

GENERIC REALIGNMENTS IN MAXILLARIINAE (ORCHIDACEAE)

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ABSTRACT. A recent phylogenetic analysis of four DNA regions for ca. 354 species of core Maxillariinae strongly indicate that the genus *Maxillaria*, as traditionally circumscribed, is grossly polyphyletic. We present a new phylogenetic classification for core Maxillariinae that recognizes 17 genera. Necessary realignments include: 1) resurrection of the genera *Camaridium*, *Heterotaxis*, and *Ornithidium*; 2) recognition of the recent segregates *Brasiliorchis* (= *Maxillaria* sect. *Repentes*), *Christensonella* (= *Maxillaria* sect. *Urceolatae*), *Nitidobulbon* (in press), and a recircumscribed *Sauvetrea* (= *Maxillaria* sect. *Trigonae*); 3) adoption of the new genera *Inti* (= *Maxillaria* sect. *Polyphyllae*), *Mapinguari*, *Maxillariella* (= *Maxillaria* sections *Ebulbes* and *Erectae*), and *Rhetinantha*; 4) transfers from *Maxillaria* sect. *Reflexae* to *Ornithidium*, and *Maxillaria* sect. *Rufescens* to *Mormolyca*; and 5) synonymizing of the genera *Adamanthus*, *Pseudomaxillaria*, *Psittacoglossum*, and *Sepalosaccus* (under *Camaridium*), *Anthosiphon* (under *Cryptocentrum*), *Chrysoecynis* (under *Mormolyca*), *Dicrypta*, *Marsupiarina*, and *Pentulops* (under *Heterotaxis*), and *Laricorchis*, *Neo-urbania*, and *Siagonanthus* (under *Ornithidium*). Some new synonyms at the specific level are also presented.

RESUMEN. Un reciente análisis filogenético de cuatro regiones de ADN para ca. 354 especies de la subtribu Maxillariinae indican fuertemente que el género *Maxillaria*, en su circunscripción tradicional, es altamente polifilético. Presentamos una nueva clasificación filogenética para Maxillariinae que reconoce 17 géneros. Los cambios necesarios incluyen: 1) la resurrección de los géneros *Camaridium*, *Heterotaxis*, y *Ornithidium*; 2) el reconocimiento de los recientes segregados genéricos *Brasiliorchis* (= *Maxillaria* sección *Repentes*), *Christensonella* (= *Maxillaria* sección *Urceolatae*), *Nitidobulbon* (en prensa), y una *Sauvetrea* recircunscrita (= *Maxillaria* sección *Trigonae*); 3) la adopción de los nuevos géneros *Inti* (= *Maxillaria* sección *Polyphyllae*), *Mapinguari*, *Maxillariella* (= *Maxillaria* secciones *Ebulbes* y *Erectae*), y *Rhetinantha*; 4) transferencias de *Maxillaria* sección *Reflexae* a *Ornithidium*, y *Maxillaria* sección *Rufescens* a *Mormolyca*; y 5) puesta en sinonimia de los géneros *Adamanthus*, *Pseudomaxillaria*, *Psittacoglossum* y *Sepalosaccus* (bajo *Camaridium*), *Anthosiphon* (bajo *Cryptocentrum*), *Chrysoecynis* (bajo *Mormolyca*), *Dicrypta*, *Marsupiarina* y *Pentulops* (bajo *Heterotaxis*), y *Laricorchis*, *Neo-Urbania*, y *Siagonanthus* (bajo *Ornithidium*). Algunos sinónimos nuevos al nivel de especie también son presentados.

KEY WORDS: Cymbidieae, generic recircumscription, *Inti*, *Mapinguari*, *Maxillariella*, Maxillariinae, Orchidaceae, *Rhetinantha*.

Subtribe Maxillariinae (sensu Chase *et al.* 2003) includes a number of genera endemic to the Neotropics. The circumscription of genera in the core Maxillariinae (sensu Whitten *et al.* 2007, equal to Maxillariinae sensu Dressler, 1993) has been problematic since the creation of the genus *Maxillaria* by Ruiz and Pavón (1794, 1798). This large genus (ca. 580 species as traditionally defined; e.g., Govaerts *et al.* 2005) has for a long time been considered an assemblage of morphologically disparate taxa (Christenson 2002a, 2002b; Whitten *et al.* 2007 and references therein), and thus probably non-monophyletic. The complicated species-level taxonomy of *Maxillaria* has hampered attempts of providing a subgeneric classification (Christenson 2002a, 2002b¹), a situation mirrored in other large plant genera (Pfeil & Crisp 2005, Monro 2006, Parnell *et al.* 2007).

The recent molecular phylogenetic analysis of Dathe & Dietrich (2006) provided the first concrete evidence for the grossly polyphyletic nature of *Maxillaria*. However, the limited taxon sampling (30 species, one individual each) and low number of DNA regions used in their study (nrITS only) precluded any sound taxonomic decisions based on their results. More recently, Whitten *et al.* (2007) presented a vastly more detailed phylogenetic analysis of core Maxillariinae (619 individuals representing ca. 354 species; four DNA regions used) that corroborated Dathe and Dietrich's preliminary results and revealed a worst-case scenario: all the currently accepted minor genera of core Maxillariinae

(*Anthosiphon*, *Cryptocentrum*, *Chrysocycnis*, *Cyrtidiorchis*, *Mormolyca*, *Pityphyllum*, and *Trigonidium*, Govaerts *et al.* 2005), are firmly nested in *Maxillaria* sensu lato. Thus, the current generic classification in core Maxillariinae is untenable on phylogenetic grounds.

Backlund & Bremer (1998) presented guidelines on how to modify existing classifications in order to comply with phylogenetic requirements. Their primary principle is to designate only monophyletic groups as ranked taxa. Secondary principles (in no particular order of importance) are: a) to designate only highly supported clades as ranked taxa; b) to minimize nomenclatural disruption; c) to designate easily recognizable clades as ranked taxa; and d) to minimize taxonomic redundancy by lumping monotypic taxa with their sister group, if feasible. Entwisle & Weston (2005) independently advanced similar guidelines, although they also recommended to minimize taxonomic change in "charismatic" or economically and/or horticulturally important groups, and to avoid the use of epithets already in existence in potential congeners (when creating new names or describing new species). Entwisle & Weston (2005) concluded that ease of recognition of genera is not always achievable, and that certain "biological criteria" (e.g., hybridization, special morphological characters) should not be emphasized when designating genera. In the new classification presented here, we attempt to follow these guidelines.

We favor the recognition of 17 genera in core Maxillariinae (clades A through Q in Whitten *et al.* 2007) that correspond to well supported clades (fig. 1). This inevitably requires the resurrection of some generic names previously placed in synonymy with *Maxillaria*, and the creation of several new genera. These new generic realignments are presented here. The alternative, to lump the minor genera in *Maxillaria*, would be less nomenclaturally disruptive, but would substantially add to the already baffling morphological diversity of that genus and make it even less morphologically diagnosable. Further arguments in support of our new classification and morphological characters for each genus are presented in Whitten *et al.* (2007). Keys and detailed descriptions to all the genera in subtribe Maxillariinae will be published elsewhere.

¹ Christenson (2002a) presented a partial subgeneric classification of *Maxillaria* with 19 sections, 13 of them newly proposed. A French translation of the same article (Christenson 2002b) was meant to appear much later, but the publication of the Proceedings of the 16th World Orchid Conference (here abbreviated "Proc. 16th World Orchid Conf.") was delayed substantially. The two publications appeared in 2006, and the exact date of printing is not indicated in either one. The Proceedings were published ca. six weeks before the translation in *Richardiana*, and thus constitute the place of valid publication of most of Christenson's sections. The only exception is section *Ornithidium*, which missed the basionym citation in the Proceedings, and was validated in *Richardiana* (E. A. Christenson, personal communication 2007).

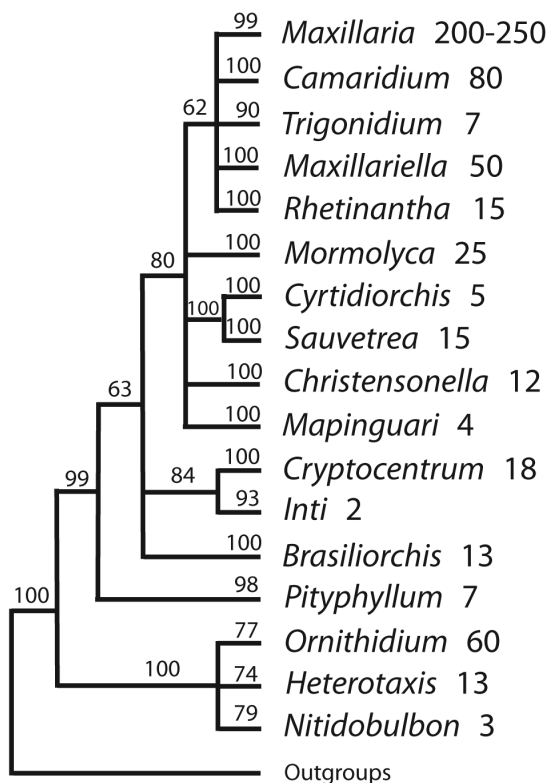


FIGURE 1. Summary of generic relationships within the core Maxillariinae, simplified from figure 8 of Whitten *et al.* (2007). Based on a maximum parsimony analysis of combined nrITS, *matK+trnK*, *atpB-rbcL* spacer, and *rpoC1* DNA sequence data. Values above branches are bootstrap percentages. Numbers next to generic names indicate their known or estimated number of species.

The realization that many large and/or charismatic genera are polyphyletic or need to be lumped with others based on phylogenetic principles has recently spurred support from part of the botanical community for the acceptance of paraphyletic taxa (most of the debate has taken place in recent issues of *Taxon*). However, we are convinced that the designation of monophyletic genera is a far better, less subjective option. Discussion of our arguments for this lies outside of the realm of the present contribution; we refer readers to Pfeil & Crisp (2005), who provide a lucid argument in favor of phylogenetic classifications and against the use of paraphyletic supraspecific taxa.

We also effect the nomenclatural transfers required by our new classification. Following Cribb

et al.'s (1985) recommendation, we only transfer species for which we are confident of their systematic position either because we have sampled them for our molecular phylogeny (Whitten *et al.* 2007) or because of their clear morphological affinity with species included in our analyses.

We refrain from transferring names that might be synonyms (even if not yet currently regarded as such), and treat taxonomically complicated groups with caution. We do not transfer a few names that appear in our phylogenies (Whitten *et al.* 2007) because now we consider them as synonyms. Many species of *Camaridium* and *Ornithidium* already have combinations in those genera, although in some cases their epithets are different than those in *Maxillaria*. For each species transferred, homotypic synonyms with a different epithet are listed after the basionym when these have been in recent use. Some heterotypic synonyms are given after the abbreviation "syn."

To further clarify the circumscription of *Camaridium*, *Maxillaria* sensu stricto and *Ornithidium*, we list the names of their constituent species. These lists mostly follow Govaerts *et al.* (2005) (synonyms not listed) except for cases in which we disagree on synonymization. We have not been able to locate extant type material for many names of Schlechter and other authors published without illustrations; these are not included here, awaiting further research. It is possible that many of these will prove to be synonyms with other better known species.

Most species for which adequate descriptions or type material is available are easy to assign to each genus. However, we prefer to await molecular data to confirm the systematic position of a few species with unusual morphology (e.g., *Maxillaria grobyoides* Garay & Dunst., *M. muscoides* J. T. Atwood, *M. poifolia* Schltr.).

BRASILIORCHIS

Brasiliorchis R. Singer, S. Koehler & Carnevali, *Novon* 17: 94. 2007.

Type species: *Maxillaria picta* Hook., = *Brasiliorchis picta* (Hook.) R. Singer, S. Koehler & Carnevali.

Maxillaria sect. *Aggregatae* Pfitz. in Engl. &

Prantl, Nat. Pflanzenfam. 2(6): 187. 1889, *pro parte* (excl. type).

Maxillaria sect. *Repentes* Pfitz. in Engl. & Prantl, Nat. Pflanzenfam. 2(6): 187. 1889.

Plants of *Brasiliorchis* have aggregated or distant, sulcate, bifoliate pseudobulbs subtended by non-foliaceous sheaths. Several inflorescences are produced simultaneously from the base of the most recent pseudobulb, and the floral bract is almost always shorter than the pedicel and ovary. The campanulate flowers are food deceptive and do not produce any rewards. The column foot can be short or long. The sepals lack fibers, and in most species they have dark spots, usually more intense on the external surface. The labellum is always markedly three-lobed. The capsules have apical dehiscence².

This well supported clade has been informally known as the “*Maxillaria picta* alliance”; most species are restricted to Brazil. It was recently described in detail and given generic status by Singer *et al.* (2007).

Three names need to be commented upon:

Brasiliorchis picta (Hook.) R. Singer, S. Koehler & Carnevali, Novon 17: 97. 2007.

Maxillaria acutipetala Hook., Bot. Mag. 69: t. 3966. 1842, *syn. nov.*

Maxillaria acutipetala was described from a plant cultivated at Kew, supposedly collected in Central America by Barclay during the HMS Sulphur expedition. The type specimen and the published painting clearly correspond to the variable *Brasiliorchis picta*, a taxon reliably documented only from Brazil and northeastern Argentina. The information associated with the plant cultivated at Kew must have been erroneous or confused, and it was most likely not collected by Barclay (the Sulphur explored only the Pacific side of the New World); it was probably collected in Brazil by someone else.

Brasiliorchis barbosa (Loefgr.) R. Singer, S. Koehler & Carnevali, Novon 17: 96. 2007.

Basionym: *Maxillaria barbosa* Loefgr., Arch. Jard. Bot. Rio de Janeiro 2: 60. 1918; ‘*barbozae*’.

Löfgren dedicated the species to João Barbosa Rodrigues but spelled the epithet as “*barbozae*”, which is clearly a typographical error and not an intentional latinization of the Brazilian orchidologist’s last name. Both spellings have been used over time, and Singer *et al.* (2007) used “*barbozae*” during the generic transfer to *Brasiliorchis*. However, the epithet should be corrected to “*barbosa*” under article 60 of the Code (McNeill *et al.* 2006; also see article 45.2).

Brasiliorchis schunkiana (Campacci & Kautsky) R. Singer, S. Koehler & Carnevali, Novon 17: 97. 2007.

Basionym: *Maxillaria schunkiana* Campacci & Kautsky, Orquidário 7: 136. 1993; ‘*schunkeana*’.

The adjectival epithet honors Vital Schunk; thus, it must be spelled “*schunkiana*”, not “*schunkeana*” (Rec. 60C.1, McNeill *et al.* 2006). Singer *et al.* (2007) and other authors have used the latter spelling, which is an incorrect orthographical variant.

Species of *Brasiliorchis* include *B. barbosa* (Loefgr.) R. Singer, S. Koehler & Carnevali, *B. chrysantha* (Barb. Rodr.) R. Singer, S. Koehler & Carnevali, *B. consanguinea* (Klotzsch) R. Singer, S. Koehler & Carnevali, *B. gracilis* (G. Lodd.) R. Singer, S. Koehler & Carnevali, *B. heismanniana* (Barb. Rodr.) R. Singer, S. Koehler & Carnevali, *B. kautskyi* (Pabst) R. Singer, S. Koehler & Carnevali, *B. marginata* (Lindl.) R. Singer, S. Koehler & Carnevali, *B. phoenicanthera* (Barb. Rodr.) R. Singer, S. Koehler & Carnevali, *B. picta* (Hook.) R. Singer, S. Koehler & Carnevali, *B. polyantha* (Barb. Rodr.) R. Singer, S. Koehler & Carnevali, *B. porphyrostele* (Rchb.f.) R. Singer, S. Koehler & Carnevali, *B. schunkiana* (Campacci & Kautsky) R. Singer, S. Koehler & Carnevali, and *B. ubatubana* (Hoehne) R. Singer, S. Koehler & Carnevali (Singer *et al.* 2007).

CAMARIDIUM

Camaridium Lindl., Bot. Reg. 10: sub t. 844. 1824.

Type species: *Camaridium ochroleucum* Lindl.

Adamanthus Szlach., Richardiana 7: 30. 2007, *pro parte* (incl. type).

Maxillaria sect. *Camaridium* (Lindl.) Christenson, Proc. 16th World Orchid Conf. 282. 2002.

² Fruits of Maxillariinae always dehisce through six longitudinal seams, but the resulting valves can either remain united both at the base and the tip, or they can separate apically. These two modes of dehiscence are termed “lateral” vs. “apical” (Blanco *et al.* 2006, Whitten *et al.* 2007).

Maxillaria sect. *Cucullatae* Christenson, Proc. 16th World Orchid Conf. 283. 2002.

Maxillaria sect. *Pseudomaxillaria* (Hoehne) Christenson, Proc. 16th World Orchid Conf. 285. 2002.

Pseudomaxillaria Hoehne, Arq. Bot. Estado Sao Paulo n.s., f.m. 2: 71. 1947.

Psittacoglossum LaLlave & Lex., Nov. Veg. Desc. fasc. 2. (Orch. Opusc.): 29. 1825.

Sauvetea Szlach., Richardiana 7: 28. 2007, *pro parte* (excl. type).

Sepalosaccus Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 244. 1923.

Species of *Camaridium* are variable in growth habit; most have pseudobulbs separated by rhizome segments of variable length. Some species are caespitose, and others lack pseudobulbs completely and have monopodial shoots. A few species have dimorphic growth (juvenile sympodial shoots with tightly spaced pseudobulbs, and monopodial mature shoots without pseudobulbs). In almost all species, the floral bract is longer than the pedicel and ovary, and overlaps with the base of the dorsal sepal (this feature is useful in separating *Camaridium* from *Maxillariella* and *Ornithidium*). The column foot can be short or long. The sepals and petals lack fiber bundles and have a sparkling appearance. Most species appear to have deceptive flowers, but some produce nectar. The pendent fruits have apical dehiscence.

As circumscribed here, *Camaridium* has ca. 80 species distributed throughout the Neotropics, with the highest diversity in Central America. The “*Maxillaria neglecta* complex” (= *Pseudomaxillaria*) is nested within *Camaridium*; the Mesoamerican species were revised by Atwood (1993). The “*Maxillaria cucullata* complex”, which is sister to the rest of *Camaridium*, is a taxonomically difficult group in dire need of revision.

Camaridium alfaroi (Ames & C. Schweinf.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria alfaroi* Ames & C. Schweinf., Sched. Orch. 10: 83-84. 1930.

Camaridium allenii (L. O. Williams) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria allenii* L. O. Williams, Ann. Missouri Bot. Gard. 27: 282-283, t. 35. 1940.

Camaridium amabile (J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria amabilis* J. T. Atwood, Lindleyana 9: 239-241. 1994.

Camaridium ampliflorum (C. Schweinf.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria ampliflora* C. Schweinf., Bot. Mus. Leaflet 8: 188. 1940. *Camaridium grandiflorum* Ames, Proc. Biol. Soc. Wash. 34: 149-150. 1921, *nom. illeg.* [non (Lindl.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 9: 165. 1921].

Camaridium anceps (Rchb.f.) M. A. Blanco, **comb. nov.**

Basionym: *Ornithidium anceps* Rchb.f., Beitr. Orch.-K. Centr. Amer. 75-76. 1866. *Maxillaria pseudoneglecta* J. T. Atwood, Lindleyana 8: 30-31. 1993.

Camaridium atratum (Lex.) M. A. Blanco, **comb. nov.**

Basionym: *Psittacoglossum atratum* Lex., Nov. Veg. Descr. 2: 30. 1825. *Maxillaria lexarzana* Soto Arenas & F. Chiang, Orquidea (Méx.) n.s., 12: 238-239. 1992.

Camaridium aurantiacum (Schltr.) M. A. Blanco, **comb. nov.**

Basionym: *Ornithidium aurantiacum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 241. 1923. Syn.: *Maxillaria lankesteri* Ames, Sched. Orch. 7: 11-12. 1924. *Maxillaria jugata* Garay, Orquideología 4: 159. 1969, **syn. nov.**

Camaridium bomboizense (Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria bomboizensis* Dodson, Orquideología 19: 59. 1994.

Camaridium brevilabium (Ames & Correll) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria brevilabia* Ames & Correll, Bot. Mus. Leaflet 11: 15, fig. 1. 1943. *Ornithidium alfaroi* Ames & C. Schweinf., Sched. Orch. 10: 98. 1930. Non *Camaridium alfaroi* (Ames & C. Schweinf.) M. A. Blanco.

Camaridium burgeri (J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria burgeri* J. T. Atwood, Lindleyana 9: 233-236. 1994.

- Camaridium campanulatum* (C. Schweinf.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria campanulata* C. Schweinf., Bot. Mus. Leafl. 5: 94-95. 1938.
- Camaridium cedralense* (J. T. Atwood & Mora-Ret.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria cedralensis* J. T. Atwood & Mora-Ret., Selbyana 18: 31-32. 1997.
- Camaridium cucullatum* (Lindl.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria cucullata* Lindl., Edwards's Bot. Reg. 26: t. 12. 1840.
- Camaridium densum* (Lindl.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria densa* Lindl., Edwards's Bot. Reg. 21: t. 1804. 1835.
- Camaridium falcatum* (Ames & Correll) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria falcata* Ames & Correll, Bot. Mus. Leafl. 11: 15. 1943. *Ornithidium costaricense* Schltr., Repert. Spec. Nov. Regni Veg. 8: 456. 1910. Non *Camaridium costaricense* Schltr. (Repert. Spec. Nov. Regni Veg. 3: 249. 1907).
- Camaridium fragrans* (J. T. Atwood) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria fragrans* J. T. Atwood, Selbyana 22: 131. 2001.
- Camaridium gomezianum* (J. T. Atwood) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria gomeziana* J. T. Atwood, Lindleyana 11: 202-204. 1996.
- Camaridium grisebachianum* (Nir & Dod) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria grisebachiana* Nir & Dod, Orchid. Antill.: 243. 2000.
- Camaridium haberi* (J. T. Atwood) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria haberi* J. T. Atwood, Selbyana 16: 245. 1995.
- Camaridium hagsaterianum* (Soto Arenas) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria hagsateriana* Soto Arenas, Orquídea (Mexico) n.s., 12: 252. 1992.
- Camaridium horichii* (Senghas) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria horichii* Senghas, Orchidee (Hamburg) 28: 13. 1977.
- Camaridium inauditum* (Rchb.f.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria inaudita* Rchb.f., Beitr. Orch.-K. Centr. Am. 76. 1866.
- Camaridium insolitum* (Dressler) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria insolita* Dressler, Orquideología 14: 204. 1981.
- Camaridium lankesteri* (Ames) M. A. Blanco, **comb. nov.**
Basionym: *Ornithidium lankesteri* Ames, Sched. Orch. 4: 52-53. 1923. *Maxillaria quadrata* Ames & Correll, Bot. Mus. Leafl. 6:16. 1943.
- Camaridium longicolumna* (J. T. Atwood) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria longicolumna* J. T. Atwood, Selbyana 22: 132. 2001.
The epithet *longicolumna* is a noun in apposition, and therefore retains its feminine gender.
- Camaridium lutheri* (J. T. Atwood) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria lutheri* J. T. Atwood, Selbyana 19: 257. 1998.
- Camaridium meleagris* (Lindl.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria meleagris* Lindl., Edwards's Bot. Reg. 30: misc. 3. 1844.
- Camaridium micranthum* M. A. Blanco, **nom. nov.**
Scaphyglottis parviflora Poepp. & Endl., Nov. Gen. ac Sp. 1: 58, t. 97. 1835. *Maxillaria parviflora* (Poepp. & Endl.) Garay, Bot. Mus. Leafl. 21: 258. 1967. Non *Camaridium parviflorum* Fawc. (Symb. Antill. 1: 472. 1910).
- Camaridium microphyton* (Schltr.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria microphyton* Schltr., Repert. Spec. Nov. Regni Veg. 8: 457. 1910.
- Camaridium mombachoense* (A. H. Heller ex J. T. Atwood) M. A. Blanco, **comb. nov.**

- Basionym: *Maxillaria mombachoensis* A. H. Heller ex J. T. Atwood, *Selbyana* 5: 302. 1981.
- Camaridium monteverdense*** (J. T. Atwood & G. Barboza) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria monteverdensis* J. T. Atwood & G. Barboza, *Lindleyana* 9: 241-242. 1994.
- Camaridium neglectum*** (Schltr.) M. A. Blanco, **comb. nov.**
Basionym: *Ornithidium neglectum* Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 19: 242. 1923.
- Camaridium obscurum*** (Linden & Rchb.f.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria obscura* Linden & Rchb.f., *Beitr. Orch.-K. Centr. Amer.* 31-32, t. 6. 1866.
- Camaridium oestlundianum*** (L. O. Williams) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria oestlundiana* L. O. Williams, *Amer. Orchid Soc. Bull.* 11: 133. 1942.
- Camaridium paleatum*** (Rchb.f.) M. A. Blanco, **comb. nov.**
Basionym: *Ornithidium paleatum* Rchb.f., *Linnaea* 41: 36. 1877.
- Camaridium praestans*** (Rchb.f.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria praestans* Rchb.f., *Gard. Chron.*, n.s. 23: 566. 1885.
- Camaridium pygmaeum*** M. A. Blanco, **nom. nov.**
Ornithidium wercklei Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 19: 60. 1923. *Maxillaria wercklei* (Schltr.) L. O. Williams, *Ann. Missouri Bot. Gard.* 27: 284. 1923. Non *Camaridium wercklei* Schltr. (*Repert. Spec. Nov. Regni Veg. Beih.* 19: 58-59. 1923).
- Camaridium ramonense*** (Schltr.) M. A. Blanco, **comb. nov.**
Basionym: *Ornithidium ramonense* Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 19: 243-244. 1923. *Maxillaria flava* Ames, Hubbard & C. Schweinf., *Bot. Mus. Leafl.* 3: 41. 1934.
- Camaridium rhombeum*** (Lindl.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria rhombea* Lindl., *Edwards's Bot. Reg.* 26: t. 12. 1840.
- Camaridium scalariforme*** (J. T. Atwood) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria scalariformis* J. T. Atwood, *Selbyana* 19: 257. 1998.
- Camaridium sigmoideum*** (C. Schweinf.) M. A. Blanco, **comb. nov.**
Basionym: *Ornithidium sigmoideum* C. Schweinf., *Bot. Mus. Leafl.* 4: 121-122. 1937.
- Camaridium soconuscanum*** (Breedlove & D. Mally) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria soconuscana* Breedlove & D. Mally, *Amer. Orchid Soc. Bull.* 58: 1234. 1989.
- Camaridium standleyi*** M. A. Blanco, **nom. nov.**
Maxillaria parvilabia Ames & C. Schweinf., *Sched. Orch.* 8: 62-64. 1925, **nom. illeg.** (non Rolfe, *Orchid Rev.* 26: 232. 1918).
- Camaridium stenophyllum*** (Schltr.) M. A. Blanco, **comb. nov.**
Basionym: *Ornithidium stenophyllum* Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 19: 59. 1923. *Maxillaria concavilabia* Ames & Correll, *Bot. Mus. Leafl.* 11: 15, fig. 2. 1953. Non *Maxillaria stenophylla* Rchb.f. (*Bonplandia* 2: 17. 1854), nec *Maxillaria stenophylla* F. Lehm. & Kraenzl. (*Bot. Jahrb. Syst.* 26: 481. 1899).
- Camaridium strumatum*** (Endres & Rchb.f.) M. A. Blanco, **comb. nov.**
Basionym: *Ornithidium strumatum* Endres & Rchb.f., *Gard. Chron.* 2: 772. 1874.
- Camaridium suaveolens*** (Barringer) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria suaveolens* Barringer, *Brittonia* 37: 44-46. 1985.
- Camaridium synsepalum*** (J. T. Atwood) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria synsepala* J. T. Atwood, *Selbyana* 19: 260. 1998.
- Camaridium tigrinum*** (C. Schweinf.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria tigrina* C. Schweinf., *Amer. Orchid Soc. Bull.* 37: 409-410. 1968.

Camaridium tricarinatum (J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria tricarinata* J. T. Atwood, Selbyana 19: 260. 1998.

Camaridium tuberculare (J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria tubercularis* J. T. Atwood, Lindleyana 9: 229-231. 1994.

Camaridium tutae (J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria tutae* J. T. Atwood, Selbyana 19: 262. 1998.

Camaridium vaginale (Rchb.f.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria vaginalis* Rchb.f., Beitr. Orch.-K. Centr. Amer. 77. 1866.

Camaridium valerioi (Ames & C. Schweinf.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria valerioi* Ames & C. Schweinf., Sched. Orch. 10: 96-97. 1930.

Camaridium vittariifolium (L. O. Williams) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria vittariifolia* L. O. Williams, Ceiba 4: 38. 1953.

Other members of *Camaridium* include *C. adolphi* Schltr., *C. amparoanum* Schltr. (*Maxillaria serrulata* Ames & Correll), *C. biolleyi* (Schltr.) Schltr., *C. bracteatum* (Schltr.) Schltr., *C. bradeorum* Schltr., *C. brenesii* Schltr. (*M. trilobata* Ames & C. Schweinf.), *C. costaricense* Schltr. (*M. tonduzii* (Schltr.) Ames & Correll), *C. ctenostachys* (Rchb.f.) Schltr., *C. dendrobioides* Schltr., *C. dichotomum* Schltr., *C. hoehnei* Pabst (*M. imbricata* Barb. Rodr.), *C. imbricatum* Schltr. (*M. schlechteriana* J. T. Atwood), *C. latifolium* Schltr. (*M. planicola* C. Schweinf.), *C. minus* Schltr. [*M. minor* (Schltr.) L. O. Williams], *C. nutantiflorum* Schltr. (*M. umbratilis* L. O. Williams), *C. ochroleucum* Lindl. (*M. camaridii* Rchb.f.), and *C. pulchrum* Schltr.

CHRISTENSONELLA

Christensonella Szlach., Mytnik, Górniak & Śmiszek, Polish Bot. J. 51: 57. 2006.

Type species: *Maxillaria paulistana* Hoehne, =

Christensonella subulata (Lindl.) Szlach., Mytnik, Górniak & Śmiszek [= *Maxillaria subulata* Lindl.], **syn. nov.**

Maxillaria sect. *Urceolatae* Christenson, Proc. 16th World Orchid Conf. 286-287. 2002.

Species of *Christensonella* are either epiphytes or lithophytes. Plants of this genus are often very small, compared to other members of Maxillariinae. In most species, the roots show characteristic constrictions. Epiphytic species tend to grow pendent and have distant pseudobulbs, while the lithophytes are erect and more caespitose. The pseudobulbs are often ridged. Each pseudobulb bears from one to four apical leaves, and has several non-foliaceous subtending sheaths. The leaves can be flat and conduplicate to subulate or hemiterete. The flowers are usually yellow to dark red and have a shiny, dry callus; perianth fibers are present. *Christensonella uncata* and *C. squamata* have prominent stelia projecting downward from the apex of the clinandrium, which support a long, tegular stipe. The fusiform fruits have apical dehiscence. In *C. nardoides*, the endocarpic trichomes are extruded as a sausage-like mass which carries the seeds outside of the fruit (Blanco *et al.* 2006).

This distinctive group of mostly South American species has been informally known as the "*Maxillaria madida* alliance" (Pabst & Dungs 1977). A detailed revision of *Christensonella* is in progress (S. Koehler, unpublished manuscript). Szlachetko *et al.* (2006) transferred most members of *Maxillaria* section *Urceolatae* to *Christensonella*, and here we transfer a few more. Whitten *et al.* (2007) wrongfully cited *M. nardoides* Kraenzl. as the type of *Christensonella*, but that species is the type of *Maxillaria* section *Urceolatae*.

Christensonella cepula (Rchb.f.) S. Koehler, **comb. nov.**

Basionym: *Maxillaria cepula* Rchb.f., Bonplandia 3: 216. 1855.

Christensonella neowiedii (Rchb.f.) S. Koehler, **comb. nov.**

Basionym: *Maxillaria neowiedii* Rchb. f., Linnaea 41: 29. 1877.

Christensonella pacholskii (Christenson) S. Koehler, **comb. nov.**

Basionym: *Maxillaria pacholskii* Christenson, *Orchid Rev.* 111: 288. 2003.

Christensonella squamata (Barb. Rodr.) Carnevali, **comb. nov.**

Basionym: *Maxillaria squamata* Barb. Rodr., *Gen. Sp. Orchid.* 1: 118. 1877.

Other members of *Christensonella* which should be recognized as discrete species (S. Koehler, unpublished manuscript) include: *C. acicularis* (Herb. ex Lindl.) Szlach., Mytnik, Górniak & Śmiszek, *C. echinophyta* (Barb. Rodr.) Szlach., Mytnik, Górniak & Śmiszek, *C. ferdinandiana* (Barb. Rodr.) Szlach., Mytnik, Górniak & Śmiszek, *C. nardooides* (Kraenzl.) Szlach., Mytnik, Górniak & Śmiszek, *C. pumila* (Hook.) Szlach., Mytnik, Górniak & Śmiszek, *C. subulata* (Lindl.) Szlach., Mytnik, Górniak & Śmiszek, *C. uncata* (Lindl.) Szlach., Mytnik, Górniak & Śmiszek, and *C. vernicosa* (Barb. Rodr.) Szlach., Mytnik, Górniak & Śmiszek. Other names transferred by Szlachetko *et al.* (2006) are regarded as synonyms (S. Koehler, unpublished manuscript).

CRYPTOCENTRUM

Cryptocentrum Benth., *J. Linn. Soc. Bot.* 18: 325. 1880.

Type species: *Cryptocentrum jamesonii* Benth., = *C. lehmannii* (Rchb.f.) Garay [= *Aeranthes lehmannii* Rchb.f.].

Anthosiphon Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 7: 182. 1920.

Cryptocentrum sect. *Anthosiphon* (Schltr.) Hawkes, *Orchid J.* 2: 379. 1953.

Cryptocentrum subgen. *Caulescentes* Senghas, in *Schlechter Orchideen*, ed. 3, I/B(29): 1798. 1994.

Cryptocentrum subgen. *Pseudobulbosa* Carnevali, *Harvard Pap. Bot.* 5: 470. 2001.

Cryptocentrum subgen. *Cryptocentrum* Benth. *sensu* Carnevali, *Harvard Pap. Bot.* 5: 468. 2001.

Pittierella Schltr., *Repert. Spec. Nov. Regni Veg.* 3(31-32): 80. 1906.

Cryptocentrum is unusual among core Maxillariinae because most species have monopodial (often congested) shoots, long, wiry inflorescences, and greenish, star shaped flowers with a nectariferous spur formed by the bases of the sepals

and the labellum. Species in subgenus *Caulescentes* are even more aberrant, and have dwarf shoots with polystichous phyllotaxis. The capsules have apical dehiscence.

Because of its unusual morphology, *Cryptocentrum* has been consistently recognized as a separate, well defined genus. Carnevali (2001) provided a synopsis. It is significant that the three subgenera (*Caulescentes*, *Cryptocentrum* and *Pseudobulbosa*; Carnevali, 2001) form strongly supported monophyletic groups (Whitten *et al.* 2007). Because we now consider *Anthosiphon* as part of *Cryptocentrum*, the erection of a new subgenus is necessary:

Cryptocentrum Benth. subgenus ***Anthosiphon*** (Schltr.) Carnevali, **comb. et stat. nov.**

Anthosiphon Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 7: 182. 1920.

Cryptocentrum sect. *Anthosiphon* (Schltr.) Hawkes, *Orchid J.* 2: 379. 1953.

TYPE: *Cryptocentrum roseans* (Schltr.) A. D. Hawkes (= *Anthosiphon roseans* Schltr.)

CYRTIDIORCHIS

Cyrtidiorchis Rauschert, *Taxon* 31: 560. 1982.

Type species (designated by Ortiz, *Orquídeas de Colombia* ed. 2: 70, 1995): *Chrysocynis rhomboglossa* F. Lehm. & Kraenzl., = *Cyrtidiorchis rhomboglossa* (F. Lehm. & Kraenzl.) Rauschert.

Cyrtidium Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 27: 178. 1924, *nom. illeg.* (non Vainio, *Acta Soc. Fauna Flora Fenn.* 49: 227, 262 1921).

Plants of *Cyrtidiorchis* have dimorphic growth with sympodial, pseudobulb bearing juvenile shoots, and monopodial, branched adult shoots. Inflorescences are supra-axillary and are only produced by the adult shoots. The flowers have spreading perianth segments that lack fibers, a tomentose, insectiform labellum, and a strongly arched column; they are probably sexually deceptive. The capsules have lateral dehiscence.

Garay (1969) presented a taxonomic revision of *Cyrtidiorchis* (as *Cyrtidium*). This small Andean genus (five species) is well characterized and no new combinations are necessary.

HETEROTAXIS

Heterotaxis Lindl., Bot. Reg. 12: t. 1028. 1826.

Type species: *Heterotaxis crassifolia* Lindl., = *H. sessilis* (Sw.) F. Barros Barros [= *Epidendrum sessile* Sw.].

Dicrypta Lindl., Gen. Sp. Orchid. Pl. 44. 1830.

Marsupiarina Hoehne, Arq. Bot. Estado Sao Paulo n.s., f.m. 2: 69. 1947.

Maxillaria subgen. *Heterotaxis* (Lindl.) Brieger, An. Soc. Bot. Brasil 1972: 94. 1972.

Maxillaria sect. *Heterotaxis* (Lindl.) Brieger, Trab. Congr. Nac. Bot. (Rio de Janeiro) 26: 242-244, 1977.

Maxillaria sect. *Iridifolieae* Pfitz., Nat. Pflanzenfam. 2(6): 187. 1889.

Pentulops Raf., Fl. Tellur. 4: 42. 1836.

Most species of *Heterotaxis* have sympodial growth with laterally compressed, oblong, unifoliate pseudobulbs subtended by several foliaceous sheaths. Two species (*H. equitans* and *H. valenzuelana*) have ensiform leaves and pseudo-monopodial shoots that lack pseudobulbs. In all cases, the shoots are aggregate. The fleshy, yellowish, campanulate flowers have perianth fibers and a very short column foot. The labellum produces a pad of very short, glandular trichomes that likely constitute a reward for pollinators. The capsules have lateral dehiscence.

Ojeda *et al.* (2005) provided the most recent detailed account of *Heterotaxis*. They described *H. fritzii* Ojeda & Carnevali but accidentally provided erroneous information for the type, which is amended here (corrections underlined):

Heterotaxis fritzii Ojeda & Carnevali, Novon 15: 574-577. 2005.

TYPE: Purchased from Orquídeas del Valle, Cali [Colombia]. Flowered in cultivation in Gainesville, Florida, U.S.A., 25 Jan 2004, M. W. Whitten 2672 (holotype: FLAS).

Species that belong in *Heterotaxis* are: *H. brasiliensis* (Brieger & Illg) F. Barros, *H. discolor* (Lodd. ex Lindl.) Ojeda & Carnevali, *H. equitans* (Schltr.) Ojeda & Carnevali, *H. fritzii* Ojeda & Carnevali, *H. maleolens* (Schltr.) Ojeda & Carnevali, *H. microiridifolia* (D. E. Benn. & Christenson) Ojeda & Carnevali, *H. santanae* (Carnevali & I. Ramírez) Ojeda & Carnevali, *H. schul-*

tesii Ojeda & G. A. Romero, *H. sessilis* (Sw.) F. Barros (*Maxillaria crassifolia* Lindl.), *H. superflua* (Rchb.f.) F. Barros, *H. valenzuelana* (A. Rich.) Ojeda & Carnevali, *H. villosa* (Barb. Rodr.) F. Barros, and *H. violaceopunctata* (Rchb.f.) F. Barros (Ojeda *et al.* 2005).

INTI

Inti M. A. Blanco, **gen. nov.**

Type species: *Maxillaria chartacifolia* Ames & C. Schweinf., = *Inti chartacifolia* (Ames & C. Schweinf.) M. A. Blanco.

Maxillaria sect. *Polyphyllae* Christenson, Proc. 16th World Orchid Conf. 284-285. 2002.

Plantae cespitosae, epiphyticae, epseudobulbosae, surculis congestis flabellatis. Folia disticha plurima longa angusta. Inflorescentiae axillares in foliis infimis. Flores foetidi, perianthio fibrarum destituto. Fructus capsulares longi dehiscentiis lateralibus.

Plants of *Inti* are easily recognized by their aggregate, congested shoots devoid of pseudobulbs, with many (>10) distichous, long leaves arranged like a fan. The yellow or maroon flowers lack perianth fibers and have a fetid odor. The column foot is virtually non-existent, and the labellum has a pad of glandular trichomes similar to those of *Heterotaxis*. The capsules are long and narrow, and have lateral dehiscence.

ETYMOLOGY: Named after Inti, the sun god of the Inca culture. The long and narrow leaves radiating from a congested shoot are reminiscent of the rays of a rising sun. Having no botanical tradition, we give this generic name a feminine gender (article 62.3, McNeill *et al.* 2006).

This small group was treated as the “*Maxillaria bicallosa* clade” in Whitten *et al.* (2007).

Inti bicallosa (Rchb.f.) M. A. Blanco, **comb. nov.**

Basionym: *Zygopetalum bicallosum* Rchb.f., Otia Bot. Hamb. 1: 9. 1878. Syn.: *Ornithidium dolichophyllum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 9: 106. 1921 (= *Maxillaria caespitosa* C. Schweinf.), **syn. nov.**

Inti chartacifolia (Ames & C. Schweinf.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria chartacifolia* Ames & C. Schweinf., Sched. Orch. 10: 92. 1930. Syn.:

Trigonidium equitans Garay, Svensk Bot. Tidskr. 47: 288, fig. 15. 1953, **syn. nov.**

MAPINGUARI

Mapinguari Carnevali & R. Singer, **gen. nov.**

Type species: *Maxillaria longipetiolata* Ames & C. Schweinf., = *Mapinguari longipetiolatus* (Ames & C. Schweinf.) Carnevali & R. Singer.

Plantae plerumque sylvicolae, epiphyticae vel rupicolae, pseudobulbis laevis, semper unifoliatis, aggregatis. Radices laeves, ferrugineae, brunneae vel albae. Flores erecti, fragrantes, rigidi et sine secretionibus; pedicello brevissimo rigidoque. Pollinarium cum tegula et viscidio semilunare.

Mapinguari is a small (four species), primarily Guayanan and Amazonian genus. *Mapinguari desvauxianus* reaches the Brazilian states of São Paulo and Rio de Janeiro. Two of the species are primarily terrestrial in sandy soils or lithophytic on sandstone. The pseudobulbs are aggregate, unifoliate and smooth to slightly sulcate. The conduplicate leaves normally display a well developed petiole. The very short inflorescences are produced from the base of the most recent pseudobulb. The flowers are erect (i.e., the labellum is held in a vertical or near-vertical position), brown or maroon in coloration, have a very short column foot, lack any secretions or trichomes, and have tough perianth fibers. We have not been able to determine the mode of dehiscence of the capsules.

ETYMOLOGY: Named after the Mapinguarí, a legendary and elusive creature of Brazilian-Amazonian mythology, in allusion to the brownish, cryptic flowers. Having no botanical tradition, we treat this generic name as masculine (article 62.3, McNeill *et al.* 2007).

This small but distinctive group was first recognized by Carnevali & Ramírez (1989; as the “*Maxillaria auyantepuiensis* complex”) and was treated as the “*Maxillaria desvauxiana* clade” in Whitten *et al.* (2007). Full synonymy for each species can be found in Carnevali & Ramírez-Morillo (2003).

Mapinguari auyantepuiensis (Foldats) Carnevali & R. Singer, **comb. nov.**

Basionym: *Maxillaria auyantepuiensis* Foldats, Bol. Soc. Venez. Ci. Nat. 22: 269. 1961.

Mapinguari desvauxianus (Rchb.f.) Carnevali & R. Singer, **comb. nov.**

Basionym: *Maxillaria desvauxiana* Rchb.f., Bonplandia (Hannover) 3: 67. 1854.

Mapinguari foldatsianus (Carnevali & I. Ramírez) Carnevali & R. Singer, **comb. nov.**

Basionym: *Maxillaria foldatsiana* Carnevali & I. Ramírez, Ann. Missouri Bot. Gard. 76: 376. 1989.

Mapinguari longipetiolatus (Ames & C. Schweinf.) Carnevali & R. Singer, **comb. nov.**

Basionym: *Maxillaria longipetiolata* Ames & C. Schweinf., Sched. Orch. 8: 61-62. 1925.

MAXILLARIA

Maxillaria Ruiz & Pav., Fl. Peruv. Prodr. 116, t. 25. 1794.

Type species (designated by Brieger & Hunt, Taxon 18: 601-603. 1969; and by Garay, Harvard Pap. Bot. 11: 51-52. 1997): *Maxillaria platypetala* Ruiz & Pav.

Adamanthus Szlach., Richardiana 7: 30. 2007, *pro parte* (excl. type).

Dendrobium sect. *Maxillaria* (Ruiz & Pav.) Pers., Syn. Pl. (Persoon) 2: 523. 1807.

Maxillaria sect. *Aggregatae* Pfitz., Nat. Pflanzenfam. 2(6): 187. 1889, *pro parte* (incl. type).

Maxillaria sect. *Amazonicae* Christenson, Proc. 16th World Orchid Conf. 282. 2002.

Maxillaria sect. *Arachnites* Christenson, Proc. 16th World Orchid Conf. 282. 2002.

Maxillaria sect. *Axilliflorae* Lindl., Gen. Sp. Orchid. Pl. 142. 1833, *pro parte*.

Maxillaria sect. *Maxillaria* Ruiz & Pav. *sensu* Christenson, Proc. 16th World Orchid Conf. 284. 2002.

Maxillaria sect. *Multiflorae* Christenson, Proc. 16th World Orchid Conf. 284. 2002.

Maxillaria subgen. *Aggregatae* (Pfitz.) Brieger, Trab. Congr. Nac. Bot. (Rio de Janeiro) 26: 244. 1977.

Menadena Raf., Fl. Tellur. 2: 98. 1836.

Sauvetrea Szlach., Richardiana 7: 28. 2007, *pro parte* (excl. type).

Plants of this group almost always have pseudobulbs (with the exception of some species in the *M.*

exaltata alliance) and are often cespitose. The pseudobulbs almost invariably are unifoliate, smooth and laterally compressed, with subtending sheaths that are either foliaceous or not. The abscission layer of the apical leaf is often projected above the pseudobulb in a persistent stalk (phyllodium). The inflorescences always emerge from the base of the youngest pseudobulbs (from the leaf axils near the top of the stem in the *M. exaltata* alliance). The floral bract can be shorter or longer than the pedicel and ovary. The flowers have a prominent column foot, and abundant perianth fibers. None of the species produce nectar, but many produce pseudopollen in the form of moniliform, pluricellular trichomes on the labellum surface (a character not seen in any other genera). The capsules have lateral dehiscence.

Almost half of the species traditionally treated in *Maxillaria* sensu lato will remain in *Maxillaria* sensu stricto, as here circumscribed. *Maxillaria* sections *Amazonicae*, *Maxillaria*, and *Multiflorae* form well supported clades (Whitten *et al.* 2007), but the other sections are polyphyletic. Increased sampling of taxa and gene regions within *Maxillaria* sensu stricto is needed to support a revised infrageneric classification. Two names included in the analyses of Whitten *et al.* (2007) need to be commented upon:

Maxillaria candida Lodd. ex Lindl., Edwards's Bot. Reg. 27 (Misc.): 28. 1841.

Syn.: *Maxillaria modesta* Brade, Orquídea (Rio de Janeiro) 6: 18. 1943, *nom. illeg.* (non Schltr., Repert. Spec. Nov. Regni Veg. Beih. 28: 93. 1924), *Maxillaria modestiflora* Pabst, Bradea 2: 319. 1979. **syn. nov.**

Whitten *et al.* (2007) reported a specimen of *Maxillaria candida* Lodd. ex Lindl. (Koehler 0335, ESA) nested in the *Mormolyca* clade. Upon examination of the type of *M. candida* at Kew, we realized that Koehler 0335 is *Mormolyca* cf. *acutifolia* (Lindl.) M. A. Blanco. Whitten *et al.* (2007) also reported a specimen of *Maxillaria modesta* Schltr. nested in *Maxillaria* sensu stricto (Koehler 0351, UEC). This specimen is, however, the true *Maxillaria candida*, which was originally identified simply as "*M. modesta*". The illegitimate name *Maxillaria modesta* Brade (non Schltr.) and its later legitimate name *M. modestiflora* Pabst are previously undetected synonyms of *M. candida*.

Even in this exclusive circumscription, *Maxillaria* remains by far the largest genus in subtribe Maxillariinae. Species that belong in *Maxillaria sensu stricto* include: *M. acostae* Schltr., *M. aequiloba* Schltr., *M. albata* Lindl., *M. albiflora* Ames & C. Schweinf., *M. amazonica* Schltr., *M. anatomorum* Rchb.f., *M. angustisegmenta* Ames & C. Schweinf., *M. angustissima* Ames, T. Hubb. & C. Schweinf., *M. arachnites* Rchb.f., *M. arachnitiflora* Ames & C. Schweinf., *M. argyrophylla* Poepp. & Endl., *M. attenuata* Ames & C. Schweinf., *M. atwoodiana* Pupulin, *M. augustae-victoriae* F. Lehm. & Kraenzl., *M. aurorae* D. E. Benn. & Christenson, *M. azulensis* D. E. Benn. & Christenson, *M. batemanii* Poepp. & Endl., *M. bennettii* Christenson, *M. bocazensis* D. E. Benn. & Christenson, *M. bolivariensis* C. Schweinf., *M. brachybulbon* Schltr., *M. bradei* Schltr. ex Hoehne, *M. breviscapa* Poepp. & Endl., *M. buchtienii* Schltr., *M. burtonii* D. E. Benn. & Christenson, *M. calantha* Schltr., *M. candida* Lodd. ex Lindl., *M. carolii* Christenson, *M. chionantha* J. T. Atwood, *M. chlorantha* Lindl., *M. christensonii* D. E. Benn., *M. colemanii* Carnevali & Fritz, *M. colorata* Rchb.f., *M. confusa* Ames & C. Schweinf., *M. connellii* Rolfe, *M. crocea* Poepp. & Endl., *M. cryptobulbon* Carnevali & J. T. Atwood, *M. curvicolonna* M. A. Blanco & Neubig, *M. cuzcoensis* C. Schweinf., *M. dalessandroi* Dodson, *M. dichroma* Rolfe, *M. dillonii* D. E. Benn. & Christenson, *M. x dunstervillei* Carnevali & I. Ramírez, *M. eburnea* Lindl., *M. ecuadorensis* Schltr., *M. edwardsii* D. E. Benn. & Christenson, *M. elegantula* Rolfe, *M. embreei* Dodson, *M. endresii* Rchb.f., *M. exaltata* (Kraenzl.) C. Schweinf., *M. fletcheriana* Rolfe, *M. floribunda* Lindl., *M. formosa* Carnevali & G. A. Romero, *M. fractiflexa* Rchb.f., *M. frechettei* D. E. Benn. & Christenson, *M. fucata* Rchb.f., *M. fuerstenbergiana* Schltr., *M. galantha* J. T. Atwood & Carnevali, *M. gentryi* Dodson, *M. gorbatschowii* R. Vásquez, Dodson & Ibisch, *M. grandiflora* (Kunth) Lindl., *M. grandimentum* C. Schweinf., *M. grandis* Rchb.f., *M. granditenuis* D. E. Benn. & Christenson, *M. grayi* Dodson, *M. guadalupensis* Cogn., *M. hastulata* Lindl., *M. hennisiana* Schltr., *M. hillsii* Dodson, *M. hirsutilabia* D. E. Benn. & Christenson, *M. huanucoensis* D. E. Benn. & Christenson, *M. huebschii* Rchb.f., *M. irrorata* Rchb.f., *M. jostii* Dodson, *M. jucunda* F. Lehm. & Kraenzl., *M. kegelii* Rchb.f., *M. klugii* C. Schweinf., *M. langlassei*

Schltr., *M. leforii* D. E. Benn. & Christenson, *M. lehmannii* Rchb.f., *M. lepidota* Lindl., *M. leucaimata* Barb. Rodr., *M. lilliputiana* D. E. Benn. & Christenson, *M. lindleyana* Schltr. (*M. crocea* Lindl.), *M. linearis* Ames & C. Schweinf., *M. litensis* Dodson, *M. longiloba* (Ames & C. Schweinf.) J. T. Atwood, *M. longipes* Lindl., *M. longissima* Lindl., *M. loretoensis* C. Schweinf., *M. lueri* Dodson, *M. luteoalba* Lindl., *M. macrura* Rchb.f., *M. margretiae* R. Vásquez, *M. marmoliana* Dodson, *M. mejiae* Carnevali & G. A. Romero, *M. melina* Lindl., *M. merana* Dodson, *M. meridensis* Lindl., *M. microtricha* Schltr., *M. milenae* V. P. Castro & Chiron, *M. molitor* Rchb.f., *M. monantha* Barb. Rodr., *M. multiflora* Barb. Rodr., *M. mungoschraderi* R. Vásquez & Ibsch, *M. nanegalensis* Rchb.f., *M. neophylla* Rchb.f., *M. niesseniae* Christenson, *M. nigrescens* Lindl., *M. nuriensis* Carnevali & I. Ramírez, *M. nutans* Lindl., *M. ochroleuca* Lodd. ex Lindl., *M. pachyneura* F. Lehm. & Kraenzl., *M. pannieri* Foldats, *M. parkeri* Hook., *M. parvibulbosa* C. Schweinf., *M. patens* Schltr., *M. pauciflora* Barb. Rodr., *M. pentura* Lindl., *M. perryae* Dodson, *M. platyloba* Schltr., *M. platypetala* Ruiz & Pav., *M. plicata* Schltr., *M. porrecta* Lindl., *M. portillae* Christenson, *M. powellii* Schltr., *M. pseudoreichenheimiana* Dodson, *M. pterocarpa* Barb. Rodr., *M. pulla* Linden & Rchb.f., *M. pyhalae* D. E. Benn. & Christenson, *M. quelchii* Rolfe, *M. ramonensis* Schltr., *M. reichenheimiana* Endres & Rchb.f., *M. ringens* Rchb.f., *M. rodriguesii* Cogn., *M. rodrigueziana* J. T. Atwood & Mora-Ret., *M. rotundilabia* C. Schweinf., *M. rubioi* Dodson, *M. sanderiana* Rchb.f. ex Sander, *M. setigera* Lindl., *M. silvana* Campacci, *M. simacoana* Schltr., *M. simplicilabia* C. Schweinf., *M. speciosa* Rchb.f., *M. spiritu-sanctensis* Pabst, *M. splendens* Poepp. & Endl., *M. striata* Rolfe, *M. tenuis* C. Schweinf., *M. thurstoniorum* Dodson, *M. tiaraensis* Carnevali & G. A. Romero, *M. tonsbergii* Christenson, *M. trilobulata* D. E. Benn. & Christenson, *M. triloris* E. Morren, *M. tristis* Schltr., *M. tuerosii* D. E. Benn. & Christenson, *M. turkeliae* Christenson, *M. valleculata* D. E. Benn. & Christenson, *M. venusta* Linden & Rchb.f., *M. whittenii* Dodson, *M. williamsii* Dodson, *M. winaywaynaensis* D. E. Benn. & Dodson, *M. wojii* Christenson, *M. woytkowskii* C. Schweinf., *M. xylobiflora* Schltr., *M. yanganensis* Dodson, and *M. yauaperyensis* Barb. Rodr.

MAXILLARIELLA

Maxillariella M. A. Blanco & Carnevali, *gen. nov.*

Type species: *Maxillaria diuturna* Ames & C. Schweinf., = *Maxillariella diuturna* (Ames & C. Schweinf.) M. A. Blanco & Carnevali.

Adamanthus Szlach., *Richardiana* 7: 30. 2007, *pro parte* (excl. type).

Maxillaria sect. *Ebulbes* Pfitz., *Nat. Pflanzenfam.* 2(6): 187. 1889.

Maxillaria sect. *Erectae* Pfitz., *Nat. Pflanzenfam.* 2(6): 187. 1889.

Plantae epiphyticae, pro parte maxima rhizomatibus longis, pseudobulbosae vel pseudobulbosae; pseudobulbi 1-2 foliis apicalibus. Flores solitarii in axillis foliorum vel bractearum. Flores plerumque parvi campanulati. Labella parviloba vel elobulata, callis nitidis. Fructus capsulares dehiscentis lateralibus.

Species of *Maxillariella* are variable in terms of growth habit; a few species are subcespitose, but most have pseudobulbs separated by medium to long rhizome segments. The ovoid pseudobulbs are either uni- or bifoliate. Several species with long rhizomes have foliaceous bracts covering the segments between pseudobulbs. Others have pseudobulbs reduced or even absent, and these species show a clear gradient from sympodial to monopodial growth. The most derived members of this genus are the species formerly treated as *Maxillaria* section *Ebulbes* (the "*Maxillaria graminifolia* suballiance", Atwood 2003), which have thin, wiry, monopodial stems completely devoid of pseudobulbs, and narrow, acute leaves. Invariably, only one flower is produced from each leaf or bract axil (e.g., the inflorescences are not fasciculate nor produced sequentially), and the floral bract is shorter than the pedicel and ovary. The column foot is very short, and the labellum is simple or obscurely three-lobed and has a glossy callus. The flowers seem to be food deceptive in most cases. The capsules have lateral dehiscence.

This group was treated as the "*Maxillaria variabilis* clade" by Whitten *et al.* (2007). *Maxillaria* sect. *Ebulbes* (the "*Maxillaria graminifolia* suballiance") was revised by Atwood (2003). *Camaridium dendrobioides*, the type of *Adamanthus*, is morphologically

convergent with members of that suballiance, but it is firmly nested in *Camaridium* (Whitten *et al.* 2007). The floral bract in *C. dendrobioides* is longer than the pedicel and ovary.

ETYMOLOGY: The name *Maxillariella* is a diminutive of *Maxillaria*, in reference to the often much smaller flowers of *Maxillariella*.

Maxillariella acervata (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria acervata* Rchb.f., Bonplandia (Hannover) 3: 217. 1855.

Maxillariella alba (Hook.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Dendrobium album* Hook.f., Exot. Fl. t. 142. 1825.

Maxillariella anceps (Ames & C. Schweinf.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria anceps* Ames & C. Schweinf., Sched. Orch. 10: 84. 1930.

Maxillariella appendiculoides (C. Schweinf.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria appendiculoides* C. Schweinf., Bot. Mus. Leafl. 4: 119-121. 1937.

Maxillariella arbuscula (Lindl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Camaridium arbuscula* Lindl., Pl. Hartw. 153. 1845.

Maxillariella brevifolia (Lindl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Camaridium brevifolium* Lindl., Benth. Pl. Hartw. 154. 1845.

Maxillariella caespitifica (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria caespitifica* Rchb.f., Linnaea 41: 73. 1877.

Maxillariella cassapensis (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria cassapensis* Rchb.f., Ann. Bot. Syst. 6: 539. 1863.

Maxillariella caucana (Schltr.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria caucana* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 167. 1920.

Maxillariella cobanensis (Schltr.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria cobanensis* Schltr., Repert. Spec. Nov. Regni Veg. 10: 295. 1912.

Maxillariella costaricensis (Schltr.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria costaricensis* Schltr., Rep. Spec. Nov. Regni Veg. Beih. 19: 232-233. 1923.

Maxillariella curtipes (Hook.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria curtipes* Hook., Icon. Pl. 4: t. 384. 1841

Maxillariella densifolia (Poepp. & Endl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Dicrypta densifolia* Poepp. & Endl., Nov. Gen. Sp. Pl. 1: 39. 1836.

Maxillariella diuturna (Ames & C. Schweinf.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria diuturna* Ames & C. Schweinf., Sched. Orch. 8: 58. 1925.

Maxillariella elatior (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Dicrypta elatior* Rchb.f., Linnaea 18: 403. 1844.

Maxillariella estradae (Dodson) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria estradae* Dodson, Icon. Pl. Trop. 1: t. 152. 1980.

Maxillariella funicaulis (C. Schweinf.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria funicaulis* C. Schweinf., Bot. Mus. Leafl. 11: 273. 1945.

Maxillariella graminifolia (Kunth) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Isochilus graminifolius* Kunth, Nov. Gen. Sp. 1: 340, t. 78. 1816.

Maxillariella guareimensis (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria guareimensis* Rchb.f., Bonplandia (Hannover) 2: 16. 1854.

Maxillariella houtteana (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria houtteana* Rchb.f., Hamb. Gartenz. 14: 212. 1858.

Maxillariella infausta (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria infausta* Rchb.f., Bonplandia (Hannover) 3: 216. 1855.

Maxillariella lawrenceana (Rolfe) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Camaridium lawrenceanum* Rolfe, Bull. Misc. Inform. Kew 1894: 185. 1894.

Maxillariella linearifolia (Ames & C. Schweinf.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria linearifolia* Ames & C. Schweinf., Sched. Orch. 10: 95-96. 1930.

Maxillariella longibracteata (Lindl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Camaridium longibracteatum* Lindl., Benth. Pl. Hartw. 154. 1845.

Maxillariella luteorubra (F. Lehm. & Kraenzl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Ornithidium luteorubrum* F. Lehm. & Kraenzl., Bot. Jahrb. Syst. 26: 486. 1899. *Maxillaria cuencana* Garay, Cand. J. Bot. 34: 257. 1956. Non *Camaridium luteo-rubrum* Lindl. (Orchid. Linden. 22. 1846).

Maxillariella mexicana (J. T. Atwood) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria mexicana* J. T. Atwood, Selbyana 24: 35-36. 2003.

Maxillariella microdendron (Schltr.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria microdendron* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 8: 94. 1921.

Maxillariella nitidula (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria nitidula* Rchb.f., Linnaea 41: 29. 1876.

In Whitten *et al.* (2007) we stated that this species probably belongs in *Camaridium*. Upon re-examination of herbarium material, we are now convinced it belongs in *Maxillariella*.

Maxillariella oreocharis (Schltr.) M. A. Blanco &

Carnevali, **comb. nov.**

Basionym: *Maxillaria oreocharis* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 17: 69. 1922.

Maxillariella pardalina (Garay) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria pardalina* Garay, Bot. Mus. Leaflet. 26: 28. 1978. *Maxillaria pantherina* Rchb.f. 1855, Bonplandia (Hannover) 3: 239. 1855, *nom. illeg.* (non Hoffmanns., Verz. Orchid. ed. 3: 71. 1844).

Maxillariella pastensis (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria pastensis* Rchb.f., Bonplandia (Hannover) 3: 239. 1855.

Maxillariella ponerantha (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria ponerantha* Rchb.f., Bonplandia (Hannover) 2: 17. 1854.

Maxillariella procurrens (Lindl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria procurrens* Lindl., Ann. Mag. Nat. Hist. 15: 383. 1845.

Maxillariella prolifera (Sw.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Epidendrum proliferum* Sw., Prodr.: 124. 1788. *Maxillaria swartziana* C. D. Adams, Amer. Orchid Soc. Bull. 35: 998. 1966.

Maxillariella purpurata (Lindl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Camaridium purpuratum* Lindl., Orchid. Linden.: 22. 1846.

Maxillariella robusta (Barb. Rodr.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Camaridium robustum* Barb. Rodr., Gen. Spec. Orchid. 2: 210. 1881. *Maxillaria johannis* Pabst, Sellowia 10: 165. 1959.

Maxillariella sanguinea (Rolfe) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria sanguinea* Rolfe, Bull. Misc. Inform. Kew 1895: 8.

Maxillariella spilotantha (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria spilotantha* Rchb.f., Bonplandia (Hannover) 2: 17. 1854.

Maxillariella stenophylla (Rchb.f.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria stenophylla* Rchb.f., Bonplandia (Hannover) 2: 17. 1854. Non F. C. Lehm. ex Kraenzl. (Bot. Jahrb. Syst. 26: 481. 1899).

Maxillariella stictantha (Schltr.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria stictantha* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 8: 97. 1921.

Maxillariella tenuifolia (Lindl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria tenuifolia* Lindl., Edwards's Bot. Reg. 23: sub. t. 1986. 1837.

Maxillariella tuerckheimii (Schltr.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Camaridium tuerckheimii* Schltr., Repert. Spec. Nov. Regni Veg. 10: 296. 1912. *Maxillaria nagelii* L. O. Williams ex Correll, Lloydia 10: 212. 1947. Non *Maxillaria tuerckheimii* Schltr. (Repert. Spec. Nov. Regni Veg. 10: 295. 1912).

Maxillariella variabilis (Bateman ex Lindl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria variabilis* Bateman ex Lindl., Edwards's Bot. Reg. 23: sub. t. 1986. 1837.

Maxillariella vinosa (Rolfe) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Camaridium vinosum* Rolfe, Bull. Misc. Inform. Kew 1922: 25-26. 1922. Non *Camaridium vinosum* Schltr. (Repert. Spec. Nov. Regni Veg. Beih. 19: 240. 1923), nec *Maxillaria vinosa* Senghas (Schlechter Orchideen, ed. 3, I/B(28): 1751. 1993, *nom. illeg.*).

Maxillariella vulcanica (F. Lehm. & Kraenzl.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria vulcanica* F. Lehm. & Kraenzl., Bot. Jahrb. Syst. 26: 484. 1899.

Maxillariella xanthorhoda (Schltr.) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria xanthorhoda* Schltr., Notizbl. Bot. Gart. Berlin-Dahlem 7: 279. 1918.

Maxillariella x yucatanensis (Carnevali & R. Jiménez) M. A. Blanco & Carnevali, **comb. nov.**

Basionym: *Maxillaria x yucatanensis* Carnevali & R. Jiménez, Harvard Pap. Bot. 5: 428. 2001.

MORMOLYCA

Mormolyca Fenzl, Denkschr. Kaiserl. Akad. Wiss., Wien. Math.-Naturwiss. Kl. 1: 253. 1850.

Type species: *Mormolyca lineolata* Fenzl, = *M. ringens* (Lindl.) Gentil [= *Trigonidium ringens* Lindl.]. *Chrysocycnis* Linden & Rchb.f., Bonplandia (Hannover) 2: 280. 1854.

Cyrtoglottis Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 181. 1920.

Maxillaria sect. *Rufescens* Christenson, Proc. 16th World Orchid Conf. 285-286. 2002.

In this expanded circumscription, *Mormolyca* can be distinguished by its unifoliate pseudobulbs having a minutely verrucose texture and subtended by non-foliaceous sheaths, the inflorescences arising from the axils of rhizome bracts well behind the most recent pseudobulb, perianth segments that lack fibers and open widely, and a conspicuously clavate, arcuate column. *Mormolyca polyphylla* (which is sister to the rest of the genus) is atypical because its long, narrow pseudobulbs have up to three apical leaves and two subtending foliaceous sheaths, and the inflorescences are produced from the base of the most recent pseudobulb. The rhizome segments and the floral peduncles can be short or long, depending on the species. The column foot is always very short. The labellum of most species (those formerly treated in *Maxillaria* section *Rufescens*) have a pad of short, glandular trichomes on the callus, but the labellum of the other species is tomentose and insectiform. The capsules have apical dehiscence.

Chrysocycnis and *Maxillaria* section *Rufescens* are firmly nested within *Mormolyca*, and thus their constituent species need to be transferred. *Mormolyca* sensu stricto was revised by Garay & Wirth (1959), and *Chrysocycnis* was revised by Sweet (1971). Species of *Maxillaria* section *Rufescens*, informally known as the "*Maxillaria rufescens* complex", constitute a taxonomically difficult group; the Mesoamerican species were revised by Carnevali *et al.* (2001), but many more are found in South America. There probably are a number of cryptic species, difficult to tell apart as

herbarium specimens, but distinguishable in life especially by their floral fragrances (Christenson 2002a, 2002b, and personal observation of the authors).

Mormolyca acutifolia (Lindl.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria acutifolia* Lindl., Edwards's Bot. Reg. 25: misc. 92. 1839.

Mormolyca aureoglobula (Christenson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria aureoglobula* Christenson, Orchids 71: 125-126. 2002.

Mormolyca chacoensis (Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria chacoensis* Dodson, Icon. Pl. Trop., II, 6: t. 531. 1989.

Mormolyca cleistogama (Brieger & Illg) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria cleistogama* Brieger & Illg, Trab. Congr. Nac. Bot. 26: 247. 1977.

Mormolyca dressleriana (Carnevali & J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria dressleriana* Carnevali & J. T. Atwood, Lindleyana 11: 29-31. 1996.

Mormolyca hedwigiae (Hamer & Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria hedwigiae* Hamer & Dodson, Icon. Pl. Trop. 8: t. 800. 1982.

Mormolyca lehmanii (Rolfe) M. A. Blanco, **comb. nov.**

Basionym: *Chrysocycnis lehmanii* Rolfe, Bull. Misc. Inform. Kew 1918: 235.

Mormolyca moralesii (Carnevali & J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria moralesii* Carnevali & J. T. Atwood, Lindleyana 11: 31-32. 1996.

Mormolyca pudica (Carnevali & Tapia-Muñoz) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria pudica* Carnevali & Tapia-Muñoz, Brittonia 53: 463-465. 2001. *Maxillaria rufescens* var. *minor* Fawcett & Rendle, J. Bot. 48: 108. 1910.

Mormolyca richii (Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria richii* Dodson, Orquideología 19: 81. 1994.

Mormolyca rufescens (Lindl.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria rufescens* Lindl., Edwards's Bot. Reg. 22: t. 1848. 1836.

Mormolyca sanantonioensis (Christenson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria sanantonioensis* Christenson, Orchids 71: 128. 2002.

Mormolyca schlimii (Linden & Rchb.f.) M. A. Blanco, **comb. nov.**

Basionym: *Chrysocycnis schlimii* Linden & Rchb.f., Bonplandia (Hannover) 2: 280. 1854.

Mormolyca sotoana (Carnevali & Gómez-Juárez) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria sotoana* Carnevali & Gómez-Juárez, Brittonia 53: 461-463.

Mormolyca suarezorum (Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria suarezorum* Dodson, Icon. Pl. Trop., II, 6: t. 547. 1989.

Mormolyca tenuibulba (Christenson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria tenuibulba* Christenson, Orchid Rev. 109: 41. 2001.

The other members of the genus constitute the paraphyletic *Mormolyca* sensu stricto: *M. aurorae* D. E. Benn. & Christenson, *M. gracilipes* (Schltr.) Garay & M. Wirth, *M. peruviana* C. Schweinf., *M. polyphylla* Garay & M. Wirth, *M. ringens* (Lindl.) Gentil, and *M. schweinfurthiana* Garay & M. Wirth. The obscure name *M. galeata* (Scheidw.) Garay & M. Wirth is not a true *Mormolyca*, but probably represents a species in the *Camaridium cucullatum* alliance.

NITIDOBULBON

Nitidobulbon Ojeda, Carnevali & G. A. Romero, ined.

Species of this group have oblong, shiny, smooth pseudobulbs with several (4-6) subtending foliaceous sheaths, and one or two apical leaves. The flowers are campanulate and the rigid perianth segments have abundant fibers. The column foot is very short, and the labellum is frequently reflexed at the tip. The labellar callus is ligulate and secretes an abundant,

resinous substance, but lacks glandular trichomes. The capsules have lateral dehiscence.

This small group was referred to as the “*Maxillaria nasuta* clade” in Whitten *et al.* (2007), and will be elevated to generic rank by Ojeda *et al.* (in press). It comprises the following three species currently in *Maxillaria*: *M. cymbidioides* Dodson, J. T. Atwood & Carnevali, *M. nasuta* Rchb.f., and *M. proboscidea* Rchb.f.

ORNITHIDIUM

Ornithidium Salisb. ex R. Br., Hort. Kew. ed. 2, 5: 210. 1813.

Type species: *Epidendrum coccineum* Jacq., = *Ornithidium coccineum* (Jacq.) Salisb. ex R. Br. *Adamanthus* Szlach., *Richardiana* 7: 30. 2007, *pro parte* (excl. type).

Laricorchis Szlach., *Richardiana* 7: 27. 2007.

Maxillaria sect. *Ornithidium* (Salisb. ex R. Br.) Christenson, *Richardiana* 2: 52. 2002.

Maxillaria sect. *Reflexae* Christenson, Proc. 16th World Orchid Conf. 285. 2002.

Maxillaria sect. *Siagonanthus* (Poepp. & Endl.) Christenson, Proc. 16th World Orchid Conf. 286. 2002.

Neo-urbania Fawc. & Rendle, *J. Bot.* 47: 125. 1909.

Siagonanthus Poepp. & Endl., Nov. Gen. Sp. Pl. (Poeppig & Endlicher) 1: 40. 1836.

Species of *Ornithidium* can be either sympodial (cespitose to long-rhizomatous) or monopodial; a few species have dimorphic growth (sympodial juvenile shoots and monopodial adult shoots). The stems and leaves of most species have an olive green coloration, which is persistent upon drying. When present, the ovoid pseudobulbs have a shiny, minutely cracked texture reminiscent of old varnish. The thick roots have a characteristic orangish coloration. Inflorescences are usually fascicled, and the pedicel and ovary invariably are much longer than the floral bract. The flowers are usually small, fleshy, campanulate or more often subglobose, and often produce nectar, and the perianth lacks fibers. Many species have yellow, orange, or red flowers. Capsules have apical dehiscence.

Ornithidium adendrobium (Rchb.f.) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Ponera adendrobium* Rchb.f., *Flora* 48: 278. 1964.

Ornithidium affine (Poepp. & Endl.) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Scaphyglottis affinis* Poepp. & Endl., Nov. Gen. Sp. Pl. 1: 59, t. 99A. 1836.

Ornithidium cachacoense (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Maxillaria cachacoensis* J. T. Atwood, *Selbyana* 24: 30-31. 2003.

Ornithidium canarense (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Maxillaria canarensis* J. T. Atwood, *Selbyana* 24: 31-32. 2003.

Ornithidium condorense (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Maxillaria condorensis* J. T. Atwood, *Selbyana* 24: 32-33. 2003.

Ornithidium fimbriatilobum (Carnevali & G. A. Romero) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Maxillaria fimbriatiliba* Carnevali & G. A. Romero, *Orchids Venezuela*, ed. 2, 3: 1138-1139. 2000.

Ornithidium gualaquizense (Dodson) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Maxillaria gualaquizensis* Dodson, *Orquideología* 19: 69. 1994.

Ornithidium haemathodes (Ruiz & Pav.) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Fernandezia haemathodes* Ruiz & Pav., *Syst. Veg. Fl. Peruv. Chil.* 1: 240. 1798.

Ornithidium lasallei (Foldats) M. A. Blanco & Ojeda, *comb. nov.*

Basionym: *Maxillaria lasallei* Foldats, *Contr. Ocas. Mus. Hist. Nat. Colegio de la Salle* 3: 2. 1961.

Ornithidium machinazense (D. E. Benn. & Christenson) M. A. Blanco, *comb. nov.*

Basionym: *Maxillaria machinazensis* D. E. Benn. & Christenson, *Lindleyana* 13: 71. 1998.

Ornithidium maldonadoense (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*

- Basionym: *Maxillaria maldonadoensis* J. T. Atwood, Selbyana 24: 33-35. 2003.
- Ornithidium minutiflorum*** (D. E. Benn. & Christenson) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria minutiflora* D. E. Benn. & Christenson, Icon. Orchid. Peruv.: t. 700. 2001.
- Ornithidium nicaraguense*** (Hamer & Garay) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Neo-urbania nicaraguensis* Hamer & Garay, Icon. Pl. Trop. 13: t. 1238. 1985.
- Ornithidium oxapampense*** (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria oxapampensis* J. T. Atwood, Selbyana 24: 36-37. 2003.
- Ornithidium patellum*** (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria patella* J. T. Atwood, Selbyana 24: 37-39. 2003.
- Ornithidium patulum*** (C. Schweinf.) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria patula* C. Schweinf., Fieldiana, Bot. 28: 197. 1951.
- Ornithidium pseudonubigenum*** (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria pseudonubigena* J. T. Atwood, Selbyana 24: 39-41. 2003.
- Ornithidium pustulosum*** (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria pustulosa* J. T. Atwood, Selbyana 24: 41-43. 2003.
- Ornithidium rauhii*** (D. E. Benn. & Christenson) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria rauhii* D. E. Benn. & Christenson, J. Orchideenfr. 12: 34. 2005.
- Ornithidium repens*** (L. O. Williams) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria repens* L. O. Williams, Amer. Orchid Soc. Bull. 10: 273. 1942.
- Ornithidium rigidum*** (Barb. Rodr.) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria rigida* Barb. Rodr., Gen. Spec. Orchid. 2: 206. 1881.
- Ornithidium scandens*** (D. E. Benn. & Christenson) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria scandens* D. E. Benn. & Christenson, Icon. Orchid. Peruv.: t. 707. 2001.
- Ornithidium scullianum*** (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria sculliana* J. T. Atwood, Selbyana 24: 1-3. 2003.
- Ornithidium sillareense*** (Dodson & Vásquez) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria sillarensis* Dodson & Vásquez, Icon. Pl. Trop., II, 3: pl. 261. 1989.
- Ornithidium simplex*** (J. T. Atwood) M. A. Blanco & Ojeda, *comb. nov.*
Basionym: *Maxillaria simplex* J. T. Atwood, Selbyana 24: 43. 2003.
- Other members of *Ornithidium* include *O. aggregatum* Rchb.f., *O. aureum* Poepp. & Endl., *O. breve* Schltr. (*Maxillaria palmensis* Dodson), *O. chrysocynooides* Schltr., *O. coccineum* (Jacq.) Salisb. ex R. Br., *O. conduplicatum* Ames & C. Schweinf., *O. croceorubens* Rchb.f., *O. distichum* Lindl., *O. fulgens* Rchb.f., *O. giganteum* Lindl., *O. hystrionicum* Rchb.f., *O. jamesonii* Rchb.f., *O. mapiriense* Kraenzl., *O. miniatum* Lindl., *O. multicaule* (Poepp. & Endl.) Rchb.f., *O. niveum* Lindl., *O. nubigenum* Rchb.f., *O. pendens* (Pabst) Senghas, *O. pendulum* (Poepp. & Endl.) Cogn., *O. pittieri* Ames, *O. purpleolabium* (D. E. Benn. & Christenson) Senghas, *O. quitense* Rchb.f., *O. ruberrimum* (Lindl.) Rchb.f., *O. sanaense* (D. E. Benn. & Christenson) Senghas, *O. semiscabrum* Lindl., *O. serrulatum* Lindl. (*M. alticola* C. Schweinf.), *O. sophronitis* Rchb.f., *O. squarrosum* Schltr., and *O. tonsoniae* (Soto Arenas) Senghas.

PITYPHYLLUM

Pityphyllum Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 162. 1920.
Type species (designated by Sweet, 1972: 205): *Pityphyllum antioquiense* Schltr.

Plants of *Pityphyllum* are minute, pendulous epiphytes, with long rhizome segments between the tiny pseudobulbs. The pseudobulbs are completely covered and fused

to a subtending sheath (tunica), and can have from one to 20 apical leaves, depending on the species. There is a pair of ligular projections at the apex of each leaf sheath, next to the abscission layer of the blade. The diminutive flowers are borne from the axils of rhizome bracts between the pseudobulbs. The column foot is virtually non-existent, and the capsules have apical dehiscence.

This small and distinctive Andean genus was revised by Sweet (1972) and recently expanded by Whitten *et al.* (2006) to accommodate *P. huancabambae* (Kraenzl.) Whitten and *P. saragurensis* (Dodson) Whitten, previously placed in *Maxillaria*. The other species are *P. amesianum* Schltr., *P. antioquiense* Schltr., *P. hirtzii* Dodson, *P. laricinum* (Kraenzl.) Schltr., and *P. pinoides* Sweet.

RHETINANTHA

Rhetinantha M. A. Blanco, **gen. nov.**

Type species: *Maxillaria acuminata* Lindl., = *Rhetinantha acuminata* (Lindl.) M. A. Blanco.

Sauvetrea Szlach., *Richardiana* 7: 28. 2007, *pro parte* (excl. type).

Plantae epiphyticae, rhizomatibus longis et pseudobulbis 1-4 foliis apicalibus vel plantae pendulae foliis equitantibus. Flores plerumque virides, nunquam late expansi, partibus perianthii rigidis acuminatis. Labella elobulata, secretionibus resinosis vel ceraceis. Fructus capsulares dehiscentiis lateralibus.

Plants of *Rhetinantha* are sub-caespitose to long rhizomatous; the pseudobulbs are often ridged, and have two to four apical leaves, and usually one or two subtending foliaceous sheaths. The inflorescences often arise from rhizome bracts a few shoots behind the most recent pseudobulb. The flowers are campanulate, with rigid, acuminate perianth parts with strong fibers, and a very short column foot. The labellum secretes a sticky, resinous substance in most species. The margins of the clinandrium are conspicuously ciliate, and the pollinarium stipe is long with involute margins. A few species have a pair of steldia projected downward from the apex of the clinandrium. The capsules have lateral dehiscence. *Rhetinantha witse-nioides* is highly modified and has pendent, monopodial shoots with ensiform, glaucous leaves.

ETYMOLOGY: From the Greek words “*rhetinos*”

(resin) and “*anthos*” (flower), in reference to the flowers of most species, which secrete resin on the labellum and occasionally on the petals.

This well defined group was treated as the “*Maxillaria acuminata* clade” by Whitten *et al.* (2007).

Rhetinantha aciantha (Rchb.f.) M. A. Blanco, **comb. nov.**
Basionym: *Maxillaria aciantha* Rchb.f., *Bot. Zeitung* (Berlin) 10: 858. 1852.

Rhetinantha acuminata (Lindl.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria acuminata* Lindl., *Pl. Hartw.* 155. 1845. *Sauvetrea acuminata* (Lindl.) Szlach., *Richardiana* 7: 29. 2006.

Rhetinantha cerifera (Barb. Rodr.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria cerifera* Barb. Rodr. *Gen. Spec. Orchid.* 1: 118. 1877.

Rhetinantha divaricata (Barb. Rodr.) M. A. Blanco, **comb. nov.**

Basionym: *Ornithidium divaricatum* Barb. Rodr., *Gen. Spec. Orchid.* 2: 209. 1881.

Rhetinantha encyclioides (J. T. Atwood & Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria encyclioides* J. T. Atwood & Dodson, *Orquideología* 20: 268. 1997.

Rhetinantha friedrichsthalii (Rchb.f.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria friedrichsthalii* Rchb.f., *Bot. Zeitung* (Berlin) 10: 858. 1852.

Rhetinantha mariaisabeliae (J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria mariaisabeliae* J. T. Atwood, *Selbyana* 7: 250. 1984.

Rhetinantha monacensis (Kraenzl.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria monacensis* Kraenzl., *Repert. Spec. Nov. Regni Veg.* 24: 49. 1927.

Rhetinantha neilii (Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria neilii* Dodson, *Orquideología* 19: 79. 1994.

Rhetinantha notylioglossa (Rchb.f.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria notylioglossa* Rchb.f., Bonplandia (Hannover) 2: 16. 1854.

Rhetinantha ophioidens (J. T. Atwood) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria ophioidens* J. T. Atwood, Selbyana 7: 248. 1984.

Rhetinantha pastorellii (D. E. Benn. & Christenson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria pastorellii* D. E. Benn. & Christenson, Lindleyana 13: 74. 1998. *Maxillaria unguiculata* D. E. Benn. & Christenson, Brittonia 47: 197. 1995, *nom. illeg.* (non Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 173. 1920).

Rhetinantha schistostele (Schltr.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria schistostele* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 303-304. 1923.

Rhetinantha scorpioidea (Kraenzl.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria scorpioidea* Kraenzl., Svensk. Vet. Akad. Handl. 46: 71. 1911.

Rhetinantha witsenioides (Schltr.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria witsenioides* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 175. 1920.

SAUVETREA

Sauvetrea Szlach., Richardiana 7: 28. 2007.

Type species: *Maxillaria alpestris* Lindl., = *Sauvetrea alpestris* (Lindl.) Szlach.

Maxillaria sect. *Trigonae* Christenson, Proc. 16th World Orchid Conf. 286. 2002.

Plants of *Sauvetrea* are caespitose to moderately long-rhizomatous. The unifoliate pseudobulbs are frequently ancipitous and are subtended by a pair of non-foliaceous bracts. The inflorescences arise from the base of the newly emerging pseudobulbs and have strongly ancipitous bracts. The column foot is short. The flowers have spreading perianth segments without strong fibers. Both the ovaries and the mature fruits are strongly trigonous. The labellum has a ligulate, sulcate

callus, and the midlobe is much longer than the lateral lobes. There are no secretions produced by the flowers. The capsules have lateral dehiscence.

Sauvetrea was polyphyletic as originally circumscribed by Szlachetko & Śmiszek (2007). We already indicated the species that do not belong in this clade (Whitten *et al.* 2007), and here we transfer some that do.

Sauvetrea bomboizensis (Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria bomboizensis* Dodson, Orquideología 19(3): 59-61. 1994.

Sauvetrea chicana (Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria chicana* Dodson, Orquideología 19(3): 61. 1994.

Sauvetrea cornuta (C. Schweinf.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria cornuta* C. Schweinf., Bot. Mus. Leaflet 11: 265. 1945.

Sauvetrea laevilabris (Lindl.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria laevilabris* Lindl., Pl. Hartw.: 155. 1845. Syn.: *Maxillaria piestopus* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 302. 1923, **syn. nov.**; *Maxillaria koehleri* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 9: 103. 1921, **syn. nov.**

Sauvetrea machupicchuensis (Christenson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria machupicchuensis* Christenson, Orchids 71: 718-719. 2002.

Sauvetrea napoensis (Dodson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria napoensis* Dodson, Icon. Pl. Trop., II, 6: t. 540. 1989.

Sauvetrea sessilis (Lindl.) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria sessilis* Lindl., Pl. Hartw. 155. 1843.

Sauvetrea trigona subsp. ***amaroensis*** (D. E. Benn. & Christenson) M. A. Blanco, **comb. nov.**

Basionym: *Maxillaria trigona* subsp. *amaroensis* D. E. Benn. & Christenson, Icon. Orchid. Peruv.: t. 708. 2001.

Other species in the genus include *S. alpestris*

(Lindl.) Szlach., *S. peruviana* (C. Schweinf.) Szlach., *S. trigona* (C. Schweinf.) Szlach., *S. uncarinata* (C. Schweinf.) Szlach., and *S. xantholeuca* (Schltr.) Szlach. However, *Sauvetea* needs a thorough taxonomic revision. The strange *Maxillaria grobyoides* Garay & Dunst. may belong in *Sauvetea*, but we prefer to wait until we have molecular data to confirm or reject this hypothesis.

TRIGONIDIUM

Trigonidium Lindl., Bot. Reg. 23: t. 1923. 1837.

Type species: *Trigonidium obtusum* Lindl.

Plants of *Trigonidium* are either caespitose or long-rhizomatous. The ridged pseudobulbs have one to four apical leaves and are subtended by non-foliaceous bracts. The inflorescences are erect, often long and wiry, and emerge from the most recent pseudobulbs. The flowers are erect and campanulate and lack a column foot. The sepals form a cup around the smaller petals and lip and are reflexed at the middle. The petals have characteristic shiny thickenings at the apex. The capsules have lateral dehiscence.

Trigonidium has been consistently recognized as a genus since its creation. No nomenclatural transfers are needed. A synoptical treatment of the genus is in progress (M. A. Blanco, unpublished manuscript).

ACKNOWLEDGEMENTS. Eric A. Christenson (BRIT) provided general discussions on taxonomy and data about the publication of his sections of *Maxillaria*. Gustavo Romero (AMES), Cassio van den Berg (HUEFS) and two anonymous reviewers provided suggestions for improving the manuscript. Funding was provided by the U.S. National Science Foundation (grant No. DEB-0234064) to N.H.W. and W.M.W., a FAPESP postdoctoral grant (01/08958-1) to R.B.S., a M.Sc. grant from CONACYT to I.O., KLARF fellowships from the Royal Botanic Garden, Kew, to M.A.B. (to study type material in European herbaria) and S.K. (a Prance Fellowship to study systematics of *Christensonella*), and a Furniss Foundation Ph.D. Fellowship from the American Orchid Society to M.A.B.

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