The *Phragmipedium caudatum* Group: What Did You Say Was the Name of That Plant Again?

Frank Cervera[1*]
Independent Biologist and Researcher, New York, United States, 10998

ABSTRACT

This group in the genus *Phragmipedium* is one of the most confused in terms of nomenclature. Names have changed multiple times for several of the species in this group. One of these names, *humboltii*, has been the source of numerous opposing articles and slander for the past twenty years. Another name, *warszewiczianum*, is both a valid name for one species and a synonym of another species, and was once thought to apply to none of these species. A comprehensive analysis was undertaken that examined the publication of all the names applied to the species in this group, the ICBN, and a twenty-five (25) year examination of natural populations to test the taxonomic publications against natural realities. One of these five species, *P. lindenii*, is very easy to recognize. This species presents a third elongated petal. Also, *P. lindenii* is limited to the slopes of volcanoes and every flower self-pollinates. The other four species, *caudatum*, *humboltii*, *guianense* and *warszewiczianum*, can be distinguished from each other based on the morphology of the labellum, or slipper, and their respective habitat range. *Phragmipedium exstaminodium* is a synonym of *P. humboltii.*

*Corresponding author E-mail: Frankrc@optonline.net

INTRODUCTION

The species in this group are very distinctive. They are distinguished by their spectacular long petals that can reach 80cm (32 inches). The species in this group belong to section Phragmipedium. There are five species in the group, *caudatum, warszewiczianum, humboltii, guianense* and *lindenii*. This group is also one of the most confused in terms of nomenclature. Names have changed multiple times for several of the species in this group. The names for the five species in this group have been confused and argued over for two hundred years. Any 19th century use of a Latin name in a publication, however brief, nonspecific, or vague it may have been, be it scientific, part of a seed list, or from a commercial orchid nursery advertisement, is now accepted as a valid publication of a species. Putting the questions and 'discussions' regarding the names aside for a moment, most taxonomists agree that this group has either five or six species, depending on whose work you are reading. The problem always comes back to the names. And this presents challenges for the community of hobbyists, who often buy plants that are not in flower; the community of judges, who need to understand the correct name for awards; and for the community of taxonomists, who rely on the literature that contains multiple names for these species to this day. How confusing have the names for this group gotten? *Phragmipedium warszewiczianum* is a name that is a synonym of one species, the valid name for another species, and once was thought to apply to none of the species in this group.

There are five species in this group. That conclusion is not based on interpretations, suppositions as to the intent of others, or what I might personally consider obvious or apparent. I approach this first from the point of view of the natural populations. What do they tell us? The natural populations tell us there are five distinct species. Second, I approach the taxonomic piece agnostic of my own interpretation; I make no conclusions about what 19th century authors intended or what I find obvious about their thought processes. What was written, and does what was written comply with the rules? Given the broad manner in which the taxonomic community interprets 19th century publications of all types, from all sources, as valid species publications, all that is needed are the words on the page. If we limit our analysis to language used, whatever native language that may have been in, and we look no further than what is contained within the four corners of what was written, the chaos dies down to a loud whisper. Taxonomists should not insert intent under the guise of translation, and should use only the language that is there in such a manner as to avoid the taxonomist's own opinions from becoming part of the publication. This group has five species, *P. caudatum, P. humboltii, P. lindenii, P. warszewiczianum*, and *P. guianense*. I reduce *P. exstaminodium* to a

synonym of *P. humboltii* (6). The primary morphological difference between *P. caudatum*, *P. humboltii, P. guianense* and *P. warszewiczianum* is in the characteristics of the slipper (9), as well as in location. The four Andean species form a north to south line through the Andes, with *P. humboltii* being native to Central America, *P. warszewiczianum* picking up in Colombia and ranging south through San Martin, Peru, with *P. caudatum* closing out the southern end of the line in southern Peru and parts of western Bolivia. *Phragmipedium lindenii* can be found on the slopes of volcanoes that straddle the equator in Ecuador and Colombia. *Phragmipedium guianense* is alleged to be from a single location near Saul, far removed from the other four species, which are limited to the Andes (18).

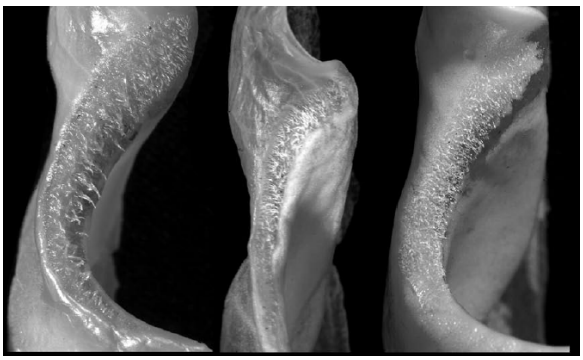

Fig. 1. Lips of three species, from L to R: *caudatum warszewiczianum humboltii*

<u>*PHRAGMIPEDIUM CAUDATUM*</u>

Phragmipedium caudatum (Lindley) Rolfe, The Orchid Review, 4:327-334 [332]. 1896. Type: Peru, Pillao, *Ruiz & Pavon s.n.* (holo. K!; iso. BM!, G!, M!, W!).

The long petaled *Phragmipedium* species *P. caudatum* once included the plants found both in Peru and Bolivia as well as the Central American form. *Phragmipedium caudatum* remained the valid name for plants from both of these locations until 1922, when Rudolf Schlechter proposed removing the Central American population and gave the long petaled *Phragmipedium* from Central America the name *P. warszewiczianum*. That we have two distinct species is not in doubt. Here, we discuss the Peruvian and Bolivian populations whose specific status is not questioned.

Phragmipedium caudatum can be found from northern Peru, in the area near San Martin, south to Cusco and east into Bolivia. Rhizomes are up to 3 cm long and are noticeable on larger plants. Leaves have been stated to be up to 60 cm but I have seen plants larger. The leaves are thick and stiff and in natural populations can support themselves and stand upright. *Phragmipedium caudatum* can produce up to five flowers simultaneously on an inflorescence that can range from 30 to 60 cm in height. The primary difference between *P. caudatum*, *P. warszewiczianum* and the Central American *P. humboltii* is in the lip of the respective flowers.

Phragmipedium caudatum has a lip, or slipper, veined with green or dark brown and the fold along the distal edge (that part directly across from the staminode) of the slipper is subquadrate-angular (almost square and angular) in cross section. The sepals are oblong-lanceolate, tapering to a point. The dorsal sepal folds in on itself like a tube at the tip, it is quite noticeable. The dorsal sepal and synsepal present as mirror images of each other in shape, and curve around the front of the flower creating a “C” shape that frames the labellum at the center. The petals are quite spectacular: long, pendent, slightly twisted, up to 80 cm long and 1.2 to 1.9 cm wide, tending to be thinner with distance from the flower toward the tip of the petals, cream with green veins, becoming reddish brown to mahogany distally. Petals continue to lengthen after the flower opens and can continue to lengthen until the flower dies. Overall flower color ranges from green and white to yellow and brown in differing degrees. Flowers with brown lips are known and the presence of a brown lip cannot distinguish *P. caudatum* from the Central American *P. humboltii*. The staminode is widely triangular, bilobed and variable. The staminode has dark red tips on each side, and hairs are long, obvious, and sparse. The shape of the labellum, or slipper, varies from elongated or calceolate (slipper shaped) to rounded in appearance. The amount of pink to red spotting on the claw face varies significantly. Overall slipper shape, color and spotting can vary considerably.

Fig. 2. *Phragmipedium caudatum* and *humboltii* showing the differences in the lip.

PHRAGMIPEDIUM HUMBOLTII

Phragmipedium humboldtii (Warsz.) J.T. Atwood & Dressler, Selbyana 19(2):246. 1998 (publ. 1999).

Basionym: *Cypripedium humboltii* Warsz., Bot. Zeitung (Berlin) 10(40): 691. 1852. TYPE PANAMA. *In Quercubus monitum Chiriqui* (Lectotype, selected by Atwood & Dressler [1998]: "Mai Juni Juli [1848-1851]/Cordill. Chiriqui," *J. Warszewicz 41* (W *Rchb Orch* 15682).

Syn: *Phragmipedium popowii* (Braem, Ohlund & Quéné) Richardiana 4(4):185. 2004 *nomen illegitimum*. Based upon same type as *P. humboltii* Warsz.

Phragmipedium exstaminodium (Castaño, Hágsater & Aguirre) Orquídea (México), 9:191-197. 1984. Type: Mexico, Chiapas, Tziscao, *Leleu s.n.* (holo. AMO!)

Phragmipedium humboldtii var. *exstaminodium* (Castaño, Hágsater & Aguirre) J.T. Atwood & Dressler ex J.M.H. Shaw in *Orchid Rev.* suppl., 119(1296):84 (2011) [*Quart. Suppl. Int. Reg. Orchid Hybrids].*

Phragmipedium monstruosum (Archila) Revista Guatemalensis, 2(3): 5. 1999. Type: Guatemala, Alta Verapaz, Kaquipeck, *Archila s.n.* (holo. AUGUAT).

Phragmipedium triandrum (Archila) Revista Guatemalensis, 2(3):6. 1999. Type: Guatemala, Alta Verapaz, *Archila s.n.* (holo. BIGUA).

Phragmipedium warszewiczianum sensu (Garay) Orchid Digest 43:140. 1979, *non* (Reichenbach fil.) Schlechter.

Much discussion has centered on the correct name for this species. The specific status of this species does not appear to be in doubt and this species is easy to recognize. There is almost universal agreement in both the taxonomic and horticultural communities that the Central American populations are in fact a distinct species. It is the correct name that is causing all the confusion.

In 1999 Atwood & Dressler published a new name for this species, *Phragmipedium humboltii*, a name that is based upon an 1852 article by Reichenbach attributing the description of *Cypripedium humboltii* (as *humbolti*) to Warszewicz (1). The 1852 Reichenbach article published the name as *Cypripedium humbolti,* meaning that the new name for the genus, *Phragmipedium*, needed to be formally paired with the species name, *humboltii*. Braem (2004; 3, 4, 5)) tried to demonstrate that *Cypripedium humbolti* was not described in 1852, was just words on the page, and should therefore be treated as just a name that appeared in an article, without validity.

The controversy centers on the 1852 text. A translation to English, per Braem, can be found in "A Language Trap – *Phragmipedium caudatum*, *Phrag. warszewiczianum*, *Phrag. humboltii*. (Braem & Ohlund) Australian Orchid Review – October/November 2004 page 19,20, 21." (3)

In 2004 Braem published the first of three papers (Braem & Öhlund 2004; Braem, Öhlund & Quené 2004' and Braem 2014; 3, 4, 5)), as well as a section in a book (Braem, Teson & Öhlund 2018) challenging the name *P. humboltii*. He repeatedly references his older articles in support of his newer publications in a circular self-validation of his contention, but proffers nothing new, nor support from anyone else for his contention, since the first 2004 article. The central premise for Braem's challenge to the name *P. humboltii* is twofold, and I quote, "This conclusion [*P. humboltii*], however, is based on a flagrant misinterpretation of the original German text…" (Braem & Ohlund 2004; 2). Braem continues; "…Atwood & Dressler would be right in their interpretation if there were no other facts that speak clearly against it. These facts, however, cannot be recognized and/or understood by anyone who is not familiar with the characteristics and finesses of the German Language." (Braem & Ohlund 2004; 2). Braem further supports his contention by opining that "the obvious lack of comprehension of some botanists in respect to the original German literature" renders them unqualified to read or understand the 19th century publication (Braem, Öhlund & Quené 2004; 4, 5). Based on the assertion that no one except him can adequately translate and understand German, Braem concludes that "Reichenbach unmistakably lists "*C.*[*ypripedium*] *Humbolti*" as a synonym for *Cypr.*[*ipedium*] *caudatum* Lindl.". Braem further contends that "Reichenbach did not describe nor did he intend to describe "*Cypripedium humbolti*" as an autonomous species" (Braem & Ohlund 2004; 3). Braem is correct in one regard. Reichenbach *fil.* Did not describe *Cypripedium humbolti*, Warszewicz did.

In 2011 Pupulin & Dressler published an article defending the publication of the name *P. humboltii* (15). As above I am quoting directly from that article using the authors' own words:

"Concerning the text of 1852 in which the name *C. humboldtii* appears for the first time, it is necessary to separate the authorship of the publication, which is by Reichenbach *filius*, from that of the taxon, which is ascribed to Warszewicz.

Reichenbach *filius* himself confirmed such a view, repeatedly citing the name of the species as "*C. humboldti* Wzw." (i.e., Reichenbach *f.*, 1854, Linden and Reichenbach *f.*, 1860). According to art. 46.2. of the ICBN, "a name of a new taxon must be attributed to the author or authors to whom both the name and the validating description or diagnosis were ascribed, even when authorship of the publication is different" (see in particular ex. 4, and Art. 31.4., Ex. 3; McNeill et al., 2006). In Reichenbach *filius*'s text for 1852, both the name of the species and the diagnosis, which was published in double quotes, were ascribed to Warszewicz; a footnote on the first page of the article confirms this ascription ("Die mit ,," bezeichneten ergänzenden Notizen danke ich Hrn. De Warszewicz"; Reichenbach f., 1852: 689). As the name of *C. humboldtii* must be attributed solely to Warszewicz, the acceptance or otherwise of the name by Reichenbach *filius* is not relevant for valid publication." Pupulin & Dressler continue; "Article 33.5. of the ICBN establishes that "for names published on or after 1 January 1953, errors in the citation of the basionym or replaced synonym, including incorrect author citation [italics are ours] but not omissions, do not preclude valid publication of a new combination, new generic name with a basionym, or *nomen novum*." As the wrong citation of the authorship by Atwood and Dressler (1998) may be treated as a simple bibliographic error to be corrected, the name *Phragmipedium humboldtii* (Warsz.) J.T. Atwood & Dressler was validly published."

Lastly, I will quote from Cribb & Purver (2017; 7): "Josef von Warszewicz, an eminent plant collector in Central America, recognized as early as 1849 that this taxon was distinct from the Peruvian *P. caudatum* by reason of its lip shape and flower colouration." Cribb & Purver continue. "Atwood & Dressler (1999) published a new combination, *Phragmipedium humboltii*, based upon *Cypripedium humboltii* (as *humbolti*), a name with a short description given by Warszewicz and published in an article by H.G. Reichenbach (1852).

The name *humbolti* was written and published in 1852 specifically in reference to a plant that came from the Chiriqui Mountains in what we know today as western Panama, and however brief, vague or poor the 1852 publication may have been, its publication in Latin was sufficient for the 19th century and is valid. There is compliance with, and support from, the ICBN for the Atwood & Dressler publication. The rules (ICBN) governing the practice of taxonomy allow for the valid publication of species names as published by Atwood & Dressler. According to Pupulin (2016; 16) this has been confirmed by Dr. Kanchi N. Gandhi, the leading expert in plant nomenclature at Harvard University.

Rhizomes are up to 3 cm and are noticeable on larger plants. Leaves have been stated to be up to 60 cm but I have not seen plants this big in natural populations nor in cultivation. The inflorescence is 30-60 cm in height. The leaves are thick and stiff and in natural populations can support themselves and stand upright. Dressler & Pupulin differentiate the three long petaled species from each other based on the characteristics of the labellum, or slipper, and on average, I agree (11). *Phragmipedium humboltii* has a lip that is distinctly rounded throughout, and not markedly thickened, while *P. caudatum* has a lip with a prominent hairy band on each side. The color brown is present in slippers of both species in varying degrees and cannot be used, on its own, as a differentiating taxonomic character. The petals are spectacular and can exceed the size of the entire plant four times over. The sepals are oblong-lanceolate, tapering to a point. The petals are long, pendent, slightly twisted, up to 80 cm long and 1.2 to 1.9 cm wide, tending to be thinner with distance away from the flower toward the tip of the petals, cream with green veins, becoming reddish brown to mahogany distally. Petals continue to lengthen after the flower opens and can continue to lengthen until the flower dies. The habitats are in the range of 1200 to 1800 meters with most occurring near 1500 meters.

Phragmipedium exstaminodium presents an interesting situation for us in the *Phragmipedium* community. When this species was described, it was the only species that we knew of that occurred in a natural population that did not have a staminode. The plants grow within the known and accepted range of *P. humboltii.* Vegetative characteristics are consistent with *P. humboltii*. The slipper is consistent with *P. humboltii*. The petals and dorsal and synsepals are consistent with *P. humboltii*. The color throughout the flower is consistent with *P. humboltii*. Ecological conditions are consistent with *P. humboltii*. But there is that problem with the lack of a staminode.

Since the description of *P. exstaminodium*, natural populations that lack a staminode have been encountered in two other species, *P. boisserianum* and *P. schlimii*. In each of these species we see identical circumstances that we see with *P. humboltii* in Central America. Plants within the natural range of a species, consistent in every way with that species, growing as a small colony without staminodes. We can't

otherwise separate any of these three groups of plants from the wider population of which they are a part in all three cases. See the Orchid Digest Vol. 84-4, Oct., Nov., Dec. 2020 (6) for a more detailed discussion and understanding of *P. exstaminodium* and why it is a synonym of *P. humboltii*.

Fig. 3. *Phragmipedium lindenii*

PHRAGMIPEDIUM LINDENII

Phragmipedium lindenii (Lindley) Dressler & N. Williams, Taxon 24:691. 1975). Type: Venezuela, savannah overlooking Lake Maracaibo, *linden s.n.* (holotype K!)

Syn: *Uropedium lindenii* Lindl., Orch. Linden. 28 (1846)

Phragmipedium lindenii was first described as part of a separate genus, *Uropedium*, in 1846. Since that time various authors have either resurrected the name *Uropedium* or placed this species in the genus *Phragmipedium*. I follow the 1975 placement in the genus *Phragmipedium*. The taxonomy of *P. lindenii* is not in doubt, and this species is easily recognizable by the lack of a slipper shaped labellum. *Phragmipedium lindenii* is the only species of slipper orchid with a labellum that is formed into a third petal. *Phragmipedium lindenii* doesn't have a pouch. This might seem odd at first, as the slipper plays a critical role in pollination. However, *P. lindenii* doesn't need the slipper. Every flower on every plant in primary habitats or in cultivation self-pollinates. Petals are typically between 20 and 40 cm in length. The elongated labellum, also measuring between 20 and 40 cm, does not appear to facilitate pollination or play a role in attracting pollinators. Given the unique biology of this species, it is not clear if a pollinator will ever be identified. The combination of unique characters; obligatory self-pollination, a labellum elongated like a third petal, and the volcanic ecology, separate *P. lindenii* from the rest of the genus and make this an easy species to identify both in and out of flower. Flowers are maroon to green to yellow in varying degrees and tend to become more yellow as the flower ages.

I am often asked, whether it be at one of my lectures, or informally at an orchid show, why this species appears to have abandoned a pollinator and developed its unique floral morphology. Perhaps it is due to the environment itself. The slopes of volcanoes, most within the habitat range being active or recently so in geological time, are constantly being wiped clean by eruptions, forcing nature to start over again. I can only surmise that any dependency on a specific pollinator must be short lived. *Phragmipedium* are deception flowers, there is no reward for pollinators. Pollinators require food sources outside the *Phragmipedium* flowers, and for this they are dependent on the surrounding ecosystem, of which they are a part, to sustain their pollinators. With these ecosystems being reset frequently, in geological time, I surmise that *P. lindenii* have evolved to depend only on themselves to continue the species. Dependency on a species-specific pollinator would be short lived when the ecosystem resets after an eruption. Also, self-pollination results in an abundance of seed, making it easier for *P. lindenii* to quickly start the process of repopulating areas after eruptions.

PHRAGMIPEDIUM WARSZEWICZIANUM

Phragmipedium warszewiczianum (Reichenbach *fil*.) Schlechter. Repertorium specierum novarum regni vegetabilis, Beihefte. Band XVII: 9 (1922)

Syn: *Phragmipedium wallisii* (Reichenbach *fil*.) Garay, Fl. Ecuador, Orchid 9:24. 1979. Type: Ecuador, Loja, Zamora, 800-1300 m, *Wallis s.n.* (holo. W); Ecuador, Zamora, *Lehmann* 6268 (neo. W!; isoneo. AMES, G, K, L, NY, US).

Phragmipedium lindenii (Lindl.) Dressler & N.H. Williams subsp. *Wallisii* (Rchb.f.) Dressler in Orchid Digest 69, 2:89 (2005).

Phragmipedium caudatum (Lindl.) Rolfe var. *wallisii* (Rchb.f.) Pfitzer in Engler, Pflanzenr. 4, 50, H. 12:53 (1903).

This is another of the long petaled species with a confused nomenclature history. However, unlike *P. humboltii*, there does not appear to be any confusion as to what the correct name for this species is.

Phragmipedium warszewiczianum is a terrestrial and rarely epiphytic species. Rhizomes are up to 3 cm and are noticeable on larger plants.

Leaves are generally about 60 cm long, however I have seen large plants in natural populations with leaves 1 meter in length. The inflorescence usually carries three to four flowers simultaneously. The flower color is a unique white suffused with yellow and pink, making this species easy to identify when placed next to its cousins *P. humboltii* and *P. caudatum*. The dorsal sepal is ovate-lanceolate and can be as long as 20 cm. The slipper, or labellum is calceolate or obovate, 4 to 6 cm in length. In *P. warszewiczianum* the rim of the slipper has a low, narrow keel, with the lower third projecting forward. The slipper morphology is the primary differentiating morphological character from both *P. caudatum* and *P. humboltii*. The staminode is consistent with the *caudatum* group overall and is generally triangular with two lobes, one on each side, with some plants showing a noticeable third lobe at the bottom. You might have to look carefully to see the third lobe, as it is not always tipped in red and can be bent back, making it difficult to see. The petals are linear cordate and can be as long as 60 cm. The petals continue to elongate for the life of flower.

Fig. 4. *Phragmipedium warszewiczianum* showing the distinctive characteristics of the lip.

PHRAGMIPEDIUM GUIANENSE

Phragmipedium guianense (Sambin & Braem) Richardiana 15:4. (2015). Type: French Guyana, near Saul, *Jean-Pierre Bikaeff in C. Saul* 003 AS 02 (holo. CAY)

Phragmipedium guianense is based on a plant that was allegedly collected near Saul in French Guiana and subsequently flowered in cultivation (18). *Phragmipedium guianense* was differentiated by its smaller flowers, shorter dorsal and synsepals, and what the authors describe as much shorter petals, in the range of 10 cm to 70 cm. That is a considerable range for the length of the petals and meets the description of all the other species in this group. The plants are stated to be about 24 cm high and grow primarily on tree branches high in evergreen forest. Plant size and ecology are consistent with *P. humboltii*. The inflorescence, slightly taller than the plant, bears one to two flowers that apparently do not open simultaneously. The ovary is green and spotted with red. The staminode is rhombic with red tips at both sides and a small protrusion at the bottom. The claw face is unique and, if stable, sets *P. guianense* apart from the closely related *P. caudatum* as well as *P. klotzschianum*. In both of those species the claw face is white. However, in *P. guianense* the claw face is heavily spotted with large brown and purple spots.

Oddly, since the description, no further photos of this species, or of subsequent blooms on the type plant, have been seen. The description should have spurred a heightened interest in this species from both scientific and horticultural communities. No species of *Phragmipedium* is known from such a restricted range. On the contrary *Phragmipedium* species are widespread. This species is currently known only from the type material. Given how little we know about this species outside of the description and the fact the description was authored based on a cultivated plant, which may or may not have been aberrant in one form or another, or potentially a man-made hybrid, it is best to accept *P. guianense* with caution until further information can be obtained.

BIBLIOGRAPHY

1. Atwood, J.T. & Dressler, R.L. (1998) Clarifications and new combinations in the *Phragmipedium caudatum* complex from Central America. *Selbyana*, 19(2): 245-248
2. Braem, G. (2014) The enigmatic (?) case of the most beautiful *Phragmipedium popowii*. *Orchid Digest* 78, 2: 101-112
3. Braem, G. & S. Öhlund (2004). A Language Trap – *Phragmipedium caudatum, Phragmipedium warszewiczianum, Phragmipedium humboltii. Australian Orchid Review* 69, 5: 19-21
4. Braem, G.J., Öhlund, S. & Quené, R.J. (2004). The real *Phragmipedium warszewiczianum* - A clarification of the *Phragmipedium caudatum complex*

(*Phragmipedium*n section Phragmipedium). *Orquideología*, 23(2): 117-136
5. Braem, G.J., Ohlund, S. & Quené, R. (2004b). Will the real *Phragmipedium warszewiczianum* please stand up? - A clarification of the *Phragmipedium caudatum* complex (*Phragmipedium* section Phragmipedium). - *The Australian Orchid Review*, 69 (6): 4-15
6. Cervera, F. (2020) A revised checklist of the genus *Phragmipedium*. Orchid Digest Vol. 84-4, Oct., Nov., Dec. 2020
7. Cribb, P. & Purver, C. (2017) Slipper Orchids of the Tropical Americas. Natural History Publications (Borneo), Kota Kinabalu & The Orchid Digest Corporation, Laguna Niguel
8. Dressler R.L. (2005). Le Chinela, alive and well in western Panama. *Orchid Digest* 69, 2: 86-91
9. Dressler, R.L. & F. Pupulin (2011). *Phragmipedium* section Phragmipedium. The long petaled tropical American lady's slipper orchids. *Orchids* (Lindelyana) 80: 626-630
10. Hágsater, E. & Soto, M. (2002) *Phragmipedium humboldtii subsp. exstaminodium. Icones Orchidacearum*, 5 6, t. 635
11. Hooker, W. (1844). *Cypripedium caudatum* Lindl. *Hooker's Icones Plantarum* 7: 658-659. International Orchid Register
12. Linden, L. (1886). *Selenipedium caudatum var. roseum. Illustration Horticole* 33: t. 506
13. Linden, L. (1888). *Selenipedium caudatum var. albertianum. Lindenia* 4: 64Lindley, J. (1850). The long tailed Lady's slipper (*Cypripedium caudatum*). *Lindley & Paxtons Flower Garden* 1: t.9
14. McCook, L. (1989). Systematics of *Phragmipedium* (*Cypripedioideae; Orchidaceae*). Ph.D. thesis, Cornell University
15. Pupulin, F. & R.L. Dressler (2011). A nomenclatural note on *Cypripedium humboltii* (*Orchidacae: Cypripedioideae*). *Harvard Papers in Botany* 16, 1: 167-179
16. Pupulin, F. (2016) *Phragmipedium humboldtii* (Warsz.) J.T.Atwood & Dressler. On the correct name for the Central American long-petaled *Phragmipedium*; again. *Orchids* 149-153
17. Reichenbach, H.G. (1873). Tafel 189. *Selenipedium wallisii* Rchb.f. *Xenia Orchidacea* 2:189
18. Sambin, A. & Braem, G. (2015). Une excitante nouvelle espece de Guyane: *Phragmipedium guianense* (*Orchidaceae, Cypripedioideae*). *Richardiana* 15: 2-6
19. Schlechter, R. (1922). Beitrage zur Orchideenkunde von Zentralemerika 1. *Orchidaceae* Powellianae Panamenses. *Repertorium Specierum Novarum Regni vegetabilium Beihefte* 17:9