

# Phragmipedium Schlimii: A New Look at an Old Species

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## ABSTRACT

The past twenty-five (25) years has seen a rapid accumulation of new scientific names in this species concept. *Phragmipedium schlimii* has been divided into five (5) species and three (3) natural hybrids. Some names are accepted by some authors, others are not. Eight (8) different names for one (1) species concept in a genus as small as *Phragmipedium* is taxonomic inflation and should only be accepted with rigorous evidence supported by natural populations. The validity of these eight (8) names has been applied in the scientific, horticultural and hobbyist communities casually, with personal opinion based on a minute sample size of material obtained *ex-hortus* often being the deciding factor in acceptance. Testing of the type descriptions and type material against natural populations was needed. What was found was compelling. Natural populations do not support breaking *Phrag. schlimii* out into more than one species and into multiple natural hybrids. Natural populations do support the maintenance of two (2) forms, and those are identified within.

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## INTRODUCTION

*Phragmipedium schlimii* is a new world species of slipper orchid belonging to section Micropetalum. Reichenbach first described it in 1854 as *Cypripedium schlimii*. This species has an impressive distribution, with primary and secondary roadside habitats ranging from the Ecuadorian border in the southwest, through Colombia to Cucuta on the border with Venezuela in the northeast. *Phragmipedium schlimii* inhabits both sides of the eastern and western Cordillera of Colombia, the two principle ranges of the Andes Mountains at altitudes that range from 1,100 to 2,000 meters. *Phragmipedium schlimii* remained a single species notwithstanding its variability, phenotypic plasticity, and progressive floral characteristics until 1996 when, based on an old (Hopp, in Schlechter, 1924; 15) reference in the literature to a *Phragmipedium* with a rose-red flower from Colombia, and a single malformed, abnormal flower, on a single plant, in a greenhouse in the United States, Braem described *Phrag. fischeri* (Braem; 7). *Phragmipedium schlimii* was subsequently divided into five species (*Phrag. schlimii*, *Phrag. fischeri*, *Phrag. andreettae*, *Phrag. manzurii* and *Phrag. anguloi*) and three natural hybrids (*Phrag. x colombianum*, *Phrag. x daguense* and *Phrag. x narinense*) by multiple authors (5, 6, 7, 8, 10, 12). A close examination of the language used to try to support the five (5) different species and three (3) natural hybrids demonstrates how even the authors of these publications have struggled to try to define these names in the face of accumulating evidence that *schlimii* one widespread and variable species. Like its cousins in

the genus, *Phrag. schlimii* is a broadly defined and highly variable ochlopecies whose flowers continue to develop after anthesis. An ochlopecies is "a very variable (polymorphic) species, whose variation, though partly correlated with ecology and geography, is of such a complex pattern that it cannot be satisfactorily accommodated within a formal classification" (Cronk 1998; 9), i.e., it is not separable into distinct subspecific groups.

## TAXONOMY

*Phragmipedium schlimii* (Linden ex Reichenbach fil.) Rolfe, Orchid Rev. 4:332. 1896.

Bas.: *Selenipedium schlimii* Linden ex Rchb. f., Bonplandia (Hannover) 2: 277. 1854.

*Phragmipedium schlimii* f. *manzurii* (W.E.Higgins & Viveros) Braem & Tesón, *Richardiana* 16: 305 (2016)

Bas: *Phragmipedium manzurii* W.E. Higgins & P. Viveiros, *Lankesteriana* 8(3): 89-92; 2008

*Phragmipedium schlimii* f. *andreettae* (P.J. Cribb & Pupulin) Cervera.

Bas: *Phragmipedium andreettae* (P.J. Cribb & Pupulin) *Lankesteriana* 6(1): 1 figs 1-2 (2006)

Homotypic synonyms:

*Cypripedium schlimii* (Linden ex Rchb.f.) Linden ex Bosse in *Vollst. Handb. Bl.-Gärtn.*, ed. 3, 1: 884 (1859)

*Paphiopedilum schlimii* (Linden ex Rchb.f.) Stein in *Orchid.-Buch*: 483 (1892)

*Selenipedium schlimii* Linden ex Rchb.f. in  
*Bonplandia* (Hannover) 2: 277 (1854)

Heterotypic synonyms:

*Cypripedium schlimii* var. *albiflorum* Linden, Ill.  
Hort. 1874: t. 183. 1874.

*Phragmipedium schlimii* fo. *albiflorum* (Linden) O.  
Gruss, Orchidee (Hamburg) 47: 22. 1996.

*Phragmipedium schlimii* var. *albiflorum* (Linden)  
Braem, Orchids (West Palm Beach) 65: 128. 1996.

*Phragmipedium andreettae* (P.J. Cribb & Pupulin)  
Lankesteriana 6(1): 1 figs 1-2 2006. Type: ?N.W  
Ecuador, without exact Prov., hort. Ecuagenera,  
November 2005, *Portillo s.n. (holotypus QCA!)*.

*Phragmipedium anguloi* (Braem, Teson & Manzur)  
Richardiana 14: 290; figs 1-2. 2014. Type: SW  
Colombia, Dept. of Cauca, Patia-Timbio valley, *R.  
de Angulo Blum s.n. (holo. FAUC)*.

*Phragmipedium fischeri* (Braem & H. Mohr)  
Leaflets of the Schlechter Institute 3: 28. 1996:  
Gruss in Orchideenjournal 2013: 7-10 2013. Type:  
Ecuador, Maldonado, 1400m, April 1996, cult.  
Orchids Ltd., USA (holo. SCHL. 96/0414).

*Phragmipedium fischeri* var. *fischeri* (Braem & H.  
Mohr) Gruss in Japan Orchid Society Bulletin 43:  
34 2000.

*Phragmipedium manzurii* (W.E. Higgins & P.  
Viveros) Lankesteriana 8, 3: 89. 2008. Type:  
Colombia, Santander, cult. June 2008, D.A.  
*Manzur 1501 (holo. FAUC)*.

*Phragmipedium schlimii* var. *manurii* (W.E. Higgins  
& P. Viveros) Cribb in Slipper Orchids of the  
Tropical Americas 2017.

*Phragmipedium x colombianum* (O.Gruss) Die  
Orchidee, 62: 30. 2011 Type: Colombia, without  
exact locality, cult. Franz Glanz, Gruss 2010-09-25  
(holo. HAL).

*Phragmipedium x daguense* (Braem & Teson)  
Leaflets of the Schlechter Institute 5: 1-7. 2017.  
Type: Colombia, Dagua, Valle del Cauca, ex hort.  
Teson. Herbario Nacional Colombiano (COL!)

*Phragmipedium x narinense* (Braem & Teson)  
Leaflets of the Schlechter Institute 5: 1-7. 2017.  
Type: COLOMBIA, Departamento de Narino, ex  
hort. Teson. Herbario Nacional Colombiano (COL!)

## METHODOLOGY

Each of the species and hybrid descriptions authored in the past twenty-five (25) years was taken to the type locations in Colombia and compared against natural populations and tested against what was seen there. Natural populations revealed errors in our understanding of the species concept and our treatment must evolve to better align with what the natural populations are telling us. The size of the type population was observed to within ~ 32km (20 miles), and the characteristics of the “type” specimen, as specifically defined in each description, was compared to the characteristics evident in each population (population dynamics or mathematical biology), across multiple visits to each location as well as other populations within the range of *Phrag. schlimii*. What regulated the size of the population was found to be the ecology, or how much of the general area was agreeable to *Phragmipediums* and year over year changes due to collecting and natural habitat creation and destruction. The sequence of population changes (distribution of morphological variations) were noted and photographed and compared to the “type” descriptions. Over the past twenty-five (25) years between 100 and 500 flowering plants have been observed at each location in addition to large collections of plants of known provenance in nurseries in Colombia and Ecuador. Only two names, *manzurii* and *andreettae* demonstrated a correlation between the description and the type population of at least twenty-five percent with seventy five percent or more of plants at each location exhibiting mixed taxonomic attributes of several of the names that did not match the descriptions. As such it is useful to formally recognize these names as forms. The type location of *manzurii* has been almost completely stripped of plants by collectors and it would not be possible to repeat those numbers today. The location tested for *andreettae* exhibited mixed taxonomic attributes with other species in high numbers and that location still contains significant amounts of plants both in primary habitats and secondary roadside locations nearby. *X colombianum* lacks a specific location against which to test the description as the type plants were obtained *ex hortus*. Only one name, *fischeri*, demonstrated zero correlation between the type description and the location from which that plant came. The significant number of taxonomic references to cultivated plants (*ex hortus*) in the taxonomic history of *Phrag. schlimii* should be noted. The recent rapid accumulation of scientific names in this species concept has not been due to the discovery of new taxa, but the elevation of variations of *Phrag. schlimii* to specific status. A closer look at the formal descriptions is warranted.

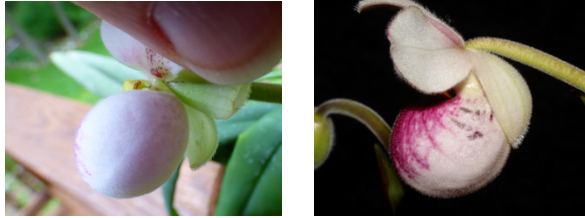


Fig. 4 Slippers with and without fenestrations can be found throughout all populations

## DESCRIPTION

Like several other species in the genus *Phrag. schlimii* self-pollinates (1). Self-pollination has been observed in natural populations across the entirety of the known range, from the Ecuadorian – Colombia border all the way to Cucuta. Self-pollination is not exclusive to any sub-population or location. It is part of the species' natural biology. Flower color in this species is variable. Color varies from pure white with hints of green, to varying degrees of pink and with deeper rose-red slippers, through to dark rose-red flowers. Flowers are produced either successively along the inflorescence or on a branching inflorescence with as many as four flowers open simultaneously. Flowers have been observed throughout the year in both natural populations and in cultivation. The lateral petals are rounded to oval shaped, and present with different degrees of reflection.



Fig. 1 Naturally occurring variations in the form of the labellum of *Phrag. Schlimii*

Consistent with the genus overall, the shape of the staminode is highly variable within natural populations across the entire range of the species. Shape varies from oval or generally egg shaped (triangular), to quadratic, to long and tapered, to varying degrees of being shaped like a violin (pandurate). How the two side lobes of the staminode approach each other at the bottom, creating a cleft or notch, varies from plant to plant,

from noticeable to non-existent. There is also a ridge down the center of the staminode that presents with varying degrees of prominence. This center ridge has been observed on some flowers to produce a small horn at the center of the staminode. This ridge is the only constant in the species concept and is present on every staminode. Flowers without a staminode, but presenting only the center ridge, have been observed both in situ and on nursery raised plants. There is, to date, no evidence to support the proposition that the staminode acts as a lure for pollinators in this species.

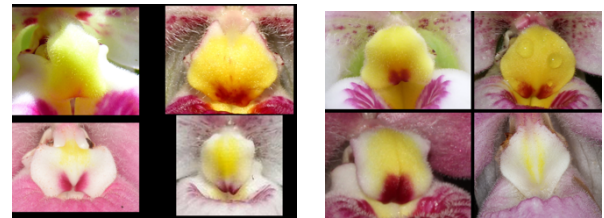


Fig. 2 Naturally occurring variations in the shape of the staminode of *Phrag. Schlimii*

Vegetative characteristics also vary. Blooming size plants in situ have been observed to range from 12cm to 45cm across. Leaves can be short and wide on mature plants, but also slender, measuring up to 25cm long on mature plants. Leaf consistency, or how stiff or erect leaves are depends on ecological conditions and varies throughout natural populations and in cultivation. Slipper (labellum) morphology varies. Slippers vary from round and ovate (oval) to more elongated, bulbous, and narrow. Some, but not all, slippers have small translucent windows on the labellum, called fenestrations, which present in varying degrees of length, width and number. Fenestrations vary throughout natural populations as well as in cultivation. The shape of the slipper and the presence of fenestrations are variable

throughout the range of *Phrag. schlimii* and apparently have no taxonomic significance in separating *Phrag. schlimii* into distinct subspecific groups.

## THE SPECIES AND NATURAL HYBRID DESCRIPTIONS

The past twenty-five (25) year period has seen a rapid accumulation of new scientific names in this species concept. Attempting to account for the natural cline in variation across multiple taxonomic characters three natural hybrids between several of the alleged new species have been proposed. The proposed natural hybrids attempt to account for what the authors describe as “intermediate characteristics” (5) seen in natural populations and greenhouses between several of the new names. If we attempt to name all the possible combinations of variable characteristics seen within natural populations of *Phrag. schlimii* the species will be left in such a state of taxonomic inflation that the species would require its own genus and the names would lose all practical value. Several of these species have been supported with vague and synonymous language and the indefinable taxonomic characteristic of “different” (5, 12). The language used by the authors in support of specific status is important, because this is how each “type” was defined. Almost any plant of *Phrag. schlimii*, *Phrag. fischeri*, *Phrag. andreettae*, *Phrag. anguloi*, *Phrag. manzurii*, *Phrag. x daguense*, *Phrag. x narinense*, and *Phrag. x colombianum* can, and will, demonstrate one or more taxonomic characters of the other alleged species and natural hybrids within the species concept, making species boundaries as vague and indefinable as some of the language used to try to differentiate these names from each other. *Phragmipedium fischeri*, *Phrag. andreettae*, *Phrag. anguloi*, *Phrag. manzurii*, *Phrag. x daguense*, *Phrag. x narinense*, and *Phrag. x colombianum* are synonyms of *Phrag. schlimii* as discussed and demonstrated within.

*Phragmipedium fischeri* was described in 1996 as having “clearcut morphological and structural differences, especially in the flower morphology” (Braem; 7). These were specified as a quadratic staminode, whereas *schlimii* had a triangular staminode, and the “important difference” of having an extra floral part, a lobe, between the synsepal and slipper formed labellum. Leaves were differentiated as being “much shorter and of greater consistency” than *schlimii*. The line drawing, part of the type material, contains drawings of two (2) different labellum shapes, and the type description makes no mention of labellum shape. Not one plant at the type location has ever been seen,

notwithstanding twenty-five (25) years of searching, that ever met the description of *Phrag. fischeri*. Plants at the location of the initial collection of what was described as *Phrag. fischeri* demonstrate longer, more strap-like leaves, wider leaves, and longer thinner leaves, mixed together, as do all populations of *schlimii*. The species was described based on a single, malformed and aberrant flower in a greenhouse that is not representative of the population from which that plant came nor any other population of *Phrag. schlimii* anywhere else in the range of the species. Twenty (20) years later, contradicting the type material and description, the author tried to redefine the concept as having a labellum with no fenestrations, a polygonal staminode, a quasi-spherical pouch and as always being self-pollinating, with no mention of the “clear cut” defining difference of a lobe between the synsepal and labellum (Braem; 3). It should be noted that in the 2014 description of *Phrag. anguloi* the same author described the slipper of *Phrag. fischeri* as either “elongated [or] calceolate” (Braem; 6). In 2016 the shape of the slipper changed to a “quasi-spherical” shape (Braem; 3) after being different shapes in 1996 and not relevant to the concept of *fischeri* (Braem; 7). The 2016 attempt to redefine the name *fischeri* references a staminode shape, polygonal, that can be found on every flower, everywhere within the range, as can flowers with and without varying degrees of fenestrations.

*Phragmipedium andreettae* was described in 2006 based on a plant that flowered at the Ecuagenera nursery in Ecuador (Cribb, P. & Pupulin, F; 8). The description states that the type plant was collected in northeast Ecuador in the same region where *Phrag. fischeri* was discovered ten years earlier. Recently, several reliable sources have claimed that the plants that were used to describe *Phrag. andreettae* never existed in Ecuador and came from locations in central Colombia in the western Cordilleras. *Phragmipedium. andreettae* was differentiated from *Phrag. schlimii* based on the pale pink color of the flowers and what was referred to as “quite distinct” slipper and staminode morphology. The staminode is described as being longer than broad and distinctly, if minutely, bifid at the tip. Over the past fourteen years as more plants have been observed in situ and ex situ the differences in the shape of the staminode have become blurred and the overall shape of the staminode is now known to be as variable as the broader population of *Phrag. schlimii* and the genus overall. Furthermore, many plants labelled as *Phrag. andreettae* have a staminode that is distinctly broader than long, making them inconsistent with the type. The overall shape of the

slipper fits nicely in the range of variation seen throughout *Phrag. schlimii* populations and matches one of the slippers illustrated in the type description of *Phrag. fischeri*.



Fig. 3 Four forms of what was described as *andreettae* from the 2006 type collection showing substantial variations in the staminode, slipper shape, petal characteristics and color.

*Phragmipedium manzurii* was described in 2008 based on a plant that came from the department of Santander in northeastern Colombia (Higgins, W.E. & Viveros, P.; 12). The description states in support of *Phrag. manzurii*, "This new species is similar to *Phragmipedium fischeri* and *Phrag. schlimii* but differs in the shape of the staminode and the color of the flowers." The authors also note a notch at the bottom of the staminode as we see in the "bifid" tip at the bottom of the staminode of *Phrag. andreettae*, but otherwise provide no differentiating characteristics for the staminode. The color difference, stated to be a greenish coloration to the dorsal sepal and lateral petals, is visible as the flower opens but fades to the more commonly seen white as the flower ages. The description describes the habitat as being terrestrial in leaf litter on steep slopes in wet montane forest, ecological characteristics common throughout the range of *Phrag. schlimii*.

*Phragmipedium x colombianum* was described in 2011 based on two plants that flowered in the nursery of Franz Glanz in Germany (Gruss; 10). The description states that *Phrag. x colombianum* is a natural hybrid between *Phrag. schlimii* and the recently described *Phrag. manzurii*. The description contains photos of flowers that show greenish coloration in the dorsal sepal with white lateral petals with a hint of purple at the base. Sidestepping the pitfalls in describing plants in

greenhouses as new species or natural hybrids for a moment, we would need to first accept that *Phrag. manzurii* is a valid species based on 'differences'. All physical characteristics of the plants used in the description show a slipper, color and staminode that are consistent with the range of variability of *Phrag. schlimii*.

*Phrag. anguloi* was described in 2014 based on a plant from the Patia-Timbio valley on the western side of the Andes in the department of Cauca in southern Colombia (Braem; 6). Two comparisons are made in the description, the first to *Phrag. andreettae* and the second to *Phrag. schlimii*, *Phrag. fischeri* and *Phrag. Manzurii*. The description states, "*Phragmipedium anguloi* is very closely related to *P. andreettae*. It differs, however, in several characteristics; Plants of *P. anguloi* are much more compact; The staminode morphology is very different and; The pouch morphology is different showing very distinct and well-developed fenestrations. From all other entities of the *P. schlimii* complex (*P. schlimii*, *P. fischeri*, *P. manzurii*) *P. anguloi* differs distinctly by; The different pouch morphology (elongated versus calceolate) and; The clearly different staminodal morphology. The author uses alleged differences in the staminode not once, but twice in the description to differentiate *Phrag. anguloi* from *Phrag. andreettae*, *Phrag. schlimii*, *Phrag. fischeri*, and *Phrag. manzurii* by describing the "distinct" differences as "different". No specificities are given. The author states that *Phrag. anguloi* has distinct fenestrations on the pouch and supports the species proposal by comparing the fenestrations only to *Phrag. andreettae*, which he claims has no fenestrations. The author does not compare the slipper fenestrations to *Phrag. schlimii*, *Phrag. fischeri*, or *Phrag. manzurii*, although it is claimed two years later that *Phrag. fischeri* also has no fenestrations on the slipper. All slipper orchids have a labellum that is calceolate. The remaining proposed taxonomic difference, a more compact growing habit, is vague, synonymous with the language used regarding *Phrag. fischeri*, and not supported by natural populations.

*Phrag. x daguense* and *Phrag. x narinense* were described in 2017 (Braem; 5). The description states in support of *Phrag. x daguense* "Plants of this natural hybrid were found amidst a *Phragmipedium andreettae* (SIC) population near some quebradas (ravine or stream) close to the Cali-Buenaventura Road. The flower is larger than those of the *Phrag. andreettae* plants and the pouch is spherical and has no fenestrations. The staminode is very much like the staminode of *Phrag. schlimii* flowers. The plants are self-pollinating". The description states in support of



*Phragmipedium x narinense*: "About 90 km from the *Phragmipedium fischeri* population on the border between Colombia and Ecuador and about 100 km south of the *Phrag. anguloi* population at the Hopp site (Schlechter, 1924; 15), a population of plants was found that clearly shows intermediate characteristics between the two species. Interestingly, some of the plants have flowers that are closer to those of *Phrag. fischeri* and others show blooms that are obviously more like those of *Phrag. anguloi*".

According to the description of these two natural hybrids plants from these locations demonstrate "intermediate characteristics" between *Phrag. fischeri* and *Phrag. anguloi*. Other than the indeterminant statement about "intermediate characteristics", no further information is given to define the proposed natural hybrid. Regarding *Phrag. x daguense* we see the encounter with plants meeting the description of *Phrag. schlimii* growing in a population exhibiting mixed taxonomic attributes with plants meeting the description of *Phrag. andreetae*. Some plants show the taxonomic attributes of *Phrag. schlimii*, while some plants show taxonomic attributes of what is asserted to be *Phrag. andreetae*.

### CONSOLIDATION BACK INTO ONE SPECIES

Botanists are skeptical in general about taxonomic novelties based on single, or a few plants, with special caution given to accepting new species described *ex hortus*. *Phragmipedium schlimii* is best studied as a group, as a widely distributed species and not on a plant-by-plant individual basis and most certainly not in a greenhouse agnostic of ecology and species biology. *Phrag. schlimii* is an ochlopecies. All forms of *Phrag schlimii* intergrade across the range, and the elevation of multiple variations of *Phrag. schlimii* to specific rank is contradicted by the natural populations. Once we aggregate the cline in natural variation seen across populations throughout Colombia, from Venezuela to Ecuador, the parameters that we need to see in order to define distinct species boundaries do not appear. As such, there is no justification throughout natural populations to maintain five different species and three natural hybrid names. *Phragmipedium fischeri*, *P. andreetae*, *P. anguloi*, *P. manzurii*, *P. x daguense*, *P. x narinense*, and *P. x colombianum* are each synonymous with *P. schlimii*. If there is a single taxonomic character that can be used to break *P. schlimii* into more than one species, a physical characteristic that is exclusive to a newly proposed species, not progressive or variable within individual populations, misunderstood phenotypic plasticity and species biology, nor seen in any other plants

across the range of *P. schlimii*, it is yet to be identified.

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