Introduction

As is often the case in the world of Orchidaceae, there can be substantial disagreement between taxonomists about the classification of orchids. This is certainly the case for Paphiopedilum, and in the context of the discussion topic “newly discovered” Paphiopedilum species, often there are more questions than answers about whether they are in fact new, are forms of existing species, synonymous with existing species or in there classification is invalid.

Given the differing and often opposing views of many of the recognised authors including Dr Guido Braem, Dr Phillip Cribb, the late Dr Jack Fowlie, Olaf Gruss, Holger Perner and Dr Tanaka to name but a few, accessing definitive authority for newly recognised species has proven difficult. For the purposes of this exercise, the Plant List supported by Kew and several leading herbaria, http://www.theplantlist.org/1.1/browse/A/Orchidaceae/Paphiopedilum/ has been used as a quick reference as it provides details of those Paphiopedilum species where the identification is accepted, as well as those unresolved or in dispute.

Dr Tanaka who is recognised as a very knowledgeable enthusiast has a long list of “new” species on his webpage http://www.orchid.or.jp/orchid/people/tanaka/indexe.html He says very clearly that his page is not for scientists or botanists, but is for enthusiasts, thereby avoiding the classification disputes that plague taxonomy.

For the purposes of this paper, I will use species that Dt Tanaka lists as “new” as a basis for informing members about newly discovered Paphiopedilum and improving our knowledge and understanding of the taxonomical processes involved in validly identifying and obtaining recognition for a previously unidentified plant species. Remember, these rules apply to all plants and animal, not just orchids. The first part of this paper covers the period 2010-2016, and excludes those that have been tentatively identified as natural hybrids.

2015

Paphiopedilum nataschae Braem

This new species was discovered in northern and central Sulawesi, Indonesia, and described in Richardiana XV 276-281(2015) by Dr.Guido J. Braem. It is named for Miss Natascha Popow. It has been recognised by Kew and placed in the subgenus Sigmatopetalum (not yet accepted) The species has mottled leaves, and a single large flower. Photo source: http://cattlaelia.forumactif.org/t15233-paphiopedilum-nataschae
When comparing *Paphiopedilum nataschae* with *Paphiopedilum sangii*, with which it bears some resemblance, very distinct differences in the shape and colour of the staminode are evident. Also, the pouch of *Paphiopedilum sangii* shows prominent veining absent from *Paphiopedilum nataschae*. *Paphiopedilum nataschae* has also been compared to the recently discovered *Paphiopedilum robinsonianum* discovered by Dr. W. Caevestro. The major differences are the shape and colouration of the dorsal sepal, and the petals which in *Paphiopedilum robinsonianum* are strongly twisted.

**Paphiopedilum robinsonianum** Caevestro

This new species, *Paphiopedilum robinsonianum* was discovered on Mount Buyu Lumut, eastern central Sulawesi, Indonesia by a group of botanists with A.S. Robinson and described in Rhone-Alpes Orchidees 52:10-15(2014). However, the orchid-growing and taxonomical communities are somewhat suspicious about the claim that it is a new species as it closely resembles *Paphiopedilum javanicum* which is found in the same general area. Some of the original photos were inconclusive, but, the fact that it was collected in the wild mean that if it is a hybrid, at the very least it is a natural hybrid. The other alternative is that it is an as yet unknown form of *Paphiopedilum javanicum*. This species has not yet been recognised, although some authors (Braem, Chiron and Oland 2016) have decided to treat it as a unique species.


The dorsal sepal is ovate with a large green blotch at base and in the centre, it has twisted and heavily ciliate sepals and the staminode is transversely elliptic. *Paphiopedilum*
robinsonianum should not be confused with *Paphiopedilum robinsonii* which is a synonym of *Paphiopedilum bullenianum*.

*Paphiopedilum robinsonianum* increases the number of species (if ultimately it is accepted as new species) from Sulawesi known for high endemism rates of fauna and flora. The inflorescence is single-flowered; the lateral lobes of the lip are incurved and warty. These characteristics are consistent with other species in the section *Barbata*. The plant and the flower have some morphological affinities with *Paphiopedilum javanicum* (Reinw. ex Lindl.) Pfitzer but the dorsal sepal is white with emerald-green centre, the margins of the petals are twisted and heavily ciliated (margins entire for *Paphiopedilum javanicum*), the staminode is transversely elliptic (reniform for *Paphiopedilum javanicum*).


2014

**Paphiopedilum josianae** Guido J. Braem and K. Nimoonsri.

*Paphiopedilum josianae* (previously classified as *Paphiopedilum concolor* var. *longipetalum*) was described as a new species in *Richardiana* XIV:185, 2014. The close relationship to *Paphiopedilum concolor* (Bateman) Pfitzer is obvious. Braem and Nimoonsri assert that the differences between *Paphiopedilum concolor* and the variety *longipetalum* are at least as distinct as those between the generally recognised species pairs including *Paph. anitum/Paph. adductum*, *Paph. lynniae/Paph. lowii*, *Paph. parishii*/*Paph. dianthum*, *Paph. philippinense/Paph. roebbenii*, *Paph. godefroyae/Paph. leucochilum* and some others.

The significant difference is the size and form of the petals. The petals of *Paphiopedilum concolor* are elliptic to oblong-oval while those of *Paphiopedilum josianae* are elliptic to narrowly elliptic and about twice as long as in *Paphiopedilum concolor*. Furthermore, *Paphiopedilum josianae* forms distinct autonomous populations, and is therefore considered to be a distinct, genetically stable entity. For these reasons, *Paphiopedilum concolor* var. *longipetalum* was proposed for elevation to species level as *Paphiopedilum josianae*. 
This variety of *Paphiopedilum concolor* was first described in 1896, but was not revisited until plants more recently appeared for sale in the Asian orchid markets. The plants were said to have been collected near the border of Myanmar and Thailand. Further information which has recently become available enabled the critical review and identification of this new that has been accepted.

Photo source: http://richardiana.com/galerie/hires/image405.jpg

**2014**

*Paphiopedilum rungsuriyanum*

This apparently new and very distinctive species has been published by Olaf Gruss, Niwat Rungruang, Yongyouth Chaisuriyakul and Ibn Dionisio in Orchideen Journal, Vol 2-1, 2014. Like several discoveries in the last 10-15 years, it came about by chance. Wild-collected Laos *Paphiopedilum* species orchids were sent to Thailand for sale in the plant market. Mr Niwat Rungruang, a Thai orchid enthusiast purchased several plants from some of these collections. When one of the plants bloomed in May 2014, he realised that his plant was not *Paphiopedilum canhii* which it resembled vegetatively. He contacted Dr Olaf Gruss, and supplied flowering specimens and photos for analysis and identification. From several flowering specimens, this new species was proposed.

Other than a source in northern Laos, little has been published about the habitat in which it is found. In part, this is due to the fact that the plants were most likely illegally collected and transported to Thailand in the first instance.

While the species with its marbled leaves appears quite similar to *Paphiopedilum canhii*, the flower is distinctively different with much broader petals and intensive red-purple colouring, and an entirely different staminodium. The underside of the leaves is grey-green with wide purple veins while *Paphiopedilum canhii* is red-purple speckled.

This photo is purportedly the habit for *Paphiopedilum rungsuriyanum*, but could equally be *Paphiopedilum canhii* given the superficial vegetative similarity.


2011

**Paphiopedilum inamorii** P.J.Cribb & A.L.Lamb 2011

This new species was found in Sabah, north-western Borneo, Malaysia in lower montane mossy forests at 1,600m as a small sized, cool growing terrestrial with a short stem carrying 4 to 5, spreading, oblong-elliptic, obtuse to subacute, pale green boldly tessellated with darker green leaves that blooms in the fall on an erect, terminal, cylindrical, purple, densely short, purplish-brown haired, to 10" [25 cm] long, single flowered inflorescence with a cuculate, ovate, acute floral bract. It was published with photographs and illustration in Malesian Orchid Journal Vol. 8, 39-42(2011). It has been placed in Subgenus *Sigmapotetalum*, Section *Barbata*, Subsection *Barbata*, and is recognised as a new species.

This new species is allied to *Paphiopedilum sugiyamanum* but they are very different to each other in detail.

Photo source: http://www.orchid.or.jp/orchid/people/tanaka/orchid/org/shinshu/enshinshu57.html
O’Byrne, writing in the Malaysian Orchid Review Vol 49, 2015 says that plants of this species were observed growing in a garden in the Kipandi locality in Sabah, along with Paphiopedilum javanicum var. virens and Paphiopedilum sugiyamanum. Apparently the villagers previously collected plants locally for sale at roadside stalls, virtually wiping out local populations of some orchids. The garden owner wild collected some Paphiopedilum species in 2001 from the Sipitang District assuming they were Paphiopedilum sugiyamanum. Following the government closure of the roadside stalls in the late 1990’s, many of the wild-collected orchids were virtually ‘left to the own devices’ and have prospered over time. Also found in local gardens are populations of Paphiopedilum javanicum var. virens and Paphiopedilum sugiyamanum along with Paphiopedilum inamorii supporting a theory that given the morphological similarities, Paphiopedilum sugiyamanum could be a natural hybrid between Paphiopedilum javanicum var. virens and Paphiopedilum inamorii.

A previously unknown colour variant of Paphiopedilum javanicum has also been reported from a private garden in 2015 Plants were collected from a logging road embankment in an undisclosed, but previously unknown Paphiopedilum habitat.

Paphiopedilum cornuatum Z.J.Liu, Olaf Gruss and L.J.Chen 2011

This newly discovered species from south-central China is very rare and highly localised with a very restricted distribution. Paphiopedilum cornuatum is endemic to south-central China, and it is found only in southwest Yunnan, Wuliang Shan, Xiaojinggu at 1,500m. (Koopowitz 2012, Liu et al. 2011). Its publication has been accepted.

Photo source: http://www.orchid.or.jp/orchid/people/tanaka/orchid/org/shinshu/enshinshu56%20.html
The Red List says “The trend of the population is decreasing, the number of mature individuals is very low (less than 50) and the population reduction threat is very high due to illegal collection for horticultural purposes and hybridisation, regional and international trade, deforestation and habitat destruction. The estimated extent of occurrence and the estimated area of occupancy are both 4 km² with an estimated continuing decline in the number of mature individuals and the quality of the habitat in the single location. Therefore, Paphiopedilum cornutum is assessed as Critically Endangered (CR).

2010

Paphiopedilum canhii Aver. & O. Gruss

Paphiopedilum canhii was first collected in 2009 in Northern Vietnam during a field expedition. It was named for Mr. Canh Chu Xuan, who discovered the plant.

Only a few plants were collected in 2009 in northern Vietnam from primary coniferous, mixed and broad-leaved endemic forests covering tops of remnant table- or mesa-like hills and mountains composed of highly eroded marble-like rocky limestone. A small population was found in shade at the base of a vertical cliff near the mountaintop at 1,500m. Plants that were collected flowered in a nursery a few months later. The flowers did not fit with any known Paphiopedilum species based on colour and morphology, and initially it was thought that it was a natural hybrid. Further examination and study of its morphology indicated that this Paphiopedilum did not fit with any possible hybrid morphology of based on parental pairs of known species. The colour and shape of the petals, lip and particularly the staminode are specific and characteristic. The authors concluded that these characteristics distinctly segregate this plant as a separate entity. The registration has been accepted and little doubt exists that it is a new species as part of an isolated taxonomic group of local calcium-dependent limestone endemics of northern Vietnam.

Photo source: http://www.orchidspecies.com/orphotdir/paphcanhii.jpg
Within the limits of this section, this newly discovered species may have some relation to *Paphiopedilum callosum* (Rchb. f.) Stein and *Paphiopedilum purpuratum* Pfitzer. However, this affinity is rather uncertain due to the different floral morphology. Ecological, environmental and climate conditions of *Paphiopedilum canhii* look quite similar to those that were described and published earlier for *Paphiopedilum purpuratum* (Averyanov et al. 2003).

According to the most modern taxonomic system for the genus *Paphiopedilum*, this species was provisionally placed into section *Barbata* (Kraenzl.) V.A. Albert & B. Pettersen (Cribb 1998; Averyanov et al. 2003). However, that sectional placement remains uncertain due to the differences in the leaves, the staminode and the lip, as well as the lack of warts on petals.

As will often be the case for endangered plant communities that include newly discovered species, the primary forests on rocky limestone habitats for *Paphiopedilum canhii* and other plant species are presently under great threat. This species has little chance of survival without further study and implementation of protective measures.

This species was discovered during extensive botanical field explorations conducted in 2009. The limestone areas of northern Vietnam and southern China were identified as distinct and important centres for *Paphiopedilum* speciation and diversity (Averyanov 2008). These studies revealed more than 25 fairly isolated local endemics with surprisingly restricted and disjunctive distributions. Among them are several highly prized species and varieties of *Paphiopedilum*. (Averyanov 2008; Liu Zhong-Jian, Chen Sing-Chi and Cribb 2009). Southern China and Northern Vietnam have been a priority for botanical explorations and investigations for many years, but the limestone areas in northern Vietnam and northern Laos remained largely unexplored.


*Paphiopedilum canhii* in situ
When referring to some of the unusual and exciting orchids from this general area including Bulbophyllum paraemarginatum Aver., Dendrobium farinatum Schildh.&Schraut, Dendrobium trantuanii Perner et X.N. Dang, Dendrobium vietnamense Aver., Hayata glandulifera Aver. and Sunipia nigricans Aver recently discovered, (Perner and Dang 2003; Schildhauermand Schraut 2004; Averyanov 2004, 2005, 2007, 2009) note that botanists always expected many more discoveries from areas such as these that for many years had been inaccessible.

More recently, a new variety of Paphiopedilum canhii was found in south-eastern Yunnan, China and described as Paphiopedilum canhii var. funingense by Z. J. Liu and L.J. Chen. The flower closely resembles Paphiopedilum canhii with the exception of the flower colour.

**Paphiopedilum guangdongense** Z.J. Liu & L.J.Chen

*Paphiopedilum guangdongense* was discovered in southern Guangdong region in China and described as a new species following molecular evidence of comparison with the sequence of internal transcribed spacer of nuclear ribosomal DNA analysis in Journal of Systematic and Evolution 48(5):350(2010). Morphologically, it strongly resembles *Paphiopedilum villosum*.

It was discovered during botanical trips to the Yunkai Mountains of southern Guangdong in October 2008 and June 2009, two populations of *Paphiopedilum* were found on rock surfaces in a broad-leaved forest of southern subtropical area.

The Yunkai Mountains, which consist of 29 peaks higher than 1,500 m. The main peak at 1,704 m, is the second highest in Guangdong province. This area is located on the southern edge of the subtropical zone, facing the South China Sea, so it is under the influence of both ocean climate and subtropical monsoon climate. Despite the low latitude and adequate sunlight, this area has rather low average annual temperatures, high rainfall, and is often cloudy and misty. The average annual temperature is 17–18 °C, and the highest temperature is 28 °C at approximately 1,000 m.

The “New” *Paphiopedilum* species 2010 -2016

The annual rainfall is approximately 230–260 cm, but most occurs from March to November. The bedrock is mainly granite and gneiss. Soil consists of light loam or sandy soil. Red soil is below an altitude of approximately 800m and yellow soil is above 800 m; meadow soil can be found at the top of some mountains. The soil layers are generally rather thin and the bedrocks of many sections are bare because of steep slopes and serious erosion.

*Paphiopedilum guangdongense* grows on humus rich rocks or in rock crevices in the forests on steep slopes at an altitude of 1,100–1,500m. There are plentiful species in this region, more than 50 species of orchids, such as *Cymbidium eburneum* Lindl., *C. ensifolium* Swartz, *C. floribundum* Lindl., *C. kanran* Makino, *C. macrothizon* Lindl. and *C. tortisepalum* var. *longibracteatum* (Y.S. Wu & S.C. Chen) S.C. Chen & Z.J. Liu, *Zeuxine agyokuana* Fukuyama, *Calanthe densiflora* Lindl., *Goodyera procera* (Ker-Gawl.) Hook., *Oberonia caulescens* Lindl., *Dendrobium moniliforme* (L.) Sw., and *Bulbophyllum yunnanense* Rolfe.

This new *Paphiopedilum* from southern Guangdong was studied taxonomically by means of internal transcribed spacer of nuclear ribosomal DNA analysis in addition to morphological and phytogeographical considerations. It is similar to *Paphiopedilum gratrixianum* (Masters) Rolfe morphologically. The differences are narrower leaves (less than 2 cm wide) lacking purple spots toward abaxial base, pale green dorsal sepal veined with pale purplish brown and not heavily spotted with purple, and staminode subtruncate and mucronate at apex. An analysis of internal transcribed spacer sequences of this species and its allies came to the same conclusion that it is a member of section *Paphiopedilum* and closely related to, but distinct from *Paphiopedilum gratrixianum*. As a result, it is recognised as a new species, *Paphiopedilum guangdongense*.

**Paphiopedilum qingyongii**

*Paphiopedilum qingyongii* is endemic to China. It has been collected only once at an undisclosed site in Motuo, Xizang at 1,200 m. (Koopowitz 2012, Liu and Chen 2010). This species is similar to *Paphiopedilum venustum*. It was published by Dr Olaf Gruss in De Orchidee, 61(4):281, 2010.

Photo source: http://www.orchid.or.jp/orchid/people/tanaka/orchid/org/shinshu/photo2/qingyongii2.jpg
Little is known about its habitat and environment. It differs from *Paphiopedilum venustum* as it has 8-9 adaxial leaves that have little or no tessellation, the petals are white-green and densely spotted, and the purple/red staminode is broadly oblong. The species is recognised.

The Red List says of this species “The trend of the population is decreasing, the number of mature individuals is very low (less than 50) and the population reduction threat is very high due to illegal collection for horticultural purposes and hybridisation, regional and international trade, deforestation and habitat destruction. The estimated extent of occurrence and the estimated area of occupancy are both 4 km2 with an estimated continuing decline in the number of mature individuals and the quality of the habitat in the single location. Therefore, *Paphiopedilum qingyongii* is assessed as Critically Endangered

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