*P. praestans*." Garay (1995) and Braem (in Braem, Baker & Baker, 1998) revived "*P. praestans*" on that basis, a view also followed by Koopowitz in the 2000 and 2012 versions of his checklist (but considers the taxon as synonymous to *P. praestans* in his 2018 update). In our view, until further material and/or data about *P. glanduliferum* becomes available it is best to treat it as a good but lost species.

3. PAPHIOPEDILUM PRAESTANS

The original description of *P. praestans* is rather extensive by Reichenbach fil. standards. Although it does contain some vague passages, it gives a fairly good description of the staminode. Most early authors (Pfitzer, 1894, 1903; Rolfe, 1896; Hallier fil., 1897) recognised it as a good autonomous species whereas Kränzlin (1897) sank it into his *P. glanduliferum* concept. It was generally accepted as a good species by J.J. Smith (1913), M. W. Wood (1977) and Asher (1981). Cribb (1987) and Braem (1988) succumbed to the *P. glanduliferum* confusion and considered it part of that entity. Koopowitz phrased the same view in his 1995 checklist. Braem (in Braem, Baker & Baker, 1998, in Braem & Chiron, 2003, and in Braem, Chiron & Öhlund, 2016) as well as Koopowitz (2000, 2012, 2018) reconsidered and listed *P. praestans* as a separate species.

Because of the morphology of its staminodal shield and other aspects of flower morphology, it is evident that *P. praestans* is quite different from Blume's *P. glanduliferum*. *Paphiopedilum praestans* is thus to be considered an autonomous species.

4. PAPHIOPEDILUM STRIATUM

Paphiopedilum striatum was published by Clements & Jones (1996) on the basis of a plant illustrated under the name *P. glanduliferum* var. *wilhelminiae* in Cribb's 1987 treatise. This taxon, hitherto, had not been accepted by any author.

Cribb (1998), now accepting *P. wilhelminiae* as an autonomous species, lists *P. striatum* there as a synonym. Braem, in all his treatments since 1998, lists *P. striatum* as a synonym of *P. praestans*, a view followed by Koopowitz in his 2000 and 2018 revisions.

The original description is not very helpful. The Latin diagnosis begins with "related to *P. wilhelminiae* L.O. Williams and *P. gardineri* (Guillemand) Pfitzer" ... but as we have seen above, no one knows what *P. gardineri* is. And that *P. striatum* is related to all plants of the *P. glanduliferum*/*P. praestans* complex is evident.

In their English description, Clements & Jones stated that their taxon differs in the number of flowers (1 to 3), in the prominently striped sepals, in the petals that are twisted only once, and in the prominent staminodal plate which is large, yellow with brownish hairs on its margin. Let's look at each of those characteristics:

- a) Flower number: Plants with 1 to 3 flowers are not unusual in the group. The number of flowers on any given plant depends on the strength of the plant, the age of the plant, and on the climatic conditions in which the plants grow, that is, habitat conditions. Thus, this is by no means an argument for segregation.
- b) The petals are prominently striped. The same is true in many plants of *P. praestans*.
- c) In their description, Clements & Jones state that the petals are twisted only once. However, the illustration provided by the authors depicts a plant with flowers showing multiple twists in their petals.
- d) The plate (disc) of the staminode is indeed wide. Following the Garay staminode key (Garay, 1995) this would best correspond with the staminode for *P. wilhelminiae*.

Thus what we are left with is a description of a plant that differs from a typical *P. praestans* only by a relatively broad staminodal shield. Cribb's decision to list *P. striatum* as a synonym for *P. wilhelminiae* is erroneous as Clements & Jones clearly state that their plant has "darker striations" on the petals and as their illustration clearly shows a plant with twisted petals. Both characteristics contradict the corresponding characteristics of *P. wilhelminiae* which has untwisted, uniformly deep purple petals.

5. PAPHIOPEDILUM WILHELMINIAE

Paphiopedilum wilhelminiae has been treated in various ways. Until the early nineteen-nineties it was generally considered to be a variant of *P. glanduliferum* or *P. praestans*, depending on which name was accepted. The plants answering to the *P. wilhelminiae* concept, however, show considerable differences both in habit as well in flower morphology as compared to the *P. glanduliferum* and *P. praestans* concepts. Therefore, *P. wilhelminiae* is now generally accepted as an autonomous species.

Key to the Taxa belonging to the *Paphiopedilum glanduliferum/praestans* complex

1. Sepals without stripes. Labellum with long (1.5 cm) or possibly longer processes protruding into the main lobe of the lip (pouch). Staminodal shield not inflated, elliptic with a long-pointed acuminate apex, much smaller than the stigma *P. glanduliferum*
- 1a. Sepals always striped or uniformly deep purple; short (2-6 mm) labellar processes protruding into the main lobe of the lip (pouch). Staminodal shield inflated, not with a long-pointed acuminate apex, always larger than the stigma 2
2. Petals barely twisted or untwisted, their margins without or with very few wart-like structures, petals uniformly deep purple *P. wilhelminiae*
- 2a. Petals distinctly twisted in spirals, striped, not uniformly purple, the margins of their basal parts with several distinct, wart-like structures *P. praestans*

PAPHIOPEDILUM GLANDULIFERUM

(BLUME) STEIN

STEIN'S ORCHIDEENBUCH, 468 (1892)

BASIONYM

Cypripedium glanduliferum Blume

RUMPHIA, 4: 56, t. 195 (1848)

SYNONYM

Cordula glanduligera (Blume) Rolfe (*lapsus*)

THE ORCHID REVIEW, 20 (1): 2 (1912)

ETYMOLOGY

Named *glanduliferum* referring to the glands on the petals.

DISCUSSION

This species is known only from the type material and the description and illustration in Blume's *Rumphia* and there is widespread disagreement about its correct classification. Unfortunately, although the description rendered by Blume (*loc. cit*) is relatively extensive and quite detailed (see below), it causes confusion because there are no plants available that quite answer to that description.

Pfitzer, in his treatise of the genus in 1903, recognised two species : *Paphiopedilum glanduliferum* and *P. praestans* - and differentiated between them by the morphology of the staminodal shield. On the other hand, most other authors have considered *P. glanduliferum* and *P. praestans* to be conspecific as they did not consider the differences in the staminodal morphology within the group to be of primary importance. This may well have been a serious mistake. Indeed, when we go back to the older literature, we find that J.J. Smith (1913) states:

"There is no doubt that Blume's description and drawings [of *P. glanduliferum*] show rather extensive differences to the often described and figured *P. praestans* Pfitz.; and if Blume's description and drawings are correct, it is just as certain that both plants are different species."

The key part of that statement is: "... if Blume's description and drawings are correct ...", and hitherto, no evidence has been presented that would indicate that this is not the case. A similar judgement was given by Asher who, in 1981, wrote:

"Short of claiming that Blume misrepresented the dissected bloom of *P. glanduliferum*, there appears to be little doubt that *P. glanduliferum* and *P. praestans* are distinctly different species."



ILLUSTRATIONS OF *PAPHIOPEDILUM GLANDULIFERUM*
RUMPHIA VOL. 4 (1848) (SEE TEXT P.P. 465-466)

The problem of a primary description which is, in certain aspects, extensive and detailed, but in other respects more or less vague, (that was rendered, not to forget, from dried herbarium materials) has not exactly been clarified by the pertinent literature available. The plant designated as *P. glanduliferum* by Fowlie (1991), Cribb (1987, 1998), Braem (1988), Koopowitz (1995) and many others, has nothing in common with the plant originally shown by Blume. It was Garay (1995) who first reviewed the problem in more detail, and who came to the conclusion - mainly on the basis of staminode morphology - that *P. glanduliferum* is indeed different from *P. praestans* and may not have been rediscovered since the type was collected by Zippel in New Guinea. In the treatment of Braem (Braem *et al.*, 1998) the author followed the opinion of Garay; and Koopowitz in his two updates of his "Checklist" (2000, 2012) has done so also, although in his 2018 update he considers *P. glanduliferum* to be identical with *P. praestans*.

Questions do remain. Indeed, it is strange that plants answering to the description and illustration in the *Rumphia* have never been found again, in spite of the severe slipper orchid hype of the recent decades that was paired with quite a few "new and not so new discoveries". But we all know from the re-discovery of *P. sanderianum* that known entities may be lost for decades and perhaps even more than one and a half centuries! Admittedly, to declare *P. glanduliferum* conspecific with *P. praestans* would be the easier way out, but it would not satisfy. Cribb (1998) is most certainly correct when he says that staminode morphology is variable within any given species (although there are exceptions), but to go as far as to claim that there can be two completely different forms of staminodes in a single specific entity is, in our opinion, a touch too extreme.

We have reviewed the primary as well as the secondary literature, and we have studied several hundred plants of what we like to call the *P. glanduliferum*/*P. praestans* complex. Never have we seen anything that could, by any means, claim to be the Blume/Zippel plant. Thus, we maintain the independence of *P. glanduliferum*.

DESCRIPTION

Translated from the Blume original.

C. glanduliferum Plate 195, figure 2 (designated as *C. insigne*) and Plate 198A: Apparently stemless [*sic*]; leaves leathery, rigid, linear, with blunt or rounded apices, basally grooved. Scape hairy, one to two flowers. Dorsal sepal oblong, lanceolate, acuminate, often with the margins rolled back. Petals linear, very acuminate, with undulate margins and having bearded glands at the base. Staminode arched, drawn out in front into a beak covered with very soft hairs. - Habitat: In the forests of New Guinea on old, decayed tree trunks. Allied to *C. insigne* Wallich but with much narrower, very acuminate petals and a staminode that is differently constructed, thus very distinct. *C. javanicum*, a plant which is barely distinguishable from *C. venustum* Wallich is another allied species. - Roots arising from the base, undivided, covered with yellow-grey woolly hairs. Leaves usually four to seven, equitant, outer leaves many and small, inner leaves 17.5 to 25 cm long, 1.8 to 3.8 cm wide, erect, spreading from an axis at nearly 90 degrees, more or less obtuse and sometimes emarginate, margins somewhat curved backward,

dark green, without mottling, grooved near the base, pale green toward the tip, leathery, firm, rigid with depressed medial vein above, below distinctly sharp-toothed, above with numerous blister-like eroded areas, bright copper, fading to pale tan. Scape located at the centre, flexible, ascending, terete, dingy purple, hairy, two-flowered, each flower with a single, large bract. Petals and sepals externally light rose shading to pale green centrally, lip yellow fading to light brown, veins above the median dark violet and strongly branching; synsepal emarginate; dorsal sepal a bit shorter, concave with upward-rolled margins; petals extremely long, distinctly acuminate, twisted and wavy, bearing several fleshy, brownish, bearded glandular projections on the upper margin. Labellum large, inflated, slipper-shaped, margins of both sides of the base rolled inward and upward producing a sharply pointed appendage. Gynostemium short, stamen or staminode projecting more dorsally and exteriorly with two anthers being more evident than in allied species. Staminode arched upward with depressions above, hairy, the front elongated into a keeled, glabrous beak (see drawing 8, 9 and 10); the fertile portion of the gynostemium with lateral edges turned upward and basally narrowed into a keel, apically enlarged into two curved, lateral, short petal-like lobes with sub-apical anthers toward the stigma.

DISTRIBUTION AND HABITAT

New Guinea. As *P. glanduliferum* has never been collected since its original description, no further information is available.

PAPHIOPEDILUM PRAESTANS

(REICHENBACH FIL.) PFITZER

ENGLER, BOTANISCHE JAHRBÜCHER, 19: 41 (1894)

BASIONYM

Cypripedium praestans Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 26: 776 (1886)

SYNONYMS

Cypripedium gardineri Guillemard

THE CRUISE OF THE MARCHESA, 1st. ed., vol. 2: 309 (1886) & 2nd ed., 406 & fig. (1889)

Cypripedium praestans var. *kimballianum* Linden fil. & Rodigas

LINDENIA, 6: t. 249 (1890)

Paphiopedilum gardineri (Guillemard) Pfitzer

Engler, BOTANISCHE JAHRBÜCHER, 19: 41 (1894)

Paphiopedilum praestans var. *kimballianum* (Linden fil. & Rodigas) Pfitzer

Engler, DAS PFLANZENREICH. Orchidaceae-Pleionandrae, 61 (1903)

Cordula praestans (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum glanduliferum var. *praestans sensu* Braem

PAPHIOPEDILUM, 69 (1988)

Paphiopedilum striatum Clements & Jones

LASIANTHERA, 1(1): 2-5 (1996)

Paphiopedilum bodegomensis Hort., *nomen nudum*

Paphiopedilum bodegomii Hort., *nomen nudum*

Paphiopedilum glanduliferum Auct. non Blume

ETYMOLOGY

Named *praestans* which is Latin and means "excellent."

DISCUSSION

Paphiopedilum praestans is obviously an extremely variable species which is closely related to and has often been confused with *P. glanduliferum* Blume. Until further material and information become available, especially regarding the real identity of *P. glanduliferum* Blume, the affinities and relationships within the complex and within *P. praestans* cannot be conclusively clarified. See preceding discussion under *P. glanduliferum*.

Paphiopedilum bodegomii and *P. bodegomensis* are horticultural designations which are



PAPHIOPEDILUM PRAESTANS
WATERCOLOUR PAINTING BY DEINITISA AMARAWI
COURTESY OF DEINITISA AMARAWI

probably based on a concept published as "*Paphiopedilum* nov. spec." by Van Bodegom (1973), who took the information from a travel account written by J. K. van Eechoud. Unfortunately, no further information about this book has hitherto become available. Van Bodegom (*loc. cit.*) states that the plant originates from the southern shore of Lake Tigi at 1,700 m (5,440 feet) above sea level. About the flower colour of this plant, Van Bodegom writes, "The colours are generally darker than in *P. praestans*. The base colour of the flower parts is a distinct yellow."

Paphiopedilum striatum, described by Clements & Jones (1996) is a geographical variant of *P. praestans*.

DESCRIPTION

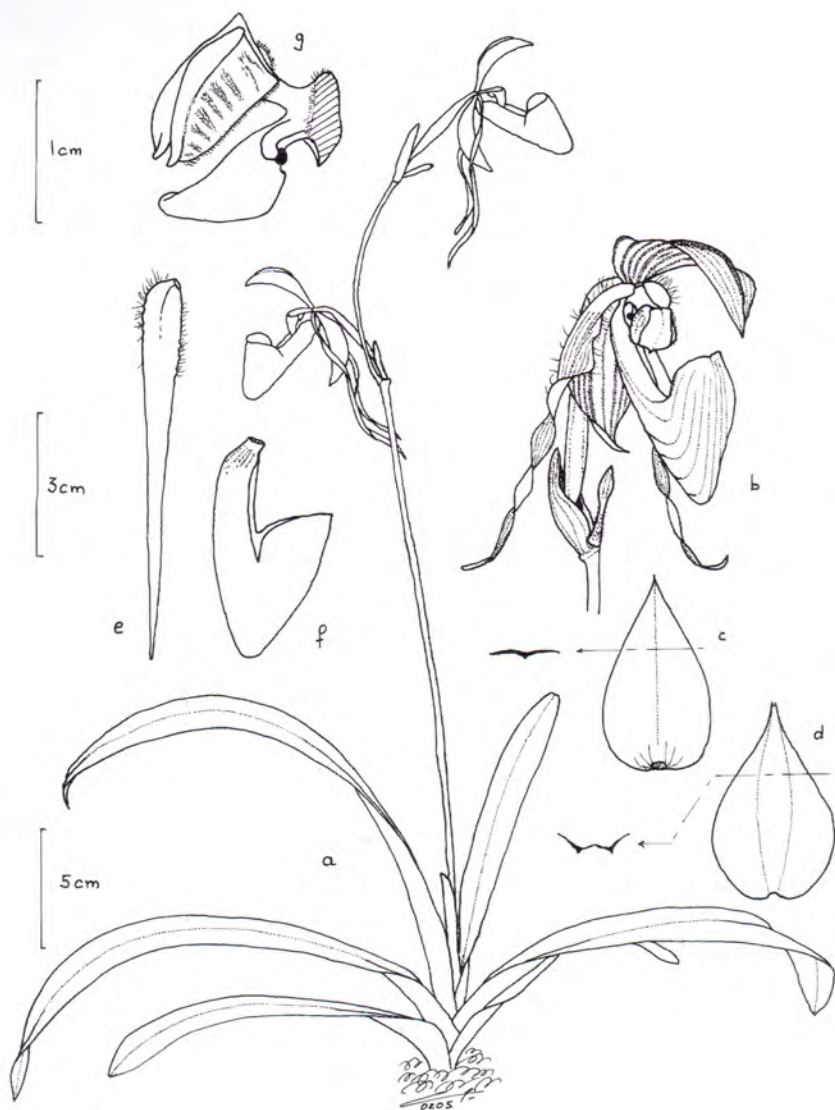
Paphiopedilum praestans is an herbaceous perennial, generally growing in leaf-mould. Leaves are narrow-linear, up to 60 cm long by about 3 cm wide, rounded at the apex, rather fleshy, uniformly green, and distinctly keeled underneath. Leaf size varies considerably, depending on the geographic variant. The inflorescence is usually up to 50 cm long, but may be even longer. It is deep purple, partly spotted green, covered with grey-brown hairs, and usually bears up to five flowers. Floral bracts are sharply keeled, lanceolate, brown with darker veins, and 2.5 to 4.5 cm long. Flowers are up to 12.5 cm long. The dorsal sepal, which is up to 5.5 cm long by about 2.5 cm wide, is ovate, acute, pale yellow to whitish, sometimes with dark yellow in the middle, striped deep yellow to reddish-brown, and keeled externally. The synsepal is similar but smaller. Petals are linear to strap-shaped, 10 to 13 cm long by about 0.5 cm wide, held at a downward angle of approximately 45 degrees, and more or less helically twisted. They are pale yellow-green with darker yellow-green to reddish-purple longitudinal veins. Petal margins are undulate and covered with very dark, nearly black, hairy warts. The lip is distinctly saccate, up to 4.5 cm long by about 2 cm across, and is green to yellowish-green or light pink and marked with darker venation. The staminodal shield is elongate, angular, fleshy, cucullate with two umbonate projections near the base. The shield has sides that are not curved to the back, a truncate apex, a glabrous middle, and is obtusely mucronate. It is buff-yellow to reddish, and the broadly inflexed lateral margins are studded with short red-brown bristles.

DISTRIBUTION AND HABITAT

Paphiopedilum praestans is found on the northwest coast of western New Guinea (Irian Jaya) and adjacent islands. Plants grow in humus-filled, mossy clefts and crevices on limestone cliff faces. They are found in situations ranging from deep shade to nearly full sun from sea level to 200 m.

FLOWERING

In its natural habitats *Paphiopedilum praestans* flowers between November and April. Blooming occurs in the second year on a mature growth, but a well-established plant with many growths may bloom several times a year.



PAPHIOPEDILUM PRAESTANS
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON



PAPHIOPEDILUM PRAESTANS
COURTESY OF DOROTHY POTTER BARNETT

MISCELLANEOUS NOTES

The mitotic chromosome counts for *P. praestans* are $2n = 26$ (Karasawa, 1979) and $2n = 28$ (Duncan & MacLeod, 1948).

VARIETIES AND FORMS

As previously mentioned, *Paphiopedilum praestans*, as understood in this treatment, is variable in respect to the colour and morphology of the flower.

PAPHIOPEDILUM PRAESTANS* VAR. *BICORNUTUM

GRUSS

DIE ORCHIDEE, 65(1): 22-24 [23] (2014)

This variety differs from the nominal variety by having two distinct horns at the top of the staminodal plate.



PAPHIOPEDILUM WILHELMINIAE
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC

PAPHIOPEDILUM WILHELMINIAE

L. O. WILLIAMS

AMERICAN ORCHID SOCIETY BULLETIN, 10(5): 373-375 (1942)

SYNONYMS

Paphiopedilum praestans subspecies *wilhelminiae* (L. O. Williams) M. W. Wood
CURTIS'S BOTANICAL MAGAZINE, new series, 6, t. 743 (1977)

Paphiopedilum glanduliferum var. *wilhelminiae* (L. O. Williams) Cribb
THE GENUS PAPHIOPEDILUM, III (1987)

ETYMOLOGY

Named *wilhelminiae* in honour of Wilhelmina Helena Paulina Maria van Oranje Nassau (1880-1962), queen of the Netherlands from 1890 through 1948.

DISCUSSION

L.O. Williams, in his original publication, writes:

"*Paphiopedilum wilhelminiae* is closely allied to *P. glanduliferum* (Blume) Pfitzer from which it is distinguished by the lack of ciliate calluses and the presence of verrucose-papillose tips on the petals; the dorsal sepal is larger and longer than the synsepal; there are not long apicules originating on the margins of the claw which are interjected into the sac of the lip; the staminode is differently shaped and lacks the erect dorsal projection; the flower colour also differs considerably."

An interesting contribution about this taxon is found in Reisinger's account (Reisinger, 1993) of a visit to some of the habitats:

"I think *P. wilhelminiae* is a good species of its own right, easy to separate from *P. glanduliferum* even without flowers, by its shorter, glossy dark green leaves. It grows hundreds of kilometres from the nearest known site of *P. glanduliferum* and always high up in the mountains, while the latter is a plant of the sea level. *P. wilhelminiae* is reproductively isolated from its next relative, and at least as different from *P. glanduliferum* as *P. liemianum* is different from *P. chamberlainianum*."

In respect to this, the following must be said:

- (a) Williams's and Reisinger's *P. glanduliferum*, of course, is *P. praestans*, the former only known from an herbarium specimen of uncertain origin,
- (b) geographical separation in its own right is not a valid characteristic with which one should separate species [indeed, this would only allow for a consideration of *P. wilhelminiae* as a mountain race of *P. praestans*], and
- (c) whether there is reproductive segregation or not cannot be deduced from the data hitherto available.

Paphiopedilum wilhelminiae is accepted here as a valid, autonomous species because of the morphological differences of the plant.

DESCRIPTION

Paphiopedilum wilhelminiae is an herbaceous perennial growing in soil intermixed with leafy debris. The plants form large clumps with clustered growths. There are 4 to 6 leaves which are linear-oblong, obtuse and three-toothed at the tips. They are up to 30 cm long by 2 to 3.5 cm wide, uniformly dark green, glabrous. The inflorescence generally bears 2 or 3 flowers (rarely only one). The inflorescence is 30 to 50 cm long, greenish-brown to purple, covered with short bristles. The bracts are ovate and acute, up to about 4.5 cm long, glabrous, pale yellow ornamented with purple stripes, ciliate. The pedicel and ovary are 5 to 7 cm long, only sparsely covered with short hairs or glabrous, chestnut-brown. The large flowers are 12 to 16 cm across. The sepals are whitish-yellow with maroon veins. The dorsal sepal is ovate, acuminate, 5 to 5.5 cm long by 2.5 to 3.0 cm wide. The synsepal is similar in shape, 5.3 to 5.5 cm long by about 3.0 cm wide. The petals are deflexed, somewhat helically twisted, linear-tapering, 5 to 7 cm long by about 1 cm wide, yellow with dark maroon veins at the base and maroon above. The petals have very few or are without any marginal warty structures. The lip is 3.5 to 4.5 cm long by about 2 cm wide, three-lobed. The side-lobes are acute, curved inward and thus forming the usual tube. The main lobe is shaped like an inverted helmet. The lip is yellow, flushed and veined with purple-brown. The staminodal shield is convex, sub-quadrate, obtuse, about 12 mm long by 10 to 12 mm wide, reddish with a yellow base, the sides covered with brownish hairs.

DISTRIBUTION AND HABITAT

Paphiopedilum wilhelminiae grows in western and central New Guinea. Plants are found near the Wissel Lakes region in western New Guinea (Irian Jaya) eastward to the Southern Highlands Province in Papua New Guinea. Plants grow at 1,700 to 1,800 m on grassy slopes and on limestone rubble in full sunlight. The type specimen was collected on a grassy, deforested slope near the Balim River, at 1,700 m, in December of 1938.

FLOWERING

Paphiopedilum wilhelminiae has been reported to flower in cultivation from November through March and from June through August. In the wild, the plants generally flower in December and January. Blooming occurs in the second year on a mature growth, but a well-established plant with many growths may bloom several times a year.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (fide Cribb, 1998, without reference).

PAPHIOPEDILUM RANDSII

FOWLIE

ORCHID DIGEST, 33(10): 321-322 (1969)

ETYMOLOGY

Named *randsii* for Ray Rands (?-2008), a well-known nurseryman from California.

DISCUSSION

Paphiopedilum randsii was discovered on the Philippine island of Mindanao and designated as the "yellow flowered *P. philippinense* with short petals". Plants were obtained as *P. roebbelenii* by the American orchid nursery of Ray Rands. The species was described by the late Dr. Jack Fowlie (*loc.cit.*). In the early days of its history, the validity of *P. randsii* as an autonomous species was often questioned. Some people saw in this plant merely a "bad *P. philippinense*", but this view was erroneous, and *P. randsii* was soon established as a valid entity. It is, however, evident that *P. randsii* and *P. philippinense* have a number of common characteristics in respect to the structure of the flower; but on the other hand, their differences are too obvious to be ignored.

Fowlie (1969b) suggested that *P. randsii* might be a hybrid between *P. philippinense* and *P. stonei*. That suggestion, however, should be ignored as *P. stonei* has a glabrous ovary and a very distinct column structure. Furthermore, *P. randsii* is very different from the man-made hybrid between the two species suggested, *Paphiopedilum* Mount Toro, registered by R.W. Cryder in 1976. Cribb (1987) suggests that *P. randsii* and *P. philippinense* are derived from the same ancestry, a statement that cannot be regarded as anything but pure guesswork.

Paphiopedilum randsii is unique within its group in that it has auricula (lateral ears) on the pouch.

DESCRIPTION

Paphiopedilum randsii is an herbaceous perennial. Its leaves are oblong-elliptic, up to 35 cm long by 5 to 6 cm wide, rounded at the apex, and uniformly bright green with no mottling. The inflorescence is up to 40 cm high, erect, densely pilose, and generally bears two to 10 flowers. Exceptionally, very well-grown plants can generate up to 14 flowers. Floral bracts are about 3 cm long by nearly 2 cm wide, lanceolate, and acute. The large flowers have whitish to brilliant greenish-white sepals with a number of distinct, maroon-coloured, longitudinal stripes. The upper sepal is narrowly ovate, 3.8 to 4.3 cm long by 1.7 to 2.2 cm wide, somewhat inclined over the lip, concave, and the apex is sparsely pubescent. As in all species of the genus, the lateral sepals are united into a synsepal which is similar to the dorsal sepal but smaller. It is 3.0 to 3.3 cm long by 1.8 to 2.2 cm wide and somewhat truncated at the apex. Petals are linear-lanceolate,



PAPHIOPEDILUM RANDSII
WATERCOLOUR PAINTING BY FANNY AGUSTINA
COURTESY OF FANNY AGUSTINA



PAPHIOPEDILUM RANDSII

COURTESY OF DR. MIGUELDAVID DE LEON

rounded at the apex, and 3.7 to 4.6 cm long by 0.4 to 0.7 cm wide. They are light green with maroon longitudinal stripes, shortly pilose along the margins, and curve down and in toward the lip. The three-lobed lip is shaped like an inverted helmet, more or less bright yellowish-green with darker veins, and about 2.8 to 3.2 cm long by 1.2 to 1.5 cm wide. The blunt side lobes are folded inward. The middle lobe has auricula (lateral "ears") at the base and a distinct groove at the apex. The staminodal shield is elliptic, truncate at the apex, and about 0.5 cm long by about 0.5 cm wide. It is bright green and has distinctly pubescent margins.

DISTRIBUTION AND HABITAT

Paphiopedilum randsii is found only in the Philippines on northeast Mindanao Island. Plants grow on Mt. Diuata in Surigao del Sur Province and in Agusan Province. They are found in thick clumps on the forest floor at about 400 m in moderately dense forest with their roots embedded in decaying leaf litter.

FLOWERING

Paphiopedilum randsii flowers mainly from May through July. This species is reputed to be difficult to flower in cultivation.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa, 1979).

PAPHIOPEDILUM ROTHSCHILDIANUM

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 482 (1892)

BASIONYM

Cypripedium rothschildianum Reichenbach fil.

THE GARDENERS' CHRONICLE, 3rd series., 3: 457 (1888)

SYNONYMS

Cypripedium neo-guineense Linden

THE GARDENERS' CHRONICLE, 3rd series., 3: 505 (1888)

Cordula rothschildiana (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

Cypripedium nicholsonianum Hort., *nomen nudum*

A specimen from the Royal Botanic Gardens, Glasnevin, conserved in the Kew Herbarium

ETYMOLOGY

Named *rothschildianum* for Baron Ferdinand de Rothschild (1839-1898) who was one of the key customers of the Sander establishment.

DISCUSSION

Paphiopedilum rothschildianum is still considered the most spectacular orchid within the genus, despite the rediscovery of the marvellous and intriguing *P. sanderianum*. It was named for Baron Ferdinand de Rothschild, possibly the most eminent of all orchid growers in Victorian times, and probably the most distinguished customer of the Sander establishment. *Paphiopedilum rothschildianum* was introduced into cultivation by the famous Belgian nurseryman Jean Jules Linden in May 1887 and by the company of Sander & Son of St. Albans, England, in early 1888. The species was originally described by the younger Reichenbach, who had received material from Sander which was said to originate in New Guinea. Cribb (1987) may well have been right in suggesting that this might have been a deliberate attempt by Sander to mislead his competitors, as it is now generally accepted that the natural distribution of *P. rothschildianum* is limited to the northeastern part of Borneo.

Cribb (1987, 1997) limits its distribution to only two or three sites "on the lower slopes of Mount Kinabalu". Linden, who imported plants of this species nearly a year before Sander, also reported its origin as being New Guinea. Unfortunately all documents from the Linden establishment remain lost, and thus, it is questionable whether we will ever know through which channels the first specimens of *P. rothschildianum* reached Europe. Linden subsequently offered the plants for sale as *Cypripedium neo-guineense* in THE GARDENERS' CHRONICLE in 1888. This designation, however, appeared after



PAPHIOPEDILUM ROTHSCILDIANUM IN SITU
COURTESY OF ROGIER VAN VUGT



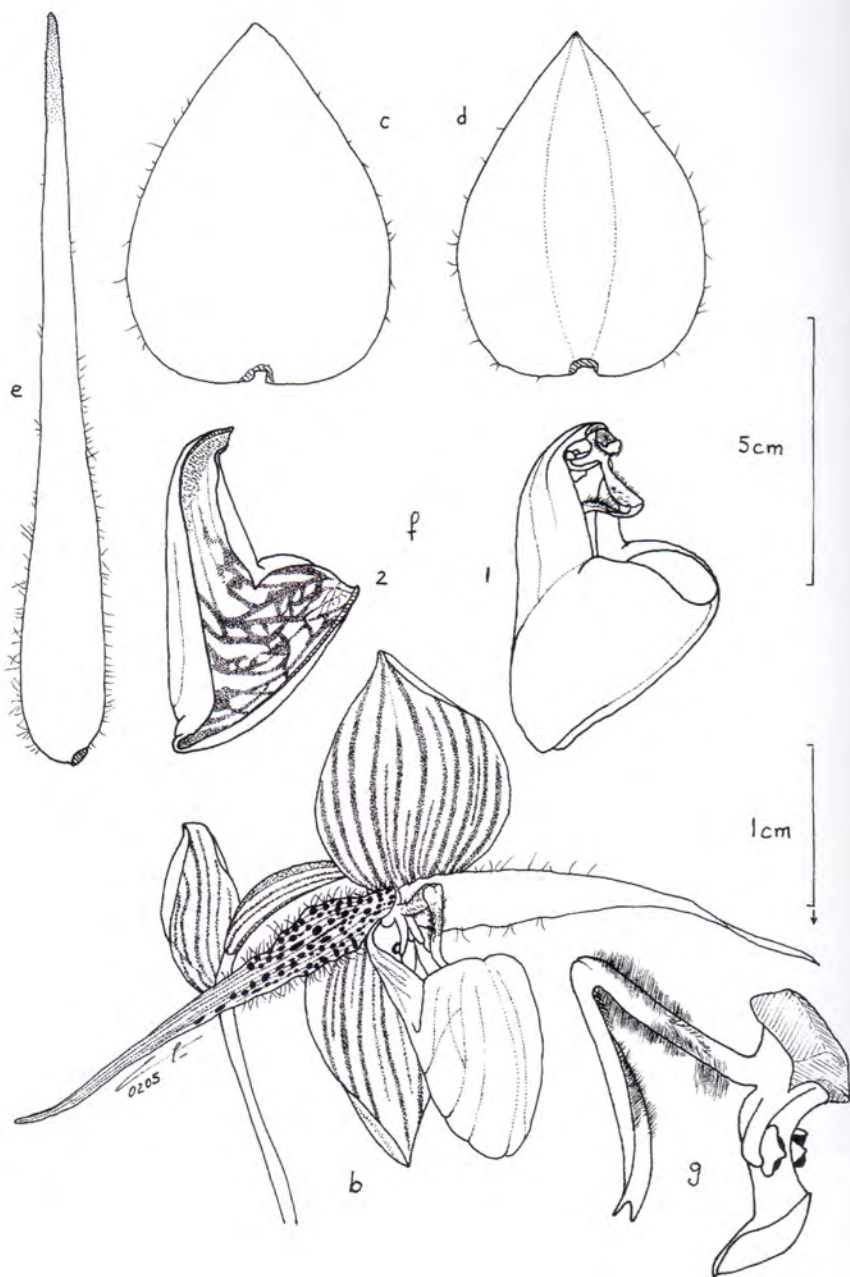
PAPHIOPEDILUM ROTHSCILDIANUM
COURTESY OF DOROTHY POTTER BARNETT



PAPHIOPEDILUM ROTHSCILDIANUM
WATERCOLOUR PAINTING BY IRENE NG
COURTESY OF IRENE NG



PAPHIOPEDILUM ROTHSCILDIANUM
COURTESY OF DOROTHY POTTER BARNETT



PAPHIOPEDILUM ROTHSCHILDIANUM
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON

the Reichenbach description was published, and it is, therefore, to be regarded as a synonym.

Further confusion about *P. rothschildianum* came from the description of *P. elliottianum* by O'Brien and Gower, a plant said to originate from the Philippines but often considered identical to *P. rothschildianum*.

Paphiopedilum rothschildianum is closely related to *P. supardii* from Kalimantan, *P. gigantifolium* from Sulawesi, *P. praestans* from New Guinea, and *P. adductum* from the Philippines. It clearly differs from these taxa, however, by its overall flower morphology and especially by its very distinctive staminode, which is narrow with a knee-like bend at the base and a bifid tip. The staminode has often been compared with the head and beak of a large bird.

DESCRIPTION

Paphiopedilum rothschildianum is, as are all tropical slipper orchids, an herbaceous perennial plant. Its leaves are sub-erect, bright green, uniformly coloured without any mottling, narrowly elliptic to strap-shaped, and up to 60 cm long by 4.5 to 7.5 cm wide. The inflorescence is up to 45 cm long, reddish, minutely pubescent, and generally bears three to six flowers. The floral bracts, which are nearly two-thirds as long as the glabrous ovary, are three-toothed at the apex and bright yellow-green with nearly black longitudinal stripes. The dorsal sepal is about 6.5 cm long by 3.5 to 4.5 cm wide, ovate, and acute. It is yellowish with numerous very dark, nearly black longitudinal stripes and white margins. The synsepal, which is similar in colour and width to the dorsal sepal, is about 5.5 cm long. The spreading, linear-lanceolate petals are nearly horizontal. Petals are 10 to 14 cm long by about 1 cm wide and attenuate into a more or less acute apex. The basal part of the petals is undulate, and the apical part is twisted. They are greenish-yellow with dark spots near the base and have dark longitudinal stripes that extend the entire length. The lip is distinctly saccate, somewhat laterally compressed, protruding, and 4.5 to 5.8 cm long by about 2.2 cm wide. It is cinnamon-coloured with vermilion around the mouth. The staminode is peculiarly structured, resembling the head and beak of a crane, with a long, two-toothed apex held at right angles to the base. It is hairy at the base and along the margins. *P. rothschildianum* is somewhat variable in vegetative size and flower colour. Smaller plants usually have more deeply coloured, better-shaped flowers.

DISTRIBUTION AND HABITAT

Paphiopedilum rothschildianum has been found in northern Borneo. The best known locations are on the lower slopes of Mt. Kinabalu at 600 to 1,200 m. Plants grow in leafy humus on ledges of steep, northeast-facing cliffs and slopes of eroded serpentine. Plants normally are found near running water, and apparently thrive in both high light and shady situations.



HABITAT OF *PAPHIOPEDILUM ROTHSCILDIANUM*
COURTESY OF ROGIER VAN VUUT

FLOWERING

Paphiopedilum rothschildianum flowers all year round with a peak season from March through July.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan, 1947; Duncan & MacLeod, 1949; Karasawa, 1979).

Atwood (1985) has shown that the strange beak-like staminode plays a most important role in the pollination of the plant by syrphid flies of the genus *Dideopsis*. The glandular hairs of the staminode mimic a colony of aphids, which is the natural brood site of the syrphid larvae. Females of the fly *Dideopsis aegrota* are attracted by the staminode where they land to deposit their eggs on its surface. Some of the flies fall in the pouch of the orchid and find the only way to escape is the gap between the stigma and pollinia. When the fly crawls through the gap, pollinia are deposited on the fly's body. A visit by that fly to a second flower followed by the same accident of falling into and escaping from the pouch, results in pollination.

VARIETIES AND FORMS

Paphiopedilum rothschildianum is somewhat variable in respect to flower colour. Rumours of an albino plant of *Paphiopedilum rothschildianum* have surfaced repeatedly. The plant in question is known to the author and is a faintly coloured specimen but by no means an albino of any sort. This plant was allegedly selfed and seedlings from this selfing have been and possibly still are put on the market as *P. rothschildianum* var. *albinum*.

PAPHIOPEDILUM ROTHSCILDIANUM VAR. ELLIOTTIANUM

(O'BRIEN & GOWER) PFITZER

ENGLER, DAS PFLANZENREICH, 4(50), HEFT 12: 59 (1903)

BASIONYMS¹²

Cypripedium elliotianum O'Brien

THE GARDENERS' CHRONICLE, 3rd series, 4: 501 (1888 [3 Nov.])

Selenipedium elliotianum Gower

THE GARDEN, 34: 408 (1888 [3. Nov.])

SYNONYM

Paphiopedilum elliotianum (O'Brien & Gower) Stein

STEIN'S ORCHIDEENBUCH, 466 (1892)

ETYMOLOGY

Named *elliotianum* in honour of Mr. Elliott, of Young & Elliott, a nurseryman from New York.

DISCUSSION

The enigma of *Paphiopedilum elliotianum* has, for a long time, been one of the foremost problems when attempting to clarify the taxonomy of *Paphiopedilum* subgenus *Polyantha*. This taxon has been the subject of many speculations and publications, and no matter how deeply one pursued the matter, the questions remained for a long time. Now, we can welcome evidence that supports the identification of the taxon as a variety of *P. rothschildianum*, as first published by Ernst Pfitzer in 1903. Indeed, the picture of a plant collected in the area near Ulu Tomani, about 150 km southeast of Mount Kinabalu, in southern Sabah, corresponds to the drawing that was published with the original advertisement of the taxon by Frederick Sander.

Evidently, *P. elliotianum* is to be considered a variety of *P. rothschildianum*, and differs from the type specimen only by its drooping petals.

¹² The descriptions by J. O'Brien and W. H. Gower were based on plants of the same species which originated from the same lot imported by Sander & Co. Both descriptions were validly published, and since it is impossible to establish a priority between the two publications, there are two basionyms, and the taxon is to be credited to both authors.



PAPHIOPEDILUM SANDERIANUM
WATERCOLOUR PAINTING BY EUNIKE NUGROHO
COURTESY OF EUNIKE NUGROHO

PAPHIOPEDILUM SANDERIANUM

(REICHENBACH FIL.) STEIN

STEIN'S ORCHIDEENBUCH, 482 (1892)

BASIONYM

Cypripedium sandertianum Reichenbach fil.

THE GARDENERS' CHRONICLE, 2nd series, 25: 554 (1886)

SYNONYMS

Cordula sandieriana (Reichenbach fil.) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Cypripedium foerstermannii Hort. *nomen nudum*

ETYMOLOGY

Paphiopedilum sandertianum was named for Heinrich Friedrich Conrad "Henry Frederick" Sander (1847-1920), the famous German-born nurseryman of St. Albans, England.

DISCUSSION

In 1885, Frederick Sander dispatched his German orchid collector Förstermann to Borneo in search of *Paphiopedilum stonei* var. *platytaenium*, a mutative form that fetched enormous prices (see under *P. stonei*). Sander did not know that the plant was a mutation, and naturally, Förstermann failed to find it. During his search, however, Förstermann came across a plant that appeared to be a new slipper orchid, and a shipment was sent to Sander, who managed to flower the first specimens in the spring of 1886. As usual, the younger Reichenbach was called upon to describe and publish the plant, which, indeed, proved to be new to science, and was duly named *Cypripedium sandertianum*. As occurred with all plants discovered in Borneo at that time, the place of origin was misleadingly said to be the Malayan Archipelago. This was often done to fool other collectors.

Cribb (1987, 1997) states that the plant has always been rare in cultivation and that "By the turn of the century, it had probably disappeared from orchid collections." That may well have been true in Great Britain, but there is evidence that *P. sandertianum* survived in a few collections for quite some time beyond that date. In the collection of the French Senate, it was used for hybridisation around 1910, and in the famous Ross collection in Florence, Italy, it may have survived much longer.

By the early part of the 20th century, however, *P. sandertianum* had become known only from drawings and paintings, many of which were not easily obtainable. They include the painting in John Day's SCRAPBOOKS, which could until recently only be consulted in the Kew Herbarium; an illustration prepared by the famous Walter Fitch for Sander's REICHENBACHIA (1898); an illustration in THE PROCEEDINGS OF THE LINNEAN SOCIETY OF NEW SOUTH WALES (1889); and a number of line drawings, such



PAPHIOPEDILUM SANDERIANUM
COURTESY OF JASON ONG



PAPHIOPEDILUM SANDERIANUM
COURTESY OF JASON ONG

as the ones in the *DEUTSCHE GARTENZEITUNG* (1886), Veitch's work *A MANUAL OF ORCHIDACEOUS PLANTS* (1889), and *THE GARDENERS' CHRONICLE* (1896).

The plant became such an enigma that even its existence was questioned. Schaffer (1974) suggested that it was either a hybrid or a monstrosity of *P. rothschildianum*.

In 1984, finally, Alexander reported that *P. sanderianum* was rediscovered in 1978 in Sarawak on Borneo by Ivan Nielsen. In the early nineteen-eighties it was offered for sale for \$10,000 (!) in the pamphlet of a California nursery. In 1985, the Austrian engineer Paul Mattes found the habitat of the species and brought some plants to continental Europe. Two of these were grown at the botanical gardens in Frankfurt, Germany, and flowered shortly before Christmas 1985.

Since then, several collections of *P. sanderianum* have reached Europe, and in the meantime, artificially propagated plants also have become available.

Paphiopedilum sanderianum is one of the most splendid species of the genus, and it does, without any doubt, rival *P. rothschildianum*. Tennison-Woods (1889) declared it "the most wonderful flower in an order where wonderful structures are the rule." In his exceptionally long original description, Reichenbach (1886) called it an "extraordinary surprise as well as a beauty".

DESCRIPTION

Paphiopedilum sanderianum is an herbaceous perennial, growing generally in decaying leaf-litter. The stems are short, bearing approximately six elongated, linear leaves, which are up to 45 cm long by about 4.5 cm wide. Each leaf is shiny and unequally two-lobed at the apex. The upper surface is uniformly green, and the under surface is distinctly keeled with a purple spotted basal area. The inflorescence is erect, purple, covered with short purple hairs, measures up to 60 cm long by about 0.5 cm in diameter, and generally bears two to five flowers. The floral bracts are narrowly elliptic, rounded at the apex, and generally up to 8 cm long by about 3 cm wide. They are purple with a green apex, and the ciliate edges are striped with dark purple. The white ovary, which is up to 7 cm long by about 1 cm in diameter, is six-sided and sparsely hairy. Flowers are approximately 7 cm high, not counting the pendulous elongated petals. The dorsal sepal is broadly lanceolate, acute, hooded at the tip, keeled, and about 5.5 cm long by approximately 2.5 cm wide. It is pubescent, especially on the keel and at the tip, and pale greenish-yellow with purple margins and about ten brownish-purple stripes. The synsepal is narrowly lanceolate, two-keeled, rounded to truncate at the apex, deeply concave, and about 5 cm long by 2 cm wide. It is similar in colour and degree of pubescence to the dorsal sepal but has narrower longitudinal stripes. Petals are linear and twisted near the base, horizontal for about 3 cm and then abruptly turn downward and taper into long, pendulous filaments, which are often up to 80 cm long. Petals up to 1 m long are reported in the literature. They are about 5 mm wide at the base, approximately 9 mm wide at the "shoulder", and taper to 1.5 to 2.0 mm wide above the swollen fleshy tip. Petals are coarsely ciliate and pale yellowish-green with irregular, brownish-purple spots and blotches at the base, but they become entirely purple toward the tip. The lip

is yellowish-green flushed with purple, deeply saccate, obtusely pointed, 5.5 to 6.5 cm long by 2.0 to 2.5 cm wide. Its rear margins are turned inward. The staminode is oblong with reflexed and densely pilose margins.

DISTRIBUTION AND HABITAT

Paphiopedilum sanderianum is found in Borneo in northern Sarawak near the border with Brunei at 150 to 600 m. Plants grow on vertical, southeast-facing limestone cliffs that are shaded except for dappled morning light. Plants usually grow with roots embedded in moss and leaf litter near water seepages in cracks on limestone rocks. However, they are occasionally found in tree crotches with their roots in moss and accumulated forest debris.

FLOWERING

Paphiopedilum sanderianum (like most plants of subgenus *Polyantha*) flowers throughout the year upon completion of the new growth. In nature, the plants generally flower from late March through June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa *et al.*, 1997).

A great number of plants sold as seedlings of a cross between two clones of *P. sanderianum* ('Deep Pockets' x 'Jacob's Ladder') have proven to be *P. Prince Edward of York*, the primary hybrid of *P. sanderianum* and *P. rothschildianum*.

VARIETIES AND FORMS

There have been rumours about the existence of an albino *P. sanderianum*. They have never been substantiated. Hitherto, no varieties of *P. sanderianum* have been described.



PAPHIOPEDILUM STONEI

WATERCOLOUR PAINTING BY ANANDA FIRMAN

COURTESY OF ANANDA FIRMAN

PAPHIOPEDILUM STONEI

(HOOKER) STEIN

STEIN'S ORCHIDEENBUCH, 487 (1892)

BASIONYM

Cypripedium stonei Hooker

CURTIS'S BOTANICAL MAGAZINE, 88: t. 5349 (1862)

SYNONYM

Cordula stonei (Hooker) Rolfe

THE ORCHID REVIEW, 20 (1): 2 (1912)

ETYMOLOGY

Paphiopedilum stonei was named in honour of "Mr. Stone, Mr. Day's able gardener" (Hooker, 1862).

DISCUSSION

Hugh Low collected the first plants of this species and brought them to England under the assumption that they were specimens of *Paphiopedilum lowii*. Plants were purchased by John Day, whose gardener, Robert Stone, managed to flower some of the plants the following year. Following a request by Low, William Jackson Hooker described the species as *Cypripedium stonei*. Hooker noted:

"Nothing like this, as far as I know, has ever been received from the Old World; but it is evidently allied to a species gathered by Ruiz and Pavon, in Peru, *C. caudatum* of Dr. Lindley".

P. stonei is one of the most desirable of all species within the genus, and until the late nineteen-eighties relatively large numbers of plants were brought to Europe. In the meantime, the species has become rather rare in cultivation, especially as wild-collected plants of *P. stonei* are very difficult to establish and need special care in a suitable greenhouse. Well-established plants, however, are very easy to grow and flower.

P. stonei is difficult to confuse with any other species. It is rather variable in respect to flower colour, and several unusual plants have received recognition as varieties (see below).

DESCRIPTION

Paphiopedilum stonei is an herbaceous perennial which attains an overall height of about 60 cm. The strap-shaped leaves are very leathery, uniformly grass-green and 30 to 70 cm long by up to 4.5 cm wide. The inflorescence is greenish-purple, slightly pubescent, up to 70 cm tall, and bears three to five flowers. The floral bracts are lanceolate,

acuminate or acute, 3.5 to 5.5 cm long by about 2 cm wide, thus covering about two-thirds of the ovary. Flowers are up to 12 cm across. The dorsal sepal is ovate to cordate, acuminate, and white, usually with at least two to three very dark crimson, longitudinal streaks. It is 4.5 to 6.5 cm long by about 4 cm wide and keeled on the back. The synsepal is similar but somewhat smaller, elliptic-ovate, 3.6 to 5 cm long by 2 to 3.5 cm wide. The petals are linear-tapering, 12 to 15 cm long and about 0.75 cm wide (up to 2 cm wide in var. *platytaenium*), arcuate-pendent, and more or less twisted, with a few black ciliate hairs on each margin toward the base. The yellowish petals are suffused with elongated brown spots from the base toward the apex, and the apical one-third is wholly brownish-crimson. The projecting, calceiform lip is 4.5 to 6 cm long by about 2.5 cm wide. It is dull rose-colored, veined and reticulated with crimson, and whitish beneath. The narrow, infolded lobes are whitish. The staminode is ovate-oblong to sub-circular, convex, truncate or incised at the apex, about 15 mm long by about 1 cm wide, yellowish-white, fringed, and densely covered with bristle-like hairs except for the glabrous front.

DISTRIBUTION AND HABITAT

Paphiopedilum stonei is found in Borneo near Kuching, Sarawak, at 60 to 500 m. It usually grows on steep, northeast-facing limestone slopes or cliffs and is lightly shaded by the crowns of trees growing at the base of the cliff. The plants cling to the limestone with only a minimum of humus and leaf litter around the roots. However, the roots are often embedded in mosses.

FLOWERING

In nature, plants bloom in late spring and early summer. *Paphiopedilum stonei* blooms on growths that are two to three years old. In cultivation, plants can bloom all year round.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Duncan, 1947; Duncan & MacLeod, 1949; Karasawa, 1979).

VARIETIES AND FORMS

The most remarkable of the plants described as varieties of *P. stonei* was most certainly var. *platytaenium* published by Reichenbach fil. in 1867. The designation was derived from the Greek where “*platy*” means “broad” and Latin where “*taenias*” means “flat ribbon”, and obviously refers to the extraordinary broad ribbon-like petals of this variety. Most probably, however, this was a unique clone. It was owned by John Day, who sold five divisions of the plant, two to Veitch (one in 1878 and one in 1881) and the remaining three at the sale of his collection in 1881. Of the latter three, Taylor (1975) reported that one was obtained by Sir Trevor Lawrence, who paid the highest price, and the other two went to Baron Schröder. Lucien Linden (1894) gives a more detailed account of this sale and the fate of *P. stonei* var. *platytaenium*. According to him, only “small plants”



PART OF AN INFLORESCENCE OF *PAPHIOPEDILUM STONEI*
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

were sold at the 1881 sale, one for 2,650 francs to Baron Schröder and one for 3,675 francs to Sir Trevor Lawrence. According to Linden, one more plant originating from the Day collection was sold "after Mr. Day's death" for 3,976 francs, and a further plant of this extraordinary variety, "from the collection of Mr. Lee of Leatherhead" for 8,137 francs in 1887. Linden ends his paragraph on the sale of *P. stonei* var. *platytaenium* by stating that the Lee plant was estimated to have a value of 25,000 francs in 1894. Nothing is known about the origin of Mr. Lee's plant, but it may well be assumed that it was a division of the Day specimen.

The division obtained by Sir Trevor Lawrence received a Silver Medal at the 1895 Temple Show in London, England where it was exhibited "with two spikes of two flowers each." In 1899 it had five growths, and an inflorescence with three flowers was pictured in THE GARDENERS' CHRONICLE. The plant perished sometime before the First World War. There is not much information on the fate of the other divisions, but at least one of the plants obtained by Baron Schröder was still alive in 1894. It may, however, be assumed that they also perished long ago.

It is interesting to note that John Day painted a specimen which had one normal petal and one "*platytaenium*." This flower is preserved at Kew. Schaffer & Taylor (1975) reported that the plant produced fully normal blooms upon the next flowering.

H.G. Reichenbach (1867) hinted at the possibility that *P. stonei* var. *platytaenium* may have been a natural hybrid between *P. lowii* and *P. stonei*. That would have made the plant identical with the hybrid registered as *Cypripedium Mercatelii* by Linaria in 1904. Fowlie (1975), on the other hand, postulated that *P. stonei* var. *platytaenium* represented a natural hybrid between *P. stonei* and *P. hookerae*, which, if true, would make it identical with the artificial hybrid registered by Veitch as *Cypripedium Melanthus* in 1893. However, none of these hybrids resembles the drawings of *P. stonei* var. *platytaenium*.

The plant described by Linden (1888) as *Cypripedium stonei* var. *album* was nothing but a faintly coloured normal clone. It is by no means an albino as one would expect from the variety name.

Paphiopedilum stonei subspecies *Stictopetalum*, described by M.W. Wood in 1977, is a man-made hybrid originating from a nursery in Java. Cribb (1987) suggests that it is a cross between *P. stonei* and the Himalayan species *P. spicerianum*, which would make it the same as the artificial hybrid *Paphiopedilum Alice*, registered by Drewett in 1890.

Within the judging system of the American Orchid Society, a plant has been awarded as *Paphiopedilum stonei* var. *latifolium* 'Ruth Kennedy'. This plant does not represent *P. stonei* but shows a very close affinity to *P. kolopakingii*. It has been suggested that it is a hybrid between *P. kolopakingii* and *P. stonei*, but it proved impossible to substantiate this hypothesis by the examination of the flowers. Karasawa (1986) established the mitotic chromosome count of the plant and reported the karyotype as "extremely similar to that of *P. stonei*". The plant was described as an autonomous species (Gruß., 2001) under the name of *Paphiopedilum platyphyllum* and as such we include it in this book.



CYPRIPEDIUM STONEI PLATYTAENIUM

PAPHIOPEDILUM STONEI VAR. *PLATYTAENIUM*
 PLATE 496 OF THE ORCHID ALBUM, VOL. 11 (1897)
 PAINTING BY JOHN NUGENT FITCH (1840-1927)

In 1985, a plant designated as "*Paphiopedilum stonei album Formosa*" was found among plants cultivated at a Taiwan nursery, the fate of which remains unknown.

Recently, an albino of *Paphiopedilum stonei* was published as *Paphiopedilum stonei* forma *luteo-album* by Harold Koopowitz and Olaf Gruß (ORCHID DIGEST, 80[1]: 20-21 [2016]). The flowers are mainly white, yellow and green. At the base of each petal, there is an orange dot. Koopowitz and Gruß also report that the "original albino" which they had reported in 2008 (ORCHID DIGEST, 72: 133) was "white with green stripes, green petals and pouch on white background", and postulate the possible existence of two "colour phases" in the albino forms of *P. stonei*. Neither the "*Formosa*" plant nor the plant available to Koopowitz and Gruß in 2008 was ever validly published and both plants have since perished.

PAPHIOPEDILUM PLATYPHYLLUM

YUKAWA EX GRUSS

DIE ORCHIDEE, 52(1): 84-87 (2001)

SYNONYMS

Paphiopedilum fumi Hort. (*nomen nudum*)

Paphiopedilum stonei var. *latifolium* Hort. (*nomen nudum*)

Paphiopedilum sugiyamii Hort. (*nomen nudum*)

ETYMOLOGY

Paphiopedilum platyphyllum was named in reference to the extreme width of the leaves.

DISCUSSION

Although we have serious doubts about the provenance of this taxon and its validity as an autonomous species, we include it for the sake of completeness.

This taxon is generally known under the designation *Paphiopedilum stonei* var. *latifolium*. According to Gruss (*loc. cit.*), it was discovered by Mr. Toyoshima in 1964 in Sarawak, Borneo. Quené (2003) claims that the plant was discovered by Dr. Yoshishige Tachibana at 800 metres, near the summit of Bukit Kana. According to the Quené report, Tachibana found a population of about 30 plants and collected 20 of them. Fifteen of the plants were passed on to Fumimasa Sugiyama of Yamata-Noen Orchids who, some years later, sent a division to Norwood Schaffer in Baltimore, Maryland, USA. The plant was passed on to the geologist George Kennedy, who erroneously coined the name "*Paphiopedilum stonei* var. *latifolium*" and obtained the now "legendary" award from the AOS.

For many years, insiders have suggested that the plant is nothing but a manmade hybrid of *P. stonei* and an undisclosed second parent. The karyotype is very close to that of *P. stonei* (Karasawa, 1986). All plants known to be in cultivation are divisions of the plant awarded in the United States under the clonal designation 'Ruth Kennedy'.

According to Gruss (2001), Yukawa studied the macromolecular characteristics and reported that "the nuclear and plastid DNA markers show a great similarity to those of *P. stonei*, *P. kolopakingii*, and *P. supardii*." The study was never published, and therefore cannot be verified and remains useless.

Koopowitz (2019) considers it to be "A magnificent plant that appears to be a natural hybrid between *P. stonei* and *P. kolopakingii* but with more affinities to the latter species." He credits the discovery to Mr. Sugiyama who has claimed (in a letter to Koopowitz) to have discovered the plant as a single population in Sarawak, Borneo.

Neither the publications by Gruss and Koopowitz, nor the elaborate and well-illustrated article by Quené goes beyond assumptions based on hearsay and allegations.



PAPHIOPEDILUM PLATYPHYLLUM

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

DESCRIPTION

Paphiopedilum platyphyllum is an herbaceous perennial, said to be usually growing on moss-covered rocks with its roots embedded in leafy humus. The plants have a short rhizome. The roots are fleshy, long, and covered with hairs. Each growth produces up to 7 leaves. The leaves are up to 45 cm long by up to 8.5 cm wide, non-tessellate, ligulate, arcuate, folded, glabrous, distinctly keeled beneath, the upper surface bluish-green, the under surface a brighter green. The inflorescence is erect and generates up to 5 flowers that open simultaneously. The inflorescence is up to 40 cm long. The floral bract is lanceolate, sparsely covered with hairs, bright yellowish-green striped with brown, up to 6.5 cm long by up to 3.5 cm wide. The flowers are large, fleshy, glossy, generally 13 to 19 cm wide in their natural position on the living plant. The ovary and pedicel are yellowish-green spotted with reddish-brown. The sepals are a dull cream-ochre with whitish margins, the inside striped brown, and the outside spotted brown. The petals are greenish-ochre, spotted brown and with chestnut-brown warty structures on the inside. The lip is cream-ochre, veined and spotted brown; the staminode is cream-ochre, covered with short ochre-coloured hairs. The ovary is narrowly spindle-shaped, up to 7.5 cm long by 0.6 cm wide. The dorsal sepal is ovate to lanceolate, acuminate, the inner surface covered with short hairs, distinctly keeled on the outside, 6.2 to 7 cm long by 4 to 4.2 cm wide. The synsepal is broadly ovate, acuminate, the outer side with two keels, 5.6 to 6.3 cm long by 2.4 to 3.3 cm wide. The petals are linear, acute, spreading, spirally twisted, especially near the apex, ciliate, inside and outside covered with hairs, 14.3 to 16 cm long by 0.7 to 0.9 cm wide. The lip is deeply saccate with a distinct groove on the back, the outer surface glabrous, 5.3 to 5.8 cm long by 1.8 to 2.0 cm wide. The column is 2.1 cm long. The staminodal plate is nearly square, convex, the upper and side margins covered with hairs, 1.1 cm long by 1 cm wide. The stigmatic surface is sub-circular, convex, and translucent. There are two anthers, one on each side of the stigmatic surface.

DISTRIBUTION AND HABITAT

Paphiopedilum platyphyllum is said to have been collected only once at an undisclosed site in Sarawak on the island of Borneo. According to the type description, the plants were growing on steep rock faces alongside a waterfall at an elevation of 800 m. above sea level.

FLOWERING

The plants were allegedly collected in flower in April. In cultivation, plants of this entity flower from March through June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa, 1986; Quené [personal communication]).



PAPHIOPEDILUM SUPARDII
WATERCOLOUR PAINTING BY HENNY HERAWATI
COURTESY OF HENNY HERAWATI

PAPHIOPEDILUM SUPARDII

BRAEM & LÖB

DIE ORCHIDEE, 36 (4): 142-143 (1985)

SYNONYMS

Paphiopedilum praestans sensu Van Vloten

DE ORCHIDEE, 2(9): 214 (1933)

Paphiopedilum praestans sensu Van Hell

DE ORCHIDEE, 7(7): 157-159 (1938)

Paphiopedilum "victoria" de Vogel

PANDA NIEUWS 12: 117 (1975), *nomen nudum*

Paphiopedilum devogeli Schoser & Van Deelder ex Schoser

PROCEEDINGS OF THE WORLD ORCHID CONFERENCE (BANGKOK), (1978), *nomen nudum*

ETYMOLOGY

Paphiopedilum supardii was named in honour of Mr. Supard, the collector of the type material.

DISCUSSION

During a research trip to Java and Sumatra in the spring of 1985, representatives of the Indonesian Orchid Society handed our author some plant material of a supposedly new *Paphiopedilum* species with the request to describe the plant in honour of their collector, Mr. Supard.

The plants were examined carefully. During the study phase, the name of a "*Paphiopedilum devogeli*" was found in the literature. Indeed, in a lecture held at the 1978 World Orchid Congress in Bangkok, Dr. Schoser claimed that he and Van Deelder had described a species under that name. During a conversation in his office at the Frankfurt Municipal Botanical Gardens (Palmengarten), Dr. Schoser admitted to having fooled his Bangkok audience and declared that he had never described such a taxon, and that he did not even have any recollection of what plant he had referred to in his talk. Furthermore, he confirmed that he did not have any material, living or dried, of any plant similar to the plant on which the *Paphiopedilum supardii* concept is based.

The conclusion was reached that the material obtained in Indonesia indeed represented a new, at the time undescribed, species of *Paphiopedilum* belonging to the section *Mastigopetalum* of subgenus *Polyantha*. In 1985, Braem and Löb published the concept in DIE ORCHIDEE, the journal of the German Orchid Society (D.O.G.).

The claims by several British and Dutch botanists that *Paphiopedilum supardii* had been awaiting publication as *P. devogeli* for seven years in the drawers of the Kew offices may



PAPHIOPEDILUM SUPARDII
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC



PAPHIOPEDILUM SUPARDII

COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

or may not be true. If true, the question must be asked why the concept had not been published. Furthermore, the claim that *P. supardii* was discovered by E. F. de Vogel does not survive scientific scrutiny.

In the 2nd volume of DE ORCHIDEE (1933), a photograph showing an inflorescence of *P. supardii* with five well-developed flowers was printed. This Dutch language orchid journal was published in the Dutch East Indies (Indonesia) long before E. F. de Vogel was born. At the time, the plant was considered a possible variety of *P. praestans* and labelled accordingly. This opinion was reiterated and confirmed in the same orchid journal five years later, using the same photograph as in the 1933 edition.

Paphiopedilum supardii is closely related to *P. rothschildianum* and *P. gigantifolium* from which it clearly differs by its flower morphology. It is interesting to note that the flowers of all specimens of *P. supardii*, hitherto seen in cultivation, are always asymmetrical and appear somewhat deformed.

DESCRIPTION

Paphiopedilum supardii is an herbaceous plant growing in leafy debris and humus. Leaves are up to 50 cm long by about 5.5 cm wide, uniformly dark green, glossy, fairly leathery, and tongue-shaped, with fine incisions at the apex. The inflorescence is 35 to 40 cm tall and bears several flowers that open more or less simultaneously. The floral bracts are about 5 cm long, which is the same length or slightly longer than the ovary. The dorsal sepal is about 5.5 cm long by 2.4 to 2.6 cm wide, ovate, acute, concave, and keeled. It is white with pale green margins and distinctly striped with dark brown. The synsepal is similar but narrower. Petals are 8 to 9 cm long by 7 to 9 mm wide and pale green with dark brown spots and wart-like structures. They are ribbon-shaped and drooping, twisted on the apical part, and acuminate. The clearly saccate lip is about 4.5 cm long by 1.5 to 1.8 cm wide. It is pale to dark brown, with darker brown reticulations. The inwardly folded lateral lobes have white margins. The knee-shaped staminode, which is somewhat like that of *P. rothschildianum*, has a yellow shield and is about 8 mm wide and 8 to 9 mm high. It has dark brown hairs covering the margins of the shield.

DISTRIBUTION AND HABITAT

Paphiopedilum supardii has only been found on Borneo, in West Kalimantan, along the Kapuas River at 600 to 960 m. Plants are usually exposed to morning sun, but they are in shade for the rest of the day.

FLOWERING

Paphiopedilum supardii generally blooms from April through June.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 26$ (Karasawa, 1986).

SUBGENUS COCHLOPETALUM

(HALLIER FIL.) KARASAWA & SAITO (1982)

SUBGENERIC CHARACTERISTICS

Leaves faintly to distinctly tessellated. Inflorescence multifloral, flowers opening sequentially over a long period of time. Pouch shaped like an inverted helmet. Pollen granular. Mitotic chromosome count $2n = 30, 32, 34, 36, 37$. Type: *P. chamberlainianum*

DISCUSSION

The plants of this group form an easily defined, well-differentiated entity within the genus *Paphiopedilum*. They are readily identified as members of this subgenus by having an inflorescence that produces multiple flowers in sequence. In general, not more than two flowers open simultaneously. Nevertheless, specimens with three flowers open at one time are known. By this single alpha-taxonomic characteristic, the group is well delimited. The sequential opening of the flowers and the shape, texture, and tessellation of the leaves are ample proof for a great difference in phylogenetic relationship between the subgenera *Cochlopetalum* and *Polyantha*. There is no indication that these two groups should be united, together with single-flowering species, into one huge subgenus. The validity of the subgenus *Cochlopedilum* as an autonomous entity is also confirmed by the results of molecular analysis (Cox *et al.* [1997], Chochai *et al.* [2012], and Liao *et al.* [2019]).

There has been some confusion regarding the correct naming of the plants referred to as *Paphiopedilum chamberlainianum*, *P. victoria-regina* and *P. victoria-mariae* by various authors. These problems, which are of taxonomic rather than systematic nature, will be discussed in detail under the pertinent heading. On the basis of a careful review of the original literature, we have chosen to retain *Paphiopedilum chamberlainianum* and are convinced that *P. victoria-regina* is to be regarded as a lost species, at least until more information becomes available. *Paphiopedilum moquetteanum* is undoubtedly closely related to *P. glaucophyllum*; however, it differs by its chromosome count and several clear morphological differences. *Paphiopedilum kaliniae* is by no means identical with *P. chamberlainianum*, as can be readily seen by a number of morphological characteristics, such as a different shape of the labellum and a compressed inflorescence. *Paphiopedilum liemianum* and *P. primulinum* (including its variety *purpurascens*), which may arguably be part of a single species, are closely related to *Paphiopedilum chamberlainianum* but differ in chromosome number and a series of morphological characteristics.



PAPHIOPEDILUM CHAMBERLAINIANUM
WATERCOLOUR PAINTING BY KARYONO APIC
COURTESY OF KARYONO APIC

PAPHIOPEDILUM CHAMBERLAINIANUM

(SANDER) STEIN

STEIN'S ORCHIDEENBUCH: 461 (1892)

BASIONYM

Cypripedium chamberlainianum Sander

THE GARDENERS' CHRONICLE, 3rd series, II: 194 (1892)

SYNONYMS

Cordula chamberlainianum (Sander) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum victoria-regina subspecies *chamberlainianum* (Sander) M.W. Wood

THE ORCHID REVIEW, 84(995): 133-143 (1976)

ETYMOLOGY

Named *chamberlainianum* for Joseph Chamberlain (1836-1914), British member of parliament and orchid enthusiast, father of Sir (Joseph) Austen Chamberlain (1863-1937) and (Arthur) Neville Chamberlain (1869-1940).

DISCUSSION

On February 13, 1892, Sander (or the auction house Protheroe and Morris) announced a sale of two new slipper orchids named "*Cypripedium Victoria Regina*" and "*Cypripedium Chamberlainianum*" (THE GARDENERS' CHRONICLE, 3rd series, II[268]: 194). The full text of the advertisement is as follows:

"New Orchids - Extraordinary Lady's Slippers - *Cypripedium Victoria Regina* (Sander), new species - The most extraordinary *Cypripedium* ever imported. - *Cypripedium Chamberlainianum* (Sander) - A magnificent new species of value.

Messrs. Protheroe and Morris have received instructions from Mr. F. Sander to sell, at their Great Rooms, 67, Cheapside, a grand lot of the above new *Cypripediums* on Friday, March 4.

Cypripedium Victoria Regina (Sander) is the most remarkable *Cypripedium* we have ever seen; we are proud of the introduction into Europe of *Cypr. Sanderiae*, *Rothschildianum*, *Sanderianum*, &c, but such a one as this we have never seen, the compact zigzag inflorescence is 2 ft. high, and shows upwards of 30 flower seats, each flower springing from a conspicuous bract, and the remarkable feature is that the flower seats are not more than 1/2 inch from each other; the upper part of the flower is most lovely, it is white and green and lined with blackish purple, very broad and short, the lower sepal light green and dark purple, the petals are spreading, undulate, twisted, and are white, green, and purple in lines and dots, the whole flower is hairy, the very broad panicle is in shape like *C. Cardinale*, and

light purple violet much inflated, spotted with dark purple with a golden yellow and pea-green rim; base of the pouch white and green, as also the infolded lobes, inside the pouch is dotted with purple, staminode black and green, sometimes with a green line through the middle. The flowers are 4 inches across each way. Abundant dried material will be shown to prove the above extraordinary facts.

Cypripedium Chamberlainianum (Sander) from the Merapi Mountains, is of great beauty and distinctness, the flowers are produced in great profusion, are large in size, and unlike anything ever seen - the flowers are violet purple and white, growing all along the spike - a fine lot of this plant was collected, but few arrived safely and those very weak, but they were thoroughly established there, and a captain took great care of them on the journey home. The leaves are 2 feet long and 2 inches wide and all mottled."

On February 20th, thus a week after the first announcement, Sander advertised again a sale of the "Extraordinary New Lady's Slipper, *Cypripedium Chamberlainianum*" (THE GARDENERS' CHRONICLE, 3rd series, 11[269]: 233.) In the announcement there is an extensive description which is cited here literally:

"A magnificent and beautiful new *Cypripedium* which we have the privilege to offer. It is dedicated by permission to the Right Hon. Joseph Chamberlain, M.P.

An altogether unique and absolute new departure in every way from all known *Cypripediums*, in inflorescence, in habit, and in leaf, a perfectly marvellous novelty. Its leaves in some instances are 4 inches across, ample, undulated, and often beautifully tessellated on the upper surface, reminding one slightly of *C. Morganae*, but much larger and finer; it is altogether a noble plant.

This extraordinary *Cypripedium* produces flower spikes up to 2 feet high, bearing all along its stem its white, yellow and purple blossoms, and we are able to show dried flower spikes which have produced over thirty flowers. Another remarkable feature is that the flower seats are not more than half an inch from each other.

The upper part of the flower is yellow with about six rosy-purple lines, divided by the midrib, emerging from a profusion of rosy-purple spots; those at the lower part are much denser than at the upper half of the dorsal sepal; the whole is beautifully reticulated and charmingly transparent towards the margins, densely covered on the outer surface with white hairs. The upper half of the dorsal sepal is clear and pure, without any spots or lines; the lower dorsal sepal (*sic.*) is similar in its markings, only not so dense, and about half the size of the upper dorsal sepal, which extraordinarily enough is as broad as it is long, being about 2 inches in diameter.

The two petals are spreading, curled and twisted at the ends like a corkscrew, and spotted in the way of *C. superbiens*; the margins are charmingly undulated, and bear a profusion of white hairs. They are spotted on both surfaces with black-



PAPHIOPEDILUM CHAMBERLAINIANUM
WATERCOLOUR PAINTING BY KAZHA ZUHRIA RHAPSODY
COURTESY OF KAZHA ZUHRIA RHAPSODY

ish-purple and chocolate spots and blotches; some purple lines also run along them. They are of a lovely shining white and creamy-yellow colour, highly ornate, each of them over 2 inches long. The slipper, shoe, or pouch, sometimes called the labellum, is also exceptionally beautiful; it is rose and white, more inflated than *C. Cardinale*, and double its size, reminding one of a beautifully spotted bird's egg, so exquisite is the fine blackish-purple spotting over two-thirds of its lower part. The upper part and sidelobes are of a shining porcelain white colour; this combined with the purplish-black spotting lends it a hue and charm perfectly unique.

We have been asked by several Gentlemen to sell the whole importation of this altogether extraordinary and charming new *Cypripedium*, without reserve, and we will do so.

Cypripediums are most difficult to introduce, and without the right moment is caught, all arrive dead. This is the case unfortunately with *Cypripedium Victoria Regina*. These have perished on the journey. We shall try next year to introduce it. However, the finer of the two is *Cypripedium Chamberlainianum*, and fortunately, this has come home in altogether exceptional order and condition, and the Sale will contain the whole importation of about 700 Plants.

Abundant dried material will be on view."

On page 234 of that same issue, one finds under "New or noteworthy Plant." another description of *Cypripedium chamberlainianum* by James O'Brien. The text of that description, again, is reproduced here faithfully:

"*Cypripedium Chamberlainianum*, O'Brien, n. sp. (See fig. 34)

This is a surprising beautiful and distinct novelty, and quite unexpected by its lucky importers, Messrs. F. Sander & Co., of St. Albans, who, when sending their collector to a hitherto unsearched part of New Guinea, had little hopes of gaining such a plant, which, in addition to being an entirely new species, is also the first of a totally new section of *Cypripedium*. The plant is robust, and resembles a giant *C. spicerianum*, or it might easily be taken for a large *Angraecum pellucidum*, so distinct is its growth from that of any other species.

From the evidence of the dried spikes sent over by the collector, and those which opened immediately after their arrival, and from which our illustration was prepared, it is seen that native specimens have spikes showing from twelve to twenty or even more flowers on a spike, each flower springing from a stout and ornamental bract. The flowers themselves may be likened in colour to those of *C. superbiens* or *C. Morganae*, but in their botanical features there is nothing to compare them with. The dorsal sepal is yellowish-white, with six rosy-purple lines, three on each side of the mid-rib, and the base of the sepal has a profusion of rosy-purple spots. The lower sepal is similar to the upper, but smaller; and a

very peculiar feature in both is, that they are strongly pubescent or hairy on the backs. The petals are spreading, curled, and twisted, and beautifully spotted with crimson, the margins undulated and furnished with white hairs at the edges. The labellum or pouch is white, beautifully and densely spotted with rose colour on the lower portion. Altogether it is a charming plant, and well worthy to bear the name of the Right Hon. Joseph Chamberlain, M.P., to whom Messrs. Sander have requested it to be dedicated. *James O'Brien*."

Figure 34, referred to in the text, is to be found a few pages later (page 241). It is a botanical illustration with the legend: "Fig. 34. – *Cypripedium Chamberlainianum*, from freshly-opened flowers. Natural size. Colours: white, rose, and purple."

First, we should look at the formalities. Cribb, in 1987, considered *Cypripedium chamberlainianum* a *nomen illegitimum*. In 1998, however, he claimed that the name was a *nomen nudum*. Both interpretations, however, are wrong. *Cypripedium chamberlainianum* cannot be regarded a *nomen nudum* for the simple reason that there is a description of the plant. The argument that some people may regard the description on page 194 of issue 268 of THE GARDENERS' CHRONICLE as not quite adequate to satisfy present-day demands is rather curious in view of the fact that many other simple mentions of a plant are generally accepted as valid publications (for example from STEIN'S ORCHIDEENBUCH, or in Plant Seed Lists from botanic gardens).

Neither is *Cypripedium chamberlainianum* an invalid designation. If *Cypripedium victoria-regina* is accepted as being validly published in the sales announcement referred to above, why then would *Cypripedium chamberlainianum* not be acceptable?

Thus, the only question remaining is whether *Cypripedium victoria-regina* and *Cypripedium chamberlainianum* are identical. If they are, the name *Cypripedium victoria-regina* must be applied for reasons of priority as it is listed first in the advertisement.

However, nothing in the descriptions indicates that the two plants collected by Micholitz in 1891 are identical. Micholitz was an experienced and very critical orchid collector, and there is no reason to believe that he did not collect two different species. Sander, in turn, had no reason to advertise one species under two different names, especially not in the same advertisement. Thus, the conclusion must be that there is no reason not to accept *Paphiopedilum chamberlainianum* as a good, autonomous species differing clearly from what Sander was to call *Cypripedium victoria-regina*.

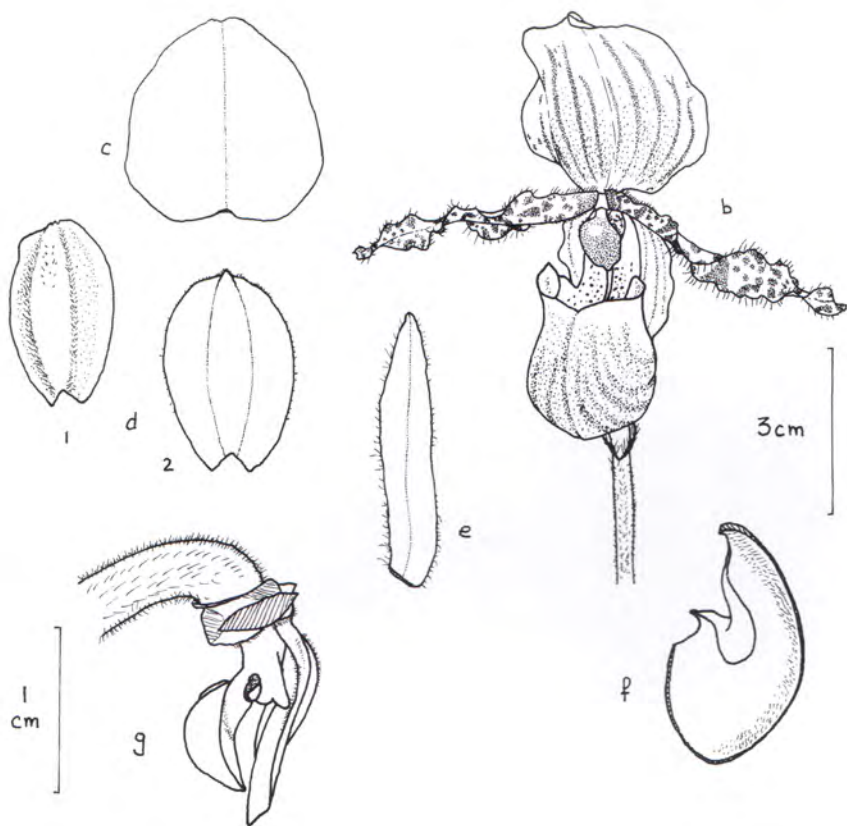
Joseph Dalton Hooker in turn featured *P. chamberlainianum* in CURTIS'S BOTANICAL MAGAZINE (vol. 124, t. 7578, 1898). Unfortunately, the plant used for the illustration was not a typical form of the species. Fowlie (1970) suggested that the plant is intermediate between *P. chamberlainianum* and *P. tonsum*, which would make it identical to *P. Muriel*, a garden hybrid registered by W.M. Appleton in 1904.

In conclusion we can state that *Paphiopedilum chamberlainianum* is a valid autonomous species. The identity of the plant offered under the name "*Cypripedium victoria-regina*" in the Sander advertisement remains an enigma and can be put in the same "drawer" as *P. glanduliferum*. Until documents turn up clarifying the true identity of *P. victoria-regina*, the name should not be used. Unfortunately, the RHS Orchid Hybrid Registrar complicates the issue in accepting *P. victoria-regina* as well as *P. chamberlainianum*. However, according to the INDEX KEWENSIS, the latter is nothing but a synonym of the former. The RHS even recognised the cross of *P. victoria-regina* x *P. chamberlainianum* in 1985 by the Rod McLellan Company, named *P. John Sutter*.



PAPHIOPEDILUM CHAMBERLAINIANUM

COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)



PAPHIOPEDILUM CHAMBERLAINIANUM

DRAWING BY DR. GUY R. CHIRON

COURTESY OF DR. GUY R. CHIRON

DESCRIPTION

Paphiopedilum chamberlainianum is an herbaceous perennial growing in leafy debris and mould on the ground in forests or on moss-covered rocks. The leaves are up to 45 cm long by up to 10 cm wide, oblong elliptic, mottled, the margins ciliate, the apex slightly notched and rounded bilobate. The under surface is green, more or less suffused with small purple spots. The inflorescence is erect, up to 60 cm long, dark brown, bearing several flowers that generally open one at a time. Up to thirty flowers can be generated but no more than three flowers are open at any time. The bracts are up to 3.7 cm long, ovate, acute, hairy. They cover more or less the whole of the juvenile bud. The flowers are up to 7.5 cm high by more or less 8.5 cm wide. The dorsal sepal is ovate, about 3.0 cm long by more or less 2.5 cm wide, green to creamy white, with dark brown longitudinal stripes, the basal portion purple. The synsepal is up to 2.7 cm long, ovate, greenish-white. The petals are spreading horizontally, up to 4 cm long by merely 5 mm wide, linear, twisted like a spiral, the margins downy and ciliate, creamy white with a purple pattern. The lip is three-lobed, the side lobes folded inward forming a tube, the main lobe distinctly saccate, shaped like an inverted helmet. Overall, the lip is up to 4 cm long, at the apex broadly rounded, rose to reddish-violet, and intensely spotted purple, with a pale green rim around the aperture. The staminodal shield is rhomboid, brown, the upper part brighter in colour.

DISTRIBUTION AND HABITAT

Sumatra. Plants grow in the central region of western Sumatra at 800 to 1,600 m. They are found on west-facing limestone cliffs with their roots embedded in moss near water seepages or catch basins that provide a nearly continuous supply of water.

FLOWERING

Paphiopedilum chamberlainianum flowers all year round. The flowers are generated in sequence over an extremely long time. Plants have been known to be constantly in flower over a period of several years.

MISCELLANEOUS NOTES

For this species, mitotic chromosome counts have been published as $2n = 32$ (Hoffman, 1929, 1930; Duncan, 1947; Duncan & MacLeod, 1949c) and $2n = 34$ (Karasawa, 1979).

VARIETIES AND FORMS

Paphiopedilum kalinae, *P. liemianum*, and *P. primulinum* have often been treated as varieties of *P. chamberlainianum*. They are all treated as separate species in this book. Three more "variants" have been published (as *Cypripedium chamberlainianum* var.). From the Sander nursery came var. *excellens*, a more brightly coloured specimen, and var. *platytaenium*, a plant with "broad" petals. Mr. MacArthur of "The London Nursery" presented a var. *macranthum* in 1894.

Paphiopedilum chamberlainianum "var. *latifolium*" is a horticultural designation without taxonomic status. The name is attributed to a group of wild-collected plants that have "extremely large", uniformly dark green, thick leaves. In cultivation, however, the leaves developed are no longer different from those of "normal" specimens.



PAPHIOPEDILUM CHAMBERLAINIANUM
COURTESY OF DOROTHY POTTER BARNETT



PAPHIOPEDILUM KALINAE

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM KALINAE

BRAEM

ORCHIS (ITALY), NO. 93: 18-23 (1995)

SYNONYM

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

ORCHID DIGEST, 59(3): 115-139 (1995)

ETYMOLOGY

Paphiopedilum kalinae was named in honour of Mrs. Patricia Fair Kalina of Naperville, Illinois, USA.

DISCUSSION

The first plants of *Paphiopedilum kalinae* were imported in 1988 among a lot of *Paphiopedilum chamberlainianum* (Sander) Stein and were marketed in the USA as *P. chamberlainianum* var. *Sumatra*. *Paphiopedilum kalinae* is probably present in many collections under that name. A comparison of the various taxa within this subgenus clearly shows that this plant deserves to be treated as a separate entity at the species level. The morphology of the leaves is quite different and so are shape and colour of its flowers. Following the morphology of the staminodal shield, the plant could be considered closest to *Paphiopedilum chamberlainianum* but by no means identical to it. The overall form of the pouch is that of *P. primulinum*, but more pointed; not as pointed, however, as in *P. victoria-mariae* (Sander ex Masters) Rolfe and never inflated as in *P. chamberlainianum*.

Noteworthy, furthermore, are the extreme pubescence of the outer surface of the flower, its unique coloration, and the relatively large distance between the flower bracts. Unfortunately, no chromosome count is as yet available. *Paphiopedilum kalinae* is considered a variety of *P. chamberlainianum* (as *P. victoria-regina*) by Koopowitz (1995, 2000, 2012, 2018). Cribb (1998) even denies it the varietal status and sinks it into *P. chamberlainianum*. However, as both authors accept *P. liemianum* (a plant more closely related and much more similar to *P. chamberlainianum*) as a separate species, their views regarding *P. kalinae* should not be overrated.

DESCRIPTION

The leaves are large, approximately 30 cm long by 10 cm wide, broadly spatulate, emarginate, apex equal to slightly unequal, heavily keeled, with a total leaf span of approximately 60 cm. The upper surface is uniformly light green. The base of the leaves is flushed with dark pink. The underside is clear light green, heavily furrowed, especially proximally. The leaf margins are without ciliations. The leaf surface is matte. The inflorescence is terete, green, intensely covered with short, stiff brown hairs. The floral bracts are relatively distant from each other, the distance decreasing from the base



PAPHIOPEDILUM KALINAE
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

of the inflorescence toward the apex. The flowers open successively. The ovary is 6.0 to 7.3 cm long, brownish, densely pubescent. The dorsal sepal is broadly ovate, 3.5 to 4.3 cm long by 2.7 to 2.9 cm wide. Its ground colour is yellowish-green centrally, fading to yellow at the margin. There are raised vertical ribs overlaid with glossy burgundy tessellation. The light green median line is surrounded by solid burgundy that breaks up into poorly-defined spots and bars near the margin. The margins are undulate and finely ciliate. Eighty percent of the dorsal is covered with the burgundy colour. The outer surface is intensely pubescent. The synsepal is much smaller than the dorsal sepal, 2.9 to 3.5 cm long by 1.8 to 2.7 cm wide and yellowish-green on the inside with some longitudinal dark brown streaks, its outer side more intensely striped and densely pubescent. The petals are 4 to 5 cm long by 7 mm wide, crisped and undulate on the proximal half of the apical margin, ciliate. Their ground colour is light yellow, changing to yellow green distally, heavily barred and spotted with burgundy. The petals are flat for approximately half their length, and then twisted clockwise in their distal half. The proximal ends of the petals are separated by a 2.5 mm wide, ivory "boss" which appears to be a vertical extension of the column. The petals are reflexed to about 40 degrees and deflexed by about 20 degrees from horizontal. Overall, the lip is 3.8 to 5 cm long by 1.8 to 2.6 cm wide. The side lobes are folded inward forming a more or less closed tube. The main lobe (pouch) is shaped like an inverted helmet. It is not inflated as in *P. chamberlainianum* and not as pointed as in *P. victoria-mariae*. Its ground colour is yellowish-green. The pouch is covered to within 2.5 mm of the orifice with very small, irregularly-shaped burgundy to mahogany spots. The inside of the pouch is covered by similar spotting. The spots are aligned into striations around the sides of the pouch and they become sparser toward the rear. The staminode is about 1.2 cm long by approximately 1 cm wide. It is more or less in the form of an inverted pear. Its surface is green, both extremities are light yellow-green, the main part is ornamented with dark green maculation. The staminode is finely covered with blackish hairs.

DISTRIBUTION AND HABITAT

Little is known of the origin of this species other than it was imported as *Paphiopedilum chamberlainianum* from Sumatra. We assume, therefore, that the plants are found in the same habitat in the central region of western Sumatra.

FLOWERING

Paphiopedilum kalinae may flower all year round. Flowers are produced one after the other over a considerable period of time.



PAPHIOPEDILUM LIEMIANUM

COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

PAPHIOPEDILUM LIEMIANUM

(FOWLIE) KARASAWA & SAITO

BULLETIN OF THE HIROSHIMA BOTANICAL GARDEN, NO. 5: 57 (1982)

BASIONYM

Paphiopedilum chamberlainianum subsp. *liemianum* Fowlie

ORCHID DIGEST, 33(2): 55 (1971)

SYNONYMS

Paphiopedilum victoria-regina subsp. *liemianum* (Fowlie) M. W. Wood

THE ORCHID REVIEW, 84(995): 133-145 (1976)

Paphiopedilum chamberlainianum var. *liemianum* (Fowlie) Braem

PAPHIOPEDILUM: 229 (1988)

ETYMOLOGY

Named *liemianum* for Liem Khe Wie (A. Kolopaking), a well-known Indonesian nurseryman who is said to have brought the first plants of this taxon into cultivation.

DISCUSSION

Paphiopedilum liemianum was originally described by Fowlie (*loc. cit.*) as a subspecies of *P. chamberlainianum*. It differs from the latter species in a number of characteristics that could be explained by differences in habitat location and that may very well be considered by some to be insufficient to warrant autonomous species status. The leaves of *P. liemianum* are ciliate from base to tip. The dorsal sepal is more weakly coloured than in *P. chamberlainianum*. The white margin around the dorsal of *P. liemianum* is constant in width and clearly set off from the green centre area. In contrast to *P. chamberlainianum*, the dark striations of the dorsal do not extend into the white margin. Furthermore, the karyotype of *Paphiopedilum liemianum* is quite different from that of *P. chamberlainianum*.

DESCRIPTION

Paphiopedilum liemianum is an herbaceous plant growing in leafy debris. Each growth produces 4 to 7 leaves which are oblong to elliptic-oblong, more or less rounded at the tip, 15 to 26 cm long by up to 6 cm wide. They are ciliate from base to tip. The upper surface is green and quite mottled. The underside sometimes shows more or less dense bands of dark brown-purple spots. The inflorescence is terete and generates many flowers in sequence. The peduncle is up to 20 cm long, purple, finely pubescent. The internodes are about 3 cm long. The flower bracts are elliptic, obtuse, up to 1.8 cm long, green, spotted with purple, ciliate. The pedicel and ovary are 3 to 5 cm long, purple, pubescent. The flowers are 7 to 12 cm across. The dorsal sepal is whitish or cream with a green centre area, ovate, obtuse, 2.6 to 3.8 cm long by 2.4 to 4.4 cm wide, ciliate, the outside covered by purple hairs. The margin around the dorsal is clearly set off from



PAPHIOPEDILUM LIEMIANUM
COURTESY OF DR. HENRY OAKELEY

the green centre area, and the width of this margin is constant. The green centre part shows dark striations as in *P. chamberlainianum*, but these striations do not extend into the clear marginal area. The synsepal is yellowish green, elliptic, truncate, about 3 cm long by 2.2 to 2.5 cm wide, and like the dorsal sepal, ciliate and covered with purple hairs on the outside. The petals are more or less horizontally spreading. They are slightly reflexed, linear, obtuse, cream with purple spots, 4 to 5.5 cm long by 0.8 to 1.5 cm wide, twisted in their apical half and ciliate. The labellum is three-lobed. The side lobes are folded inward forming a tube. The main lobe is deeply saccate, bulbously inflated toward the apex. Overall, the lip is up to 5 cm long by 2.2 to 3 cm wide, pinkish purple, spotted with darker purple, the margin pale yellow. The staminodal shield is convex, ovate to near quadrate, subacute, about 10 mm long and equally wide. It is green, flushed with maroon toward the apex, the base pubescent, with a distinct green bulge.

DISTRIBUTION AND HABITAT

Northern Sumatra. Plants grow in the humus pockets that fill the interspaces between the roots of large trees. The habitats are always on limestone at elevations between 600 and 1,000 m. The type specimen was collected on Gunung Sinabung.

FLOWERING

Paphiopedilum liemianum flowers all year round. The blooms are produced one after the other over a long period of time. In general, no more than two flowers are open at any given time.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 32$ (M. W. Wood, 1976; Karasawa, 1979).



PAPHIOPEDILUM PRIMULINUM

COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

PAPHIOPEDILUM PRIMULINUM

M. W. WOOD & P. TAYLOR

THE ORCHID REVIEW, 81(955): 220 (1973)

SYNONYMS

Paphiopedilum chamberlainianum subsp. *liemianum* forma *primulinum* Fowlie
ORCHID DIGEST, 37(2): 104 (1973)

Paphiopedilum victoria-regina subsp. *primulinum* (M. W. Wood & P. Taylor) M. W. Wood
THE ORCHID REVIEW, 84(995): 133-143 (1976)

Paphiopedilum liemianum var. *primulinum* (M. W. Wood & P. Taylor) Karasawa & Saito
BULLETIN OF THE HIROSHIMA BOTANICAL GARDEN, No 5: 57 (1982)

Paphiopedilum chamberlainianum var. *primulinum* (M. W. Wood & P. Taylor) Braem
PAPHIOPEDILUM: 230 (1988)

ETYMOLOGY

Named *primulinum* referring to the primrose-coloured flowers (primrose = *Primula*).

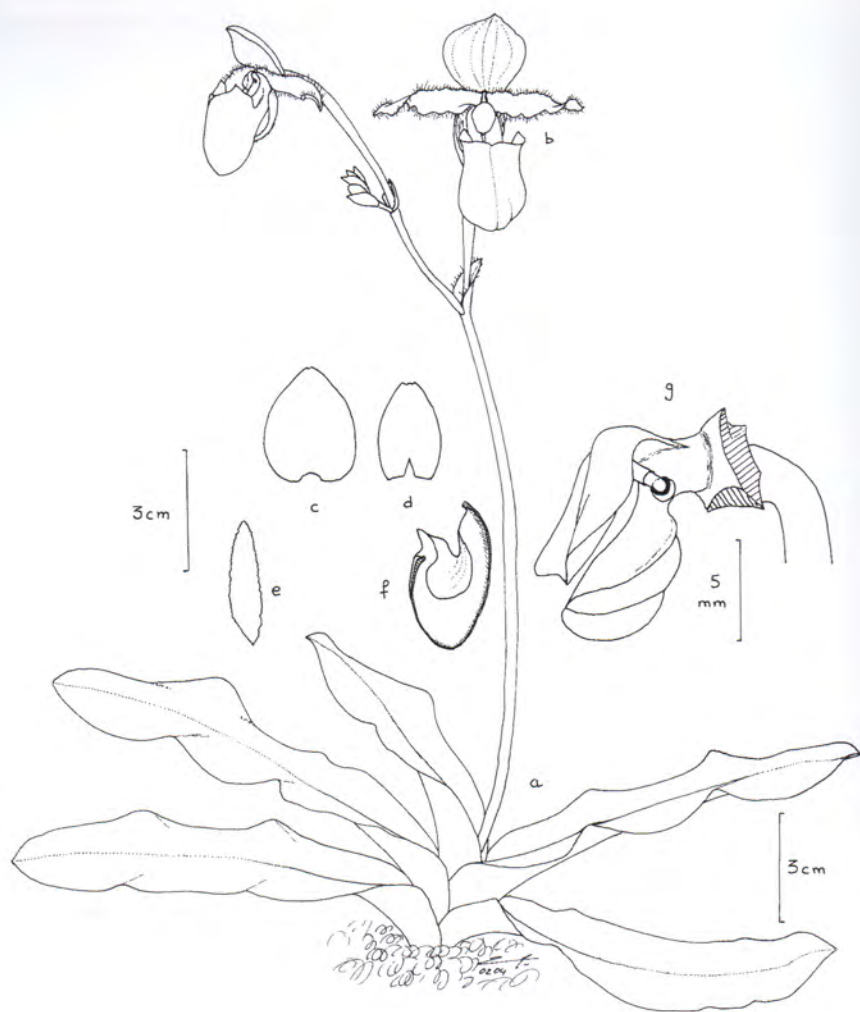
DISCUSSION

Paphiopedilum primulinum was described by Mark W. Wood and Peter Taylor based on a plant Mark Wood had purchased from the Indonesian (Javanese) nurseryman Liem Khe Wie who described its alleged discovery in THE ORCHID REVIEW for 1973 (Reprinted in ORCHID DIGEST, 37[3]: 106 [1973]). More likely, Liem Khe Wie obtained the plants from local Sumatran collectors who brought the plants to his Java-based nursery. The most amazing fact in respect to the history of this taxon is that Fowlie, a renowned splitter, reduced the species to a form of *P. chamberlainianum* subspecies *liemianum* (Fowlie 1973), a view followed by Mark Wood, who, in his 1976 work, combined almost all taxa of the subgenus under the species "*P. victoria-regina*".

Karasawa & Saito state that *P. primulinum* shares the same chromosome count with *P. liemianum* ($2n = 32$). However, their claim that *P. primulinum* also shares the fully ciliated margins with *P. liemianum* is erroneous.

Morphologically, *P. primulinum* is distinct from all other species of subgenus *Cochlopetalum*. Typically it has non-tessellated, undulate leaves and pale yellow and green flowers that are smaller than those of all other species of the group. The leaves of juvenile plants may have subtle markings.

It has been suggested that the "typical" *P. primulinum* with its immaculate yellow and green flowers is an albino of the plant now referred to as *P. primulinum* var. *purpurascens* (M. W. Wood) Cribb. Indeed, the characteristics of *P. primulinum* conform to such a hypothesis (see under Varieties and Forms).



PAPHIOPEDILUM PRIMULINUM
 DRAWING BY DR. GUY R. CHIRON
 COURTESY OF DR. GUY R. CHIRON

DESCRIPTION

Paphiopedilum primulinum is an herbaceous perennial. Each growth produces 4 to 7 leaves which are oblong-elliptic, obtuse or rounded at the tip, 15 to 17 cm long by 2.5 to 3.8 cm wide. They are typically undulated and ciliate near the base and near the apex. The upper surface is uniformly green with pale longitudinal veins, sometimes slightly mottled when juvenile. The inflorescence is terete and generates many flowers that open successively. The peduncle is 20 to 35 cm long, green, pubescent. The internodes are 4 to 5 cm long. The flower bracts are elliptic, obtuse, about 1.6 cm long, green, ciliate. The flowers are small, about 7 to 8 cm across, primrose to daffodil yellow. The sepals are greenish. The dorsal sepal is ovate and obtuse, 2.5 to 3.2 cm long by 2.5 to 3.5 cm wide, ciliate, the outside pubescent. The synsepal is ovate, truncate, 2.3 to 3 cm long by 1.2 to 2 cm wide. The petals are spreading at an angle of about 15 degrees to horizontal, linear, tapering, slightly obtuse, 3 to 4.2 cm long by 0.5 to 1.2 cm wide, twisted in their apical half and ciliate. The labellum is three-lobed. The side lobes are folded inward forming a tube. The main lobe is deeply saccate, bulbous toward the apex. Overall, the lip is 3.2 to 3.9 cm long by 1.5 to 2 cm wide. The staminodal shield is truncate to shortly apiculate, 6 to 8 mm long by 5 to 7 mm wide, the base pubescent.

DISTRIBUTION AND HABITAT

Northern Sumatra; the plants have been found from sea level to 500 m.

FLOWERING

Paphiopedilum primulinum flowers all year round. The blooms are produced one after the other over a long period of time. In general, no more than two flowers are open at any given time.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 32$ (Karasawa, 1979).

Buyers should be aware of the fact that on several occasions, plants of the garden hybrid *Paphiopedilum* Pinocchio (*glaucophyllum* x *primulinum* [registered by M. Lecoufle in 1977]) have been sold under the name of *P. primulinum*.

Apparently some of the plants of *P. Pinocchio* are completely yellow/white; others, however, have pink pouches and resemble smaller *glaucophyllums*.

Paphiopedilum Avalon Mist (produced by Norris H. Powell at The Orchid House and registered in 1992 by M. Bowell), the back cross of *P. primulinum* onto *P. Pinocchio*, is almost impossible to differentiate from the true *P. primulinum*. Only the larger size and number of flowers per inflorescence make some plants suspicious.

Paphiopedilum Avalon Mist is especially interesting for commercial growers as it reaches flowering size much faster due to hybrid vigour. As a result, the true *Paphiopedilum primulinum* may, by now, be one of the rarest species of *Paphiopedilum* in cultivation.



PAPHIOPEDILUM PRIMULINUM FMA. *PURPURASCENS*
COURTESY OF DOROTHY POTTER BARNETT

VARIETIES AND FORMS

PAPHIOPEDILUM PRIMULINUM FORMA PURPURASCENS

(M.W. WOOD) PEETERS & BRAEM

BRAEM & CHIRON, PAPHIOPEDILUM: 408 (2003)

BASIONYM

Paphiopedilum victoria-regina subsp. *primulinum* forma *purpurascens* M.W. Wood

THE ORCHID REVIEW, 84(995): 133-143 (1976)

SYNONYMS

Paphiopedilum chamberlainianum subsp. *liemianum* forma *primulinum* var. *flavescens* Fowlie

ORCHID DIGEST, 37(3): 102-105 (1973), *nomen illegitimum*

Paphiopedilum primulinum var. *purpurascens* (M.W. Wood) Cribb

THE GENUS PAPHIOPEDILUM: 131 (1987)

Paphiopedilum liltii hort., *nomen nudum*

ETYMOLOGY

Named *purpurascens* referring to the coloration of the flower.

DISCUSSION & DESCRIPTION

Forma *purpurascens* may well be the "normal" form of *P. primulinum* and the plants with the yellow-green flowers may represent the albino. The plants of forma *purpurascens* differ from those of the nominal variety in leaves that are often shorter and darker green and have purple markings on the basal part of the under surface and in flowers with a purple-flushed lip and purple-spotted petals, and a purple pubescence on the outer surface of the flower.

DISTRIBUTION AND HABITAT

Northern Sumatra. From about sea level to 500 m, in small clumps, rooted in leafy debris on coralline limestone. Liem Khe Wie claimed to have found it on Gunung Leuser, growing together with the nominal form. It is also reported to grow in another location together with *P. tonsum*.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 32$ (Karasawa, 1979).



PAPHIOPEDILUM GLAUCOPHYLLUM
WATERCOLOUR PAINTING BY EUNIKE NUGROHO
COURTESY OF EUNIKE NUGROHO

PAPHIOPEDILUM GLAUCOPHYLLUM

J. J. SMITH

BULLETIN DE L'INSTITUT BOTANIQUE DE BUITENZORG, 7: 1 (1900)

SYNONYMS

Cypripedium glaucophyllum (J. J. Smith) Masters
THE GARDENERS' CHRONICLE, 3rd series, 34: 405 (1903)

Cordula glaucophylla (J. J. Smith) Rolfe
THE ORCHID REVIEW, 20(1): 2 (1912)

Paphiopedilum victoria-regina subsp. *glaucophyllum* (J. J. Smith) Wood
THE ORCHID REVIEW, 84(995): 133-143 (1976)

ETYMOLOGY

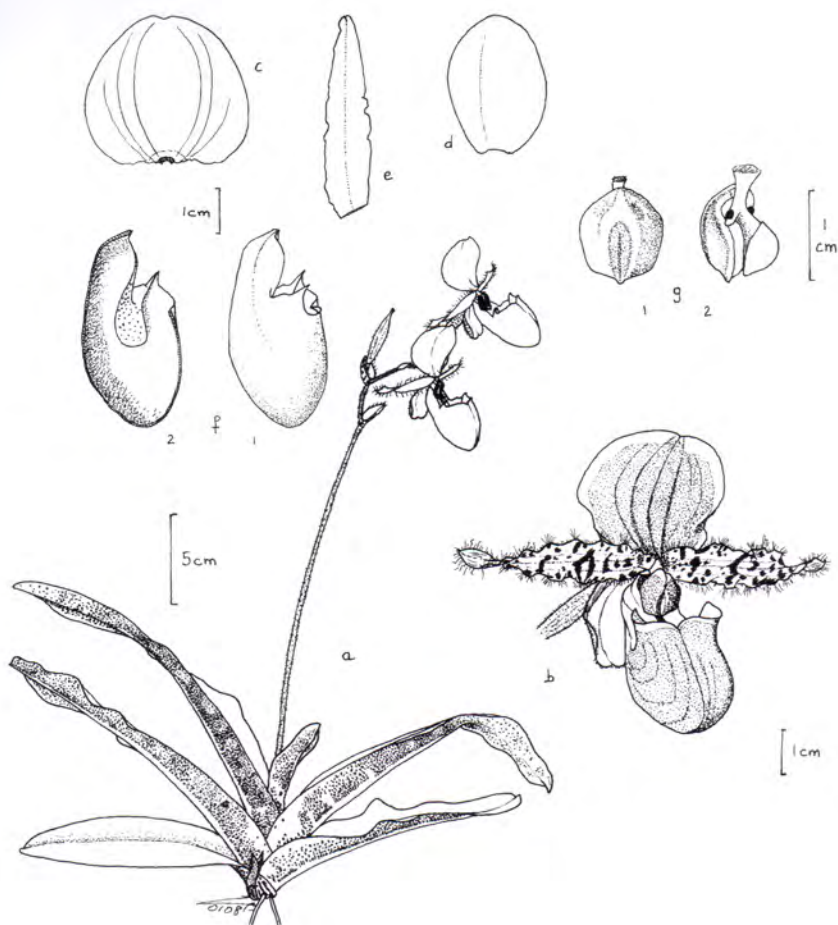
Named *glaucophyllum*, referring to the glaucous surface of the leaves, which appear to be covered with a fine white powder.

DISCUSSION

Paphiopedilum glaucophyllum was discovered near Mount Semeru (also known as Mahameru), in East Java. The species was described by J. J. Smith, at that time the director of the Botanical Gardens of Buitenzorg, in the garden's journal. In 1903 J. J. Smith credited the Dutchman B.J.C. Verhey with the discovery, but corrected this statement later (J. J. Smith, 1907) by explicitly naming J. Bekking as the person who first found the species. J. J. Smith's original description of *P. glaucophyllum* was very short but a more elaborate description followed in the *ICONES BOGORIENSIS* (J. J. Smith, 1903).

Shortly after the original collection, large numbers of plants were sent to Europe by M. Rimestead, and the first flowering plant from culture in Europe was shown by Charlesworth & Co. at the Royal Horticultural Society in September 1903. Ever since, this species has been rather common in cultivation, and it is still fairly common in the wild but remains threatened by agriculture and deforestation.

Paphiopedilum glaucophyllum is, of course, related to all other members of the subgenus *Cochlopetalum*. However, it is differentiated by stable characteristics such as glaucous foliage, dorsal, long-ciliate white petals that are spotted purple and are distinctly deflexed, an obtuse staminode, and a different chromosome count. It is therefore unwarranted to consider this taxon as anything other than a good species in its own right, and it has been regarded as such since its original description by all but M. W. Wood (*loc. cit.*).



PAPHIOPEDILUM GLAUCOPHYLLUM
DRAWING BY DR. GUY R. CHIRON
COURTESY OF DR. GUY R. CHIRON

DESCRIPTION

Paphiopedilum glaucophyllum is a short-stemmed herbaceous perennial. The leaves are broadly strap-shaped, spreading, the margins somewhat undulate and ciliate in the basal portion, the apex asymmetrically bilobed, obtuse, with a small tooth between the two lobes, the upper surface bluish-green with slightly darker veins, the under surface somewhat paler, distinctly keeled, up to 26 cm long by up to 5.5 cm wide. The inflorescence is erect, terete, up to 30 cm long, deep purple, covered with white downy hairs, multi-flowered, the flowers opening one at a time. The bracts are approximately 1.5 cm long, ovate, downy, green with purple veins, somewhat serrate and with a small acute tooth at the broad, blunt apex. The ovary is about 4.6 cm long, green, densely covered with dark-violet hairs. The flowers are up to 6.5 cm high by about 8.5 cm wide. The dorsal sepal is broadly ovate, subcircular, somewhat undulate, the apex somewhat serrate, the inner surface with a shallow median longitudinal groove; on the outside bluntly keeled, both halves somewhat convex, bright green, in the marginal areas suffused with bluish-green. There are about twelve bent, narrow, dark-grey to dark-brown longitudinal stripes covering especially the basal area, the inner surface glossy, the margins and the outer surface densely covered with deep-violet hairs, up to 3.0 cm long by up to 3.2 cm wide. The synsepal is ovate, obtuse, concave, the inner surface glossy with prominent longitudinal veins, the margins and the outer surface with spreading, deep-violet hairs, up to 2.6 cm long by more or less 1.8 cm wide. The petals are spreading horizontally, nearly always linear, intensely undulate and twisted, both surfaces glossy, the margins with about 3 mm long, spreading, bent and branched colourless hairs. The petals are up to 4.5 cm long by more or less 1 cm wide. They have about nine longitudinal veins and are whitish, toward the base somewhat greenish, toward the apex pale rose, with multiple small reddish-brown spots in the marginal regions and along the veins. The lip is trilobate, about 4.3 cm long by about 2 cm wide, at the base pale greenish-white, the large, infolded side lobes rounded and covered with small bright purple spots, the middle lobe deeply saccate, with acute, erect lateral ears, fairly uniform lilac, the rim of the aperture pale yellowish, the inner surface with the exception of the rim covered with fairly short dark-violet hairs. The staminodal shield is large, ovate, and blunt, up to 1.2 cm high by about 1 cm wide, in the basal portion green with short, spreading, deep purple hairs, elsewhere distinctly glossy blackish-purple.

DISTRIBUTION AND HABITAT

Java. Plants are found near the southeast coast at 200 to 700 m. They usually grow on cliffs of soft, crumbling limestone with their roots embedded in moss and leafy humus close to water seepages.

FLOWERING

Like all members of the subgenus *Cochlopetalum*, *Paphiopedilum glaucophyllum* has a persistent inflorescence and produces flowers successively over a long period of time. The type specimen flowered from 1899 through 1903 (J.J. Smith, 1903).



PAPHIOPEDILUM GLAUCOPHYLLUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 36$ (Duncan, 1947; Duncan & MacLeod, 1949c, Karasawa, 1979 [1 clone]) or $2n = 37$ (Karasawa, 1979 [4 clones]).

VARIETIES AND FORMS

In 1907, J. J. Smith described *Paphiopedilum glaucophyllum* var. *moquetteanum*. That plant has been the subject of a controversial discussion in respect to its proper taxonomic status. It was retained as a variety of *P. glaucophyllum* by Wood (1976a - as *P. victoria-regina* subsp. *glaucophyllum* var.), by Karasawa & Saito (1982), Cribb (1987, 1998), and Braem (1988) but treated as an autonomous species by Asher (1980, 1985), Fowlie (1985), Koopowitz (1995, 2000, 2012, 2018), Braem & Chiron (2003) and Braem, Chiron & Öhlund (2016).

As *P. moquetteanum* differs considerably from *P. glaucophyllum* in a number of aspects we have decided to treat it as an autonomous species in its own right.



PAPHIOPEDILUM MOQUETTIANUM
COURTESY OF DOROTHY POTTER BARNETT

PAPHIOPEDILUM MOQUETTEANUM

(J. J. SMITH) FOWLIE

ORCHID DIGEST, 44 (4): 133 (1980)

BASIONYM

Paphiopedilum glaucophyllum var. *moquetteanum* J. J. Smith

TEYSMANNIA, 17: 31 (1906)

SYNONYMS

Paphiopedilum victoria-regina ssp. *glaucophyllum* var. *moquetteanum* (J. J. Smith) M.W. Wood

THE ORCHID REVIEW, 84(995): 133-143, (1976)

Paphiopedilum dodyanum Cavestro

INTERNET ORCHID SPECIES PHOTO ENCYCLOPEDIA NOMENCLATURE NOTES, 5:3 (2017)

ETYMOLOGY

Paphiopedilum moquetteanum was named for Mr. Moquette, the manager of a plantation on Java.

DISCUSSION

Paphiopedilum moquetteanum is generally larger in all respects than *P. glaucophyllum*, has an overall flower coloration that is closer to *P. chamberlainianum* and a different chromosome count. Experienced hybridisers confirm that the breeding behaviour of *P. moquetteanum* is quite different from that of *P. glaucophyllum*. The more recently described *Paphiopedilum dodyanum* shows more distinct mottling of the leaves, but falls within the natural variation of *P. moquetteanum*.

DESCRIPTION

Paphiopedilum moquetteanum is an herbaceous perennial. The leaves are up to 55 cm long and up to 9 cm wide (and therefore much broader than in *P. glaucophyllum*), green, sometimes distinctly mottled. The inflorescence is erect, terete, up to 30 cm long, deep purple covered with white downy hairs, multi-flowered, the flowers opening one at a time. The bracts are 2 to 2.5 cm long, ovate, downy, green with purple veins, somewhat serrate and with a small acute tooth at the broad, blunt apex. The ovary is about 5 cm long, green, densely covered with dark-violet hairs. The natural spread of the flowers is up to 9.2 cm high by about 12.5 cm wide. The dorsal sepal is up to 4.4 cm long by approximately 5 cm wide. It is broadly ovate to subcircular, somewhat undulate, the apex rather serrate, the inner surface with a shallow median longitudinal groove; on the outside it is bluntly keeled, both halves somewhat convex, clear yellow, yellowish-green or brownish, covered with a large number of small brown-purple speckles that are sometimes arrayed in longitudinal lines. The inner surface is glossy, the mar-

gins and the outer surface are densely covered with deep violet hairs. The synsepal is up to 4.5 cm long by about 3 cm wide. It is ovate, obtuse, concave, the inner surface glossy with prominent longitudinal veins, the margins and the outer surface with spreading, deep-violet hairs. The petals are up to 6.2 cm long by approximately 1.6 cm wide. They are always linear and intensely undulate and twisted. They are glossy on both sides. The margins are covered with spreading, bent and branched colourless hairs that are about 3 mm long. The petals are whitish with approximately nine distinct longitudinal veins, toward the base somewhat greenish, toward the apex pale rose, with multiple small reddish-brown spots in the marginal regions and along the veins. The lip is trilobate, overall up to 7 cm long by up to 3 cm wide, at the base pale greenish-white, the large, infolded side lobes rounded and covered with small bright purple spots. The main lobe is deeply saccate, with acute, erect lateral ears, fairly uniform lilac, the rim of the aperture pale yellowish; the inner surface with the exception of the rim is covered with fairly short dark-violet hairs. The staminodal shield is large, ovate, blunt, up to 1.2 cm high by about 1 cm wide, in the basal portion green but elsewhere distinctly glossy purple.

DISTRIBUTION AND HABITAT

Java. Plants are found near the southwest coast at about 300 m. They usually grow near waterfalls on south-facing cliffs of soft, crumbling limestone with their roots embedded in the moss growing near water seepages.

FLOWERING

As all other species of subgenus *Cochlopetalum*, *Paphiopedilum moquetteanum* generates multiple flowers in sequence over a long period of time.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 34$ (Karasawa, 1979).

As the RHS Orchid registrar does not differentiate between *P. moquetteanum* and *P. glaucophyllum*, many plants now in cultivation under those two denominations are intermediate between the two entities.

VARIETIES AND FORMS

PAPHIOPEDILUM MOQUETTEANUM FORMA FLAVOVIRIDE

(BRAEM) BRAEM & CHIRON

BRAEM & CHIRON, PAPHIOPEDILUM: 419 (2003)

This taxon was originally described as *Paphiopedilum glaucophyllum* var. *moquetteanum* forma *flavoviride* in the AUSTRALIAN ORCHID REVIEW, 66(1): 4-16 [16](2001). The plants are devoid of all red pigmentation. The scape is pure green. The dorsal sepal is yellow, except for the margins which are entirely suffused with green. The synsepal is similar in colour. The petals and the lip are pure yellow. The staminode is yel-

low, the shield suffused with green. The plant and its flowers are distinctly larger than *P. primulinum*.

It is quite possible that some specimens of *P. Pinocchio* and some related hybrids are also being sold under this designation.



PAPHIOPEDILUM MOQUETTIANUM
COURTESY OF JERRY LEE FISCHER (ORCHIDS LIMITED)



PAPHIOPEDILUM VICTORIA-MARIAE
COURTESY OF JERRY LEE FISHER (ORCHIDS LIMITED)

PAPHIOPEDILUM VICTORIA-MARIAE

(SANDER EX MASTERS) ROLFE

THE ORCHID REVIEW, 3(35): 364-367 [364] (1896)

BASIONYM

Cypripedium victoria-mariae Sander ex Masters

THE GARDENERS' CHRONICLE, 3rd series, 13: 580 (1893)

SYNONYMS

Cypripedium chamberlainianum forma *victoria-mariae* (Sander ex Masters) Rolfe

THE ORCHID REVIEW, 1(6): 186-189 [188] (1893)

Cordula victoria-mariae (Sander ex Masters) Rolfe

THE ORCHID REVIEW, 20(1): 2 (1912)

ETYMOLOGY

Paphiopedilum victoria-mariae was named in honour of Princess Victoria Mary, of Teck (1867-1953), who was married to Prince George, Duke of York (who later became King George V). Princess Mary, who was fondly known as Princess May (after the month in which she was born), was the daughter of Queen Victoria's cousin, Princess Mary of Adelaide, the Duchess of Teck.

DISCUSSION

Paphiopedilum victoria-mariae was discovered by Wilhelm Micholitz when collecting for Sander in Sumatra. Sander showed the first flowering plant on 9 May, 1893, at the meeting of the Royal Horticultural Society's Orchid Committee, naming the species in honour of Princess Victoria Mary who was betrothed to the Duke of York on that same day.

The first extensive description was rendered by Joseph Dalton Hooker in CURTIS'S BOTANICAL MAGAZINE for 1898. The publication was illustrated with a plate depicting part of an inflorescence bearing three flowers. This, however, does not correspond to the natural condition as the species usually has no more than two open flowers at any time. In fact, the original water colour painting (preserved at Kew) of Mathilda Smith, bears a handwritten note instructing John Nugent Fitch, the lithographer, to add a third flower to the drawing in order to obtain a more appealing ensemble.

There can be no doubt that *Paphiopedilum victoria-mariae* is to be maintained as an autonomous species. Its floral characteristics, especially the morphology of the staminode, are extremely distinctive.



PAPHIOPEDILUM VICTORIA-MARIAE
COURTESY OF JAMES HADLEY CASH (MARRIOTT ORCHIDS)

DESCRIPTION

Paphiopedilum victoria-mariae is a very robust herbaceous humus epiphyte. The leaves are oblong-ligulate, rounded at the apex, emarginate with an apiculus in the sinus, up to 30 cm long by up to 6.5 cm wide. They are green, subtly mottled, and ciliate near the base. The underside is pale bluish green, its basal part flushed with purple. The inflorescence is stout, up to 1 m long, dark purple-brown. Many flowers are produced in sequence over a long period. Usually no more than two flowers are open at a time. The inflorescence is up to 35 cm long. The flower bracts are elliptic-oblong, emarginate, up to 3.5 cm long. They are green and ciliate. The pedicel and ovary are together up to 6 cm long. They are green covered with a multitude of long brown hairs. The flowers have a natural spread of up to 8 cm long by 9 cm wide. The dorsal is ovate to orbicular, ciliate, long-pubescent on the outside, pale yellow with a green centre, streaked with red. It is 2.4 to 3.4 cm wide. The synsepal is ovate, truncate, up to 3 cm long by up to 2 cm wide, ciliate, long-pubescent on the outside, green. The petals are horizontally spreading, undulate, the apical portion half twisted, reflexed, linear, more or less rounded at the apex, 3.2 to 4.2 cm long by up to 1.2 cm wide. They are green, flushed with brown to purple, shortly ciliate. The lip is three-lobed, up to 4.3 cm long by 2 to 2.6 cm wide. The finely spotted side lobes are infolded forming a tube. The main lobe is shaped like an inverted helmet, slightly compressed laterally about one-third below the mouth, distinctly tapering toward the apex. It is purple with a yellow or green band around the mouth. The margins of the aperture are erect, laterally forming two auricula. The staminode is trullate, curved in its apical section, about 10 mm long by about 8 mm wide, dark purple-brown with a green base and apex.

DISTRIBUTION AND HABITAT

South and west Sumatra. Plants grow in pockets of humus and leafy debris on steep, wet cliffs of lava at altitudes of up to more than 2,000 m.

FLOWERING

Paphiopedilum victoria-mariae produces multiple flowers successively over a long period of time. Plants can flower continuously for several years.

MISCELLANEOUS NOTES

The mitotic chromosome count is $2n = 30$ (Karasawa & Aoyama, 1980).

VARIETIES AND FORMS

None described. We have some information indicating the existence of a true albino with flowers that are green and white without any red coloration. This information, however, could hitherto not be substantiated.



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GUIDO J. BRAEM

Guido Jozef Braem was born in Ghent, Belgium, in 1944. He had a structured but extremely varied academic career, starting in Brussels with studies in Chemistry and Pharmacology. Professor Braem then worked in virus research in Canada and Belgium. In 1970 he moved to Germany, where he married his wife Gudrun, and studied Biology and English at the Justus Liebig University in Giessen. He then earned his doctorate in Plant Biology at the University of Newcastle upon Tyne in England, traveling to the Caribbean to do research for his doctoral dissertation that focused on orchid taxonomy. Afterward, he worked in Germany as an independent scientist and translator, and taught biology for the European divisions of the City Colleges of Chicago and the University of Maryland University College. His studies have led him to many foreign lands both in the eastern and western tropics to research his studies and to be able to write from a knowledgeable perspective. In the 1990s, Dr. Braem became a research associate in Botany as well as the History and Philosophy of Science for the California Academy

of Sciences. He continued to teach for the European division of the University of Maryland University College, where he was appointed full Professor in 2005. In this same time period, he also continued to travel to Ecuador, Peru, and Brazil; back in Germany he studied Art History.

Professor Braem is the author of nearly 200 scientific publications on the biology of orchids and carnivorous plants. He publishes in several languages in journals throughout Europe, Australia and the Americas. In addition to being a renowned plant biologist, teacher, and author, Prof. Braem, who lives in Lahnau, Germany, has been a Darwin scholar and has published an elaborate Darwin biography.

Prof. Braem's interest in slipper orchids started in the early 1980s, and in 1988, his first monograph on the genus *Paphiopedilum* appeared. In 2018 he published his monograph: *The Genus Phragmipedium – A Treatise on the Conduplicate-leafed Slipper Orchids of Latin America*. Here Prof. Braem presents a 3rd, updated and enhanced edition of his monograph on the genus *Paphiopedilum*.



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