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New combinations in Aeridinae (Orchidaceae)

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Abstract

New combinations are made in the genera *Arachnis*, *Brachypeza*, *Dimorphorchis*, *Grosourdya*, *Phalaenopsis*, *Renanthera*, *Robiquetia*, *Taeniophyllum*, *Thrixspermum*, *Trachoma* and *Trichoglottis*. Two new subgenera are established in *Phalaenopsis* (subgen. *Ornithochilus* and *Hygrochilus*). These changes are proposed to begin aligning the genera recognized in subtribe Aeridinae with results of recent DNA analyses (published elsewhere).

Introduction

Few of the c. 70 subtribes currently recognised in Orchidaceae have caused as many difficulties in generic delimitation as Aeridinae. In the most recent overview, by Senghas (1986–1990), the subtribe comprises 100 genera (excluding the misplaced *Dunstervillea*, now treated in Oncidiinae) with an estimated 1260 species; 25 genera are monotypic. Since then, several small genera have been added, such as *India* A.N.Rao, *Samarorchis* Ormerod, *Eclecticus* P.O'Byrne and *Ophioglossella* Schuit. & Ormerod, while species number has increased to well over 1500. Previously, details of floral morphology have been utilised to distinguish genera in this group of monopodial orchids. Characters such as presence of a column-foot, number of pollinia, slits on pollinia and whether they are porate or entire, spur presence, shape and size of lobes and callosities of the lip, lip motility, length of the rostellum, shape of the stipe and others have been given weight in classification of Aeridinae. Almost every combination of these characters has prompted recognition of new genera without taking homoplasy into account, resulting in an unprecedented proliferation of small (often monospecific) genera without any consideration given to phylogenetic relationships.

DNA-based phylogenetic studies in Aeridinae published so far have either concentrated on particular genera (*Aerides*, Kocyan *et al*. 2008; *Holcoglossum*, Fan *et al*. 2009, Liu 2011; *Phalaenopsis*, Padolina *et al*. 2005, Yukawa *et al*. 2005, Tsai *et al*. 2010; *Vanda*, Gardiner *et al*. 2013) or, when broader in scope, suffered from a relatively limited taxon sampling (Topik *et al.* 2005, Carlsward *et al*. 2006, Kocyan *et al*. 2008). The first author has performed a molecular phylogenetic analysis based on a sampling of 198 species of Aeridinae, utilising DNA sequences of the following regions: plastid *matK*, *trnL-trnL-F* and *trnS-G* and ITS nrDNA; this is presented in and formed the basis of the generic treatment of Aeridinae in the forthcoming *Genera orchidacearum* vol. 6 (Pridgeon *et al*. 2014). This paper makes the new combinations necessitated by this treatment; more detailed discussions of the phylogenetic findings and their taxonomic implications will be published in Pridgeon *et al*. (2014) and elsewhere (A. Kocyan, unpubl.). Among the key insights provided by DNA analyses in this subtribe is that all floral characters previously used for generic delimitation are to a greater or lesser extent subject to homoplasy because these (mostly) floral features are likely to be strongly influenced by pollinator-mediated selection (Topik *et al*. 2005, Kocyan *et al.* 2008, Kocyan unpubl.). Taxa with similar floral morphology may be only distantly related (e.g. *Phalaenopsis* and *Paraphalaenopsis*), whereas others with highly divergent floral characters may be closely related (e.g. *Ascocentrum* and *Vanda* s.s.; Gardiner 2012, Gardiner *et al*. 2013).

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Taxonomy

ARACHNIS

Arachnis Blume (1825: 365). Type species: *Arachnis flos-aeris* (L.) Rchb.f.
Arachnanthe Blume (1849: 55). Type species: *Arachnanthe moschifera* (Blume) Blume
Armodorum Breda (1827, t. 6). Type species: *Armodorum distichum* Breda
Arhynchium Lindley & Paxton (1851: 142). Type species: *Arhynchium labrosum* Lindl. & Paxton
Esmeralda Reichenbach (1874: 38). Type species: *Esmeralda cathcartii* (Lindl.) Rchb.f.

Species of *Arachnis* s.s., *Esmeralda* and *A. labrosa* (Lindl. & Paxton) Rchb.f. (which has often been included in *Armodorum*) form a strongly supported clade. As these genera differ mainly in lip morphology, which putatively tends to be under selection pressure, we consider it preferable to unite them in a more broadly circumscribed *Arachnis*. On the other hand, a few species previously included in *Arachnis* based on similarities in lip morphology are not closely related to the type of the genus; they are here transferred to *Dimorphorchis*.

Arachnis senapatiana (Phukan & A.A.Mao) Kocyan & Schuit., ***comb. nov.***
Basionym: *Armodorum senapatianum* Phukan & Mao (2002: 299).

BRACHYPEZA

Brachypeza Garay (1972: 163). Type species: *Brachypeza archytas* (Ridl.) Garay (basionym: *Saccolabium archytas* Ridl.).

Pteroceras as previously circumscribed (Pedersen 1993) is clearly polyphyletic, with some species forming a strongly supported clade that includes *Brachypeza*, whereas the type of *Pteroceras*, *P. teres* (Blume) Holttum, falls in a clade with *Tuberolabium* and several other genera. The main morphological character distinguishing *Pteroceras* s.s. from *Brachypeza* is found in the rachis of the inflorescence: in *Pteroceras* flowers arise from sharply delimited, longitudinal cavities on the rachis, whereas there are no such depressions on the rachis of *Brachypeza* (Fig. 1A).

Brachypeza cladostachya (Hook.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Sarcochilus cladostachys* Hooker (1894: 35).
Homotypic synonyms: *Thrixspermum cladostachyum* (Hook.f.) Kuntze (1891: 682); *Pteroceras cladostachyum* (Hook.f.) Pedersen (1992: 387).
Heterotypic synonyms: *Sarcochilus tanyphyllus* Ridley (1893: 372); *Pteroceras tanyphyllum* (Ridl.) Holttum (1960: 271); *Sarcochilus pallidus* var. *celebicus* Schlechter (1911a: 203).

Brachypeza pallida (Blume) Kocyan & Schuit., ***comb. nov.***
Basionym: *Dendrocolla pallida* Blume (1825: 290).
Homotypic synonyms: *Aerides pallida* (Blume) Lindley (1833: 241), *nom. illeg.* (non Roxb.); *Sarcochilus pallidus* (Blume) Reichenbach (1861: 500); *Thrixspermum pallidum* (Blume) Reichenbach (1874: 122); *Pteroceras pallidum* (Blume) Holttum (1960: 270).
Heterotypic synonyms: *Sarcochilus caligaris* Ridley (1893: 372); *Pteroceras caligare* (Ridl.) Holttum (1960: 269).

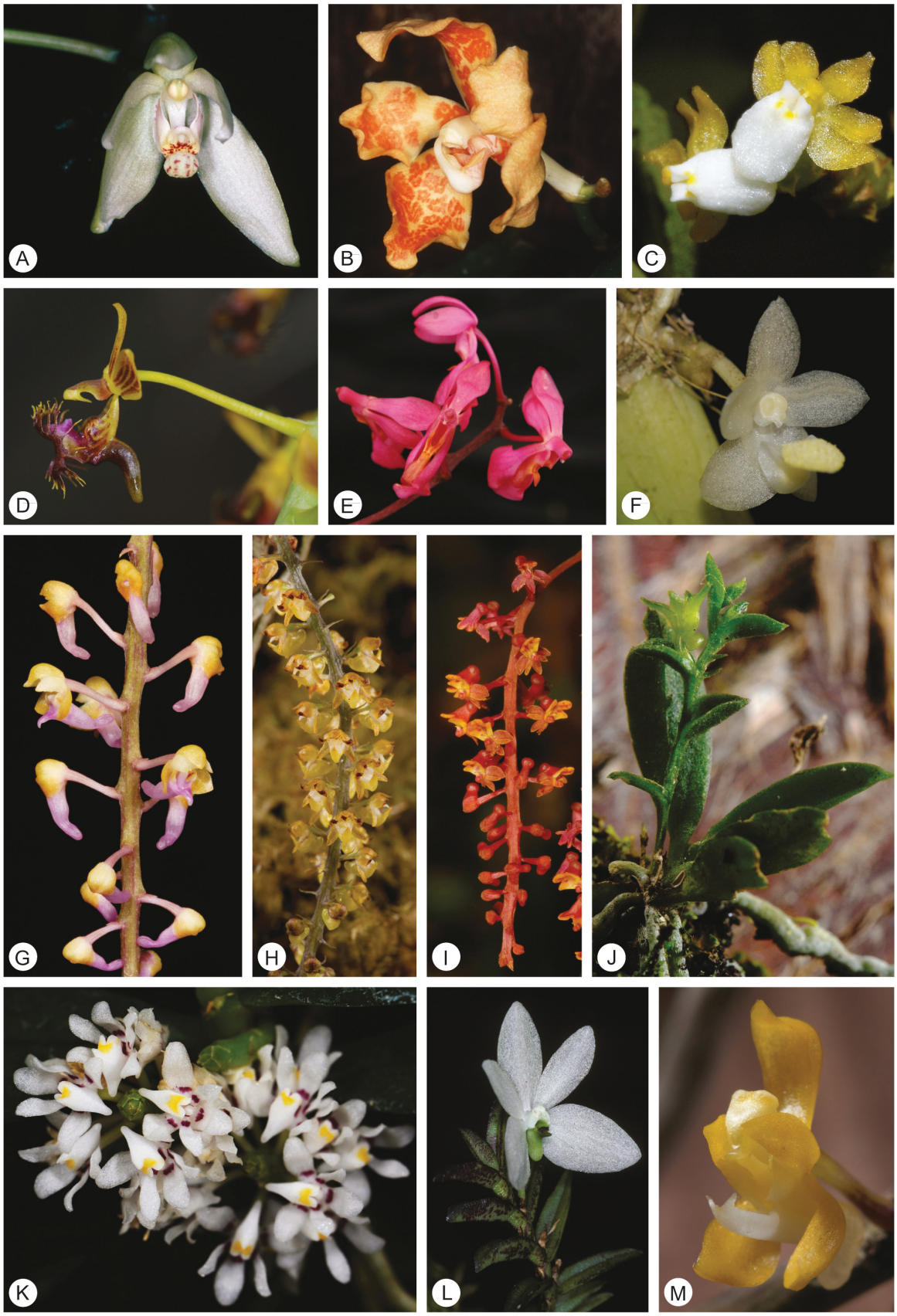

FIGURE 1. Selected flower images of the newly combined taxa to illustrate floral diversity among Aeridinae. A, *Brachypeza unguiculata*; B, *Dimorphorchis breviscapa*; C, *Grosourdya myosurus*; D, *Phalaenopsis difformis*; E, *Renanthera caloptera*; F, *Thrixspermum breviscapum*; G, *Robiquetia punctata*; H, *Robiquetia minimiflora*; I, *Renanthera porphyrodesme*; J, *Taeniophyllum javanicum*; K, *Trachoma phillipsii*; L, *Trichoglottis biglandulosa*; M, *Trichoglottis ventricularis*. Photographs by A. Kocyan (A, B, D, E, G–M), P. O'Byrne (C) and P.T. Ong (F).

Brachypeza semiteretifolia (H.A.Pedersen) Kocyan & Schuit., ***comb. nov.***
Basionym: *Pteroceras semiteretifolium* Pedersen (1992: 387).
Homotypic synonyms: *Sarcochilus uniflorus* Gagnepain (1933: 468), *nom. illeg.* (non Schltr.); *Pteroceras uniflorum* (Gagnep.) Tixier (1967: 960), *nom. illeg.*

Brachypeza simondiana (Gagnep.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Ornithochilus simondianus* Gagnepain (1950: 632).
Homotypic synonym: *Pteroceras simondianum* (Gagnep.) Averyanov (1988: 432).
Heterotypic synonyms: *Pteroceras insularum* Averyanov (1988: 426); *Thrixspermum insularum* (Aver.) Averyanov (1990: 723).

Brachypeza unguiculata (Lindl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Sarcochilus unguiculatus* Lindley (1840: 67).
Homotypic synonyms: *Thrixspermum unguiculatum* (Lindl.) Reichenbach (1868: 122); *Pteroceras unguiculatum* (Lindl.) Pedersen (1992: 388).
Heterotypic synonym: *Aerides diurna* Teijsmann & Binnendijk (1864: 19); *Phalaenopsis ruckeri* Reichenbach (1881: 562); *Sarcochilus aureus* Hooker (1891: 35); *Thrixspermum aureum* (Hook.f.) Kuntze (1891: 682); *Phalaenopsis fugax* Kränzlin (1893: 360); *Sarcochilus phalaenopsis* Schlechter (1911a: 203); *Pteroceras phalaenopsis* (Schltr.) Garay (1972: 194).

Note: The following taxa, currently treated as species of *Pteroceras*, differ in the rachis characters from the type of the genus and are probably more closely related to *Grosourdya* and *Brachypeza*. In their muricate-hirsute inflorescence, they agree with *Grosourdya*, whereas floral characters are more similar to *Brachypeza*. In the absence of DNA-based evidence we have decided not to transfer these species to either *Brachypeza* or *Grosourdya*: *Pteroceras asperatum* (Schltr.) P.F.Hunt, *P. hirsutum* (Hook.f.) Holttum, *P. indicum* Punekar, *P. johorense* (Holttum) Holttum, *P. monsooniae* Sasidh. & Sujanapal, *P. muluense* Schuit. & de Vogel, *P. muriculatum* (Rchb.f.) P.F.Hunt, *P. nabawanense* J.J.Wood & A.L.Lamb, *P. philippinense* (Ames) Garay, and *P. spathibrachiatum* (J.J.Sm.) Garay.

DIMORPHORCHIS
Dimorphorchis Rolfe (1919b: 149). Type species: *Dimorphorchis lowii* (Lindl.) Rolfe.
Lowianthus Beccari (1902: 531). Type species: *Lowianthus borneensis* Becc., nom. illeg.

The following three taxa were previously included in *Arachnis*, but they are much more closely related to *Dimorphorchis*. Given their similar flowers and, albeit weekly supported, sister group relationship to *D. rossii* Fowlie and *D. beccarii* in our analysis, we consider it preferable to include them in *Dimorphorchis* rather than to create one or even two new small genera to accommodate them. A proposal to conserve *Dimorphorchis* (Fig. 1B) against *Lowianthus* is in preparation (P.J. Cribb, pers. comm.).

Dimorphorchis beccarii (Rchb.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Arachnis beccarii* Reichenbach (1886: 343).
Homotypic synonyms: *Vandopsis beccarii* (Rchb.f.) Smith (1909a: 122).
Heterotypic synonym: *Vanda muelleri* Kraenzlin (1894: 461); *Vandopsis muelleri* (Kraenzl.) Schlechter (1911a: 196); *Arachnis muelleri* (Kraenzl.) Smith (1914b: 47).

Dimorphorchis beccarii var. ***imthurnii*** (Rolfe) Kocyan & Schuit., ***comb. nov.***
Basionym: *Stauropsis imthurnii* Rolfe (1917a: t. 8714)
Homotypic synonyms: *Arachnis imthurnii* (Rolfe) Williams (1937b: 58); *Arachnis beccarii* var. *imthurnii* (Rolfe) Tan (1974: 82); *Vandopsis imthurnii* (Rolfe) Hunt (1970: 98).

Dimorphorchis breviscapa (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Arachnis breviscapa* Smith (1912a: 74).
Homotypic synonyms: *Arachnanthe breviscapa* Smith (1909b: 48); *Vandopsis breviscapa* (J.J.Sm.) Schlechter (1911a: 195).

Heterotypic synonyms: *Vandopsis celebica* Schlechter (1911a: 195); *Arachnis celebica* (Schltr.) Smith (1912a: 74); *Dimorphorchis celebica* (Schltr.) Ormerod (2013: 35); *Vandopsis longicaulis* Schlechter (1913: 973); *Arachnis longicaulis* (Schltr.) Williams (1937a: 31); *Dimorphorchis longicaulis* (Schltr.) Ormerod (2013: 35); *Arachnis lyonii* Ames (1915: 221); *Dimorphorchis lyonii* (Ames) Ormerod (2013: 37); *Arachnis longicaulis* f. *flavescens* Valmayor & Tiu (1983: 16); *Dimorphorchis lyonii* f. *flavescens* (Valmayor & D.Tiu) Ormerod (2013: 37)

Note: We consider the differences between the taxa here listed in synonymy to be insignificant. However, Ormerod (2013) is of the opinion that *D. celebica*, *D. longicaulis* and *D. lyonii* are sufficiently distinct to be recognised at species level.

GROSOURDYA

Grosourdya Reichenbach (1864: 297). Type species: *Grosourdya elegans* Rchb.f.
Ascochilopsis Carr (1929: 21) Type species: *Ascochilopsis myosurus* (Ridl.) Car.
Ascochilus Ridley (1896: 374) Type species: *Ascochilus siamensis* Ridl.

In our analysis, *Grosourdya* (Fig. 1C) is paraphyletic unless the species of *Ascochilus*, *Ascochilopsis* and certain species of *Biermannia* (not including the type of the genus) are included in it. In this alliance, it is demonstrated again that floral characters previously used in taxonomy of this subtribe, such as the presence of a column foot, spur, or motile lip, are not reliable indicators of affinity or generic status. Species of *Grosourdya* are all small, short-stemmed plants with leaves arranged in a fan; wiry and stiff inflorescences are finely muricate, and their ephemeral flowers open in succession.

The rare Peninsular Malaysian taxa *Biermannia flava* (Carr) Garay, *B. laciniata* (Carr) Garay and *B. sarcanthoides* (Ridl.) Garay are misplaced in *Biermannia* on account of the inflorescence morphology as they lack the sharply delimited cavities on the rachis. However, they would probably be misplaced in *Grosourdya* as well, due to the abbreviated, glabrous inflorescences and narrow tepals. Carr may well have been correct in assigning them to *Chamaeanthus*. They differ from the type species of *Chamaeanthus*, *C. brachystachys* Schltr., mainly in the relatively shorter column-foot. As this is a variable character in several genera in Aeridinae, e.g. *Brachypeza*, *Grosourdya* and *Phalaenopsis*, probably not much weight should be attached to this difference.

Grosourdya bigibba (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Thrixspermum bigibbum* Schlechter (1911b: 58).
Homotypic synonyms: *Sarcochilus bigibbus* (Schltr.) Smith (1926: 63); *Biermannia bigibba* (Schltr.) Garay (1972: 162).

Grosourdya ciliata (Ridl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Dendrocolla ciliata* Ridley (1905: 192).
Homotypic synonyms: *Sarcochilus ciliatus* (Ridl.) Smith (1926: 63); *Pteroceras ciliatum* (Ridl.) Holttum (1960: 269); *Biermannia ciliata* (Ridl.) Garay (1972: 162).
Heterotypic synonym: *Thrixspermum blepharolobum* Schlechter (1911c: 56).

Grosourdya decipiens (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Sarcochilus decipiens* Smith (1920: 106).
Homotypic synonyms: *Pteroceras decipiens* (J.J.Sm.) Bakh.f. (1963: 69); *Biermannia decipiens* (J.J.Sm.) Garay (1972: 162).

Grosourdya fasciculata (Carr) Kocyan & Schuit., ***comb. nov.***
Basionym: *Sarcochilus fasciculatus* Carr (1929: 28).
Homotypic synonyms: *Pteroceras fasciculatum* (Carr) Holttum (1960:270); *Ascochilus fasciculatus* (Carr) Garay (1972: 161).

Grosourdya leytensis (Ames) Kocyan & Schuit., ***comb. nov.***
Basionym: *Sarcochilus leytensis* Ames (1915: 211).
Homotypic synonym: *Ascochilus leytensis* (Ames) Garay (1972: 161).

Grosourdya lobata (J.J.Wood & A.L.Lamb) Kocyan & Schuit., ***comb. nov.***
Basionym: *Ascochilopsis lobata* J.J.Wood & A.L.Lamb in Wood & Cribb (1994: 348).

Grosourdya mindanaensis (Ames) Kocyan & Schuit., ***comb. nov***.
Basionym: *Thrixspermum mindanaense* Ames (1913, publ. 1914: 436).
Homotypic synonyms: *Sarcochilus mindanaensis* (Ames) Ames (1915: 214); *Ascochilus mindanaensis* (Ames) Christenson (1985a: 151).
Heterotypic synonym: *Aerides calceolare* Teijsman & Binnendijk (1864: 19), *nom. illeg.* (non Buch.-Ham. ex Sm.); *Ascochilus calceolaris* Garay (1972: 161), *nom. superfl*.

Note: The taxonomy of this species and others related to *G. emarginata* (Blume) Rchb.f. is still uncertain and needs further study.

Grosourdya myosurus (Ridl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium myosurus* Ridley (1903: 84).
Homotypic synonym: *Ascochilopsis myosurus* (Ridl.) Carr (1929: 21).

Grosourdya nitida (Seidenf.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Ascochilus nitidus* Seidenfaden (1975: 91).

PHALAENOPSIS

Phalaenopsis Blume (1825: 294). Type species: *Phalaenopsis amabilis* (L.) Blume
Polychilos Breda (1827, t. s.n.). Type species: *Polychilos cornu-cervi* Breda
Doritis Lindley (1833: 178). Type species: *Doritis pulcherrima* Lindl.
Synadena Rafinesque (1836, publ. 1838: 9). Type species: *Synadena amabilis* (L.) Raf.
Stauroglottis Schauer (1843: 432).Type species: *Stauroglottis equestris* Schauer
Polystylus Hasskarl (1856: 3). Type species: *Polystylus cornu-cervi* (Breda) Hassk.
Stauritis Reichenbach (1862: 34). Type species: *Stauritis violacea* (Hort. Bogor ex Witte) Rchb.f.
Ornithochilus (Lindl.) Wall. ex Benth. in Bentham & Hooker (1883: 478) Type species: *Ornithochilus difformis* (Wall. ex Lindl.) Schltr.
Hygrochilus Pfitzer in Engler & Prantl (1897: 112). Type species: *Hygrochilus parishii* (Rchb.f.) Pfitzer
Kingiella Rolfe (1917b: 197). Type species: *Kingiella taenialis* (Lindl.) Rolfe
Grafia Hawkes (1966: 305). Type species: *Grafia parishii* (Rchb.f.) Hawkes
Kingidium Hunt (1970: 97). Type species: *Kingidium taeniale* (Lindl.) P.F.Hunt
Sedirea Garay & Sweet (1974: 149) Type species: *Sedirea japonica* (Linden & Rchb.f.) Garay & H.R.Sweet.
Lesliea Seidenfaden (1988: 190). Type species: *Lesliea mirabilis* Seidenf.
Nothodoritis Tsi (1989: 58). Type species: *Nothodoritis zhejiangensis* Z.H.Tsi
Grussia M.Wolff in Wolff & Gruss (2007: 165). Type species: *Grussia appendiculata* (Carr) M.Wolff

The phylogenetics of *Phalaenopsis* has been thoroughly investigated in DNA studies (Padolina et al. 2005; Yukawa et al. 2005; Tsai et al. 2010). On the basis of these, a tentative revised classification of *Phalaenopsis* was proposed by Cribb & Schuiteman (2012), but this did not consider how to handle relationships of other genera not previously thought to be close relatives of *Phalaenopsis*. Unexpectedly, a relatively major change is still required. Based on more recent molecular results, we here propose to merge three additional genera with *Phalaenopsis*: *Hygrochilus*, *Ornithochilus* and *Sedirea*. Until now, these were not considered to be particularly closely related to *Phalaenopsis* – especially given the striking differences in floral morphology, for example, in *Ornithochilus* – but the short stems and the relatively few, broad leaves appear to be synapomorphies. In addition, a central raised crest is often present on the lip, whereas the column is usually relatively long and slender and curved (Fig. 1D).

Phalaenopsis subgen. ***Ornithochilus*** (Lindl.) Kocyan & Schuit., ***comb. & stat. nov.***
Basionym: *Aerides* sect. *Ornithochilus* Lindley (1833: 242). Type species: *Aerides difforme* Wall. ex Lindl.

This subgenus comprises the following four taxa.

Phalaenopsis cacharensis (Barbhuiya, B.K.Dutta & Schuit.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Ornithochilus cacharensis* Barbhuiya, Dutta & Schuiteman (2012: 511).

Phalaenopsis difformis (Wall. ex Lindl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Aerides difformis* Wallich ex Lindley (1833: 242).
Homotypic synonyms: *Ornithochilus fuscus* Wallich ex Lindley (1833: 242), nom. nud.; *Ornithochilus difformis* (Wall. ex Lindl.) Schlechter (1919: 277); *Sarcochilus difformis* (Wall. ex Lindl.) Tang & Wang (1951: 92); *Trichoglottis difformis* (Wall. ex Lindl.) Ban & Huyen in Ban (1984: 206), nom. invalid.
Heterotypic synonyms: *Ornithochilus eublepharon* Hance (1884: 364). *Ornithochilus delavayi* Finet (1896: 43).

Phalaenopsis difformis (Wall. ex Lindl.) Kocyan & Schuit. var. ***kinabaluensis*** (J.J.Wood, A.L.Lamb & Shim) Kocyan & Schuit., ***comb. nov.***
Basionym: *Ornithochilus difformis* var. *kinabaluensis* J.J.Wood, A.L.Lamb & Shim in Chan, Lamb, Shim, & Wood (1994: 191).
Note: *Vanda doritoides* Guillaumin, which is undoubtedly closely related to *P. difformis*, is insufficiently known to us.

Phalaenopsis yingjiangensis (Z.H.Tsi) Kocyan & Schuit., ***comb. nov.***
Basionym: *Ornithochilus yingjiangensis* Tsi (1984: 479).

Phalaenopsis subgen. ***Hygrochilus*** (Pfitzer) Kocyan & Schuit., ***comb. & stat. nov.***
Basionym: *Hygrochilus* Pfitzer in Engler & Prantl (1897: 112). Type species: *Hygrochilus parishii* (Rchb.f.) Pfitzer (basionym: *Vanda parishii* Rchb.f.).

This subgenus comprises the following four taxa.

Phalaenopsis japonica (Rchb.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Aerides japonica* Reichenbach (1863: 210).
Homotypic synonym: *Sedirea japonica* (Rchb.f.) Garay & Sweet (1974: 149).

Phalaenopsis marriottiana (Rchb.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Vanda parishii* var. *marriottiana* Reichenbach (1880: 743) (as '*mariottiana*').
Homotypic synonyms: *Stauropsis marriottiana* (Rchb.f.) Rolfe (1919a: 97); *Hygrochilus parishii* var. *marriottianus* (Rchb.f.) Pradhan (1987: 11); *Hygrochilus marriottiana* (Rchb.f.) Christenson (2005: 343).
Heterotypic synonyms: *Vanda parishii* var. *purpurea* Brown (1883: 307); *Hygrochilus parishii* var. *purpureus* (N.E.Br.) Pradhan (1987: 11).

Phalaenopsis marriottiana (Rchb.f.) Kocyan & Schuit. var. ***parishii*** (Rchb.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Vanda parishii* Reichenbach (1868: 138).
Homotypic synonyms: *Hygrochilus parishii* (Rchb.f.) Pfitzer (1897: 112); *Vandopsis parishii* (Rchb.f.) Schlechter (1912a: 47); *Stauropsis parishii* (Rchb.f.) Rolfe (1919a: 97).

Phalaenopsis subparishii (Z.H.Tsi) Kocyan & Schuit., ***comb. nov.***
Basionym: *Hygrochilus subparishii* Tsi (1982: 267).
Homotypic synonym: *Sedirea subparishii* (Z.H.Tsi) Christenson (1985b: 518).

RENANTHERA

Renanthera Loureiro (1790: 516). Type species: *Renanthera coccinea* Lour.
Nephranthera Hasskarl (1842: 145). Type species: *Nephranthera matutina* (Poir.) Hassk.
Renantherella Ridley (1896: 354). Type species: *Renantherella histrionica* (Rchb.f.) Ridl.
Ascoglossum Schlechter (1913: 974) Type species: *Ascoglossum calopterum* (Rchb.f.) Schltr.
Porphyrodesme Schlechter (1913: 982) Type species: *Porphyrodesme papuana* Schltr.

Species of *Renanthera* form a strongly supported clade including those of *Renantherella*, *Ascoglossum* and *Porphyrodesme*. The bispecific genus *Renantherella* has often been included in *Renanthera*, whereas the monotypic genera *Ascoglossum* and *Porphyrodesme* are still widely recognised as distinct genera, albeit closely related to *Renanthera*. These four genera are distinguished by minor floral characters only (Fig. 1E, I). In our analysis *Renanthera* + *Renantherella* form a paraphyletic group, and we consider it preferable to recognise a somewhat more broadly defined genus *Renanthera* by including the three others in it.

Renanthera caloptera (Rchb.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium calopterum* Reichenbach (1882: 520).
Homotypic synonyms: *Ascoglossum calopterum* (Rchb.f.) Schlechter (1913: 975).
Heterotypic synonyms: *Cleisostoma cryptochilum* Mueller (1885: 92–93);
Saccolabium schleinitzianum Kraenzlin (1886: 440).
Saccolabium purpureum Smith (1900: 4). *Ascoglossum purpureum* (J.J.Sm.) Schlechter (1913: 975).

Renanthera porphyrodesme (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium porphyrodesme* Schltr. in Schumann & Lauterbach (1905: 229).
Homotypic synonym: *Porphyrodesme papuana* Schlechter (1913: 983).
Heterotypic synonyms: *Renanthera sarcanthoides* Smith (1917: 94); *Porphyrodesme sarcanthoides* (J.J.Sm.) Mahyar (1988: 418).

ROBIQUETIA

Robiquetia Gaudichaud-Beaupré (1829: 426). Type species: *Robiquetia ascendens* Gaudich.
Malleola J.J.Sm. & Schltr. in Schlechter (1913: 979). Type species: Not designated (Note: the lectotype proposed by Garay (1972), *Malleola sphingoides* J.J.Sm., is not valid as type because this species was not mentioned in the protologue.).
Abdominea Smith (1914d: 52) Type species: *Abdominea micrantha* J.J.Sm.
Megalotus Garay (1972: 184) Type species: *Megalotus bifidus* (Lindl.) Garay (basionym: *Saccolabium bifidum* Lindl.).
India Rao (1998, publ. 1999: 701) *India arunachalensis* A.N.Rao.
Samarorchis Ormerod (2008: 106) Type species: *Samarorchis sulitiana* Ormerod.

Our analysis indicates that *Robiquetia* (Fig. 1G, H) should be expanded to include *Abdominea*, *Malleola* and *Megalotus* because *Robiquetia* would otherwise be paraphyletic. Morphologically, these species share a pendent inflorescense with minute to small (up to c. 2 cm diam.), spurred flowers. We also include here *India* and *Samarorchis*, even though neither genus has been sampled for DNA analysis and hence uncertainty remains. Given their overall similarities with *Robiquetia*, we believe that both genera are best placed in this genus.

Robiquetia aberrans (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium aberrans* Schlechter (1911a: 202).
Homotypic synonym: *Malleola aberrans* (Schltr.) Smith (1920: 119).
Heterotypic synonyms: *Malleola baliensis* Smith (1920: 118); *Saccolabium macrantherum* Ridley (1926: 478); *Abdominea macranthera* (Ridl.) Carr (1932: 54); *Malleola macranthera* (Ridl.) Holttum (1947: 284); *Malleola altocarinata* Holttum (1947: 283).

Robiquetia andamanica (N.P.Balakr. & N.Bhargava) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola andamanica* Balakrishnan & Bhargava (1979: 317).

Robiquetia arunachalensis (A.N.Rao) Kocyan & Schuit., ***comb. nov.***
Basionym: *India arunachalensis* Rao (1998 publ. 1999: 701).

Robiquetia batakensis (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium batakense* Schlechter (1912b: 144).
Homotypic synonym: *Malleola batakensis* (Schltr.) Schlechter (1913: 981).

Robiquetia bifidus (Lindl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium bifidum* Lindley (1840: 3).
Homotypic synonyms: *Gastrochilus bifidus* (Lindl.) Kuntze (1891: 661); *Sarcanthus bifidus* (Lindl.) Ames (1915: 245); *Megalotus bifidus* (Lindl.) Garay (1972: 185).

Robiquetia brevisaccata (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola brevisaccata* Smith (1926b: 481).

Robiquetia cladophylax (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym*: Saccolabium cladophylax* Schltr. in Schumann & Lauterbach (1905: 226).
Homotypic synonym: *Malleola cladophylax* (Schltr.) J.J.Sm. & Schltr. in Schlechter (1913: 981).

Robiquetia amesiana Kocyan & Schuit., ***nom. nov.***
Replaced name: *Malleola constricta* Ames (1915: 234); not *Robiquetia constricta* (Rchb.f.) Garay.

Robiquetia culicifera (Ridl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium culiciferum* Ridley (1917: 109).
Homotypic synonym: *Malleola culicifera* (Ridl.) Garay (1972: 184).

Robiquetia eburnea (W.Suarez & Cootes) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola eburnea* Suarez & Cootes (2007a: 18).

Robiquetia flammea (Boos, Cootes & W.Suarez) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola flammea* Boos, Cootes & W.Suarez in Cootes, Suarez, Boos & Clements (2011: 51).

Robiquetia forbesii (Ridl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Sarcanthus forbesii* Ridley (1925: 118).
Homotypic synonym: *Malleola forbesii* (Ridl.) Smith (1927a: 57).

Robiquetia gautierensis (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Homotypic synonym: *Malleola gautierensis* Smith (1914c: 74).

Robiquetia glomerata (Rolfe) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium glomeratum* Rolfe (1913: 342).
Homotypic synonym: *Malleola glomerata* (Rolfe) Hunt (1970: 99).

Robiquetia honhoffii (Schuit. & A.Vogel) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola honhoffii* Schuiteman & Vogel (2007: 60).

Robiquetia inflata (Metusala & P.O'Byrne) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola inflata* Metusala & P.O'Byrne in O'Byrne (2013: 53).

Robiquetia insectifera (J.J.Smith) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium insectiferum* Smith (1905: 641).
Homotypic synonym: *Malleola insectifera* (J.J.Sm.) J.J.Sm. & Schltr. in Schlechter (1913: 981).

Robiquetia juliae (P.O'Byrne) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola juliae* O'Byrne (2007: 92).

Robiquetia kawakamii (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium kawakamii* Smith (1913:122).
Malleola kawakamii (J.J.Sm.) J.J.Sm. & Schltr. in Schlechter (1913: 981).

Robiquetia ligulata (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium witteanum* var. *ligulatum* Smith (1905: 640).
Homotypic synonym: *Malleola ligulata* (J.J.Sm.) Smith (1914a: t. 475).
Heterotypic synonym: *Malleola ligulata* (J.J.Sm.) J.J.Sm. var. *baliensis* Smith (1926a: 68).

Robiquetia lyonii (Ames) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola lyonii* Ames (1915: 235).

Robiquetia minimiflora (Hook.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium minimiflorum* Hooker (1890 (1894): 59).
Homotypic synonyms: *Gastrochilus minimiflorus* (Hook.f.) Kuntze (1891: 661); *Schoenorchis minimiflora* (Hook.f.) Ames (1915: 241); *Abdominea minimiflora* (Hook.f.) Smith (1917: 98).
Heterotypic synonyms: *Saccolabium cortinatum* Ridley (1898: 215); *Abdominea micrantha* Smith (1914d: 53); *Schoenorchis philippinensis* Ames (1915: 241).

Robiquetia palustris (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium palustre* Smith (1908: 35).
Homotypic synonym: *Malleola palustris* (J.J.Sm.) J.J.Sm. & Schltr. in Schlechter (1913: 981).

Robiquetia penangiana (Hook.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium penangianum* Hooker (1890: 57).
Homotypic synonyms: *Gastrochilus penangianus* (Hook.f.) Kuntze (1891: 661); *Malleola penangiana* (Hook.f.) J.J.Sm. & Schltr. in Schlechter (1913: 981).
Heterotypic synonym: *Saccolabium hendersonii* Carr (1929: 19).

Robiquetia punctata (J.J.Wood & A.L.Lamb) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola punctata* J.J.Wood & A.L.Lamb in Wood *et al.* (2011: 403).

Robiquetia reflexa (Boos & Cootes) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola reflexa* Boos & Cootes (2013: 6).

Robiquetia sanguinicors (P.O'Byrne & J.J.Verm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola sanguinicors* O'Byrne & Vermeulen (2005a: 150).

Robiquetia seidenfadenii (Christenson) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola seidenfadenii* Christenson (1998: 232).

Robiquetia serpentina (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium serpentinum* Smith (1904: 157).
Homotypic synonym: *Malleola serpentina* (J.J.Sm.) Schlechter (1913: 981).

Robiquetia sphingoides (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola sphingoides* Smith (1914a: t. 476).

Robiquetia steffensii (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium steffensii* Schlechter (1911a: 199).
Homotypic synonym: *Malleola steffensii* (Schltr.) J.J.Sm. & Schltr. in Schlechter (1913: 981).
Heterotypic synonyms: *Saccolabium steffensii* Schltr. var. *tomohonensis* Schlechter (1911a: 200); *Malleola steffensii* (Schltr.) J.J.Sm. & Schltr. var. *tomohonensis* (Schltr.) Schlechter (1925: 207).

Robiquetia sulitiana (Ormerod) Kocyan & Schuit., ***comb. nov.***
Basionym: *Samarorchis sulitiana* Ormerod (2008: 160).

Robiquetia sylvestris (Ridl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium sylvestre* Ridley (1911: 98).
Homotypic synonym: *Malleola sylvestris* (Ridl.) Garay (1972: 184).
Heterotypic synonym: *Malleola undulata* J.J.Sm. & Schltr. in Schlechter (1913: 981); *Saccolabium undulatum* Ridley (1900: 72), nom. illeg.

Robiquetia vietnamensis (Guillaumin) Kocyan & Schuit., ***comb. nov.***
Basionym: *Ascochilus vietnamensis* Guillaumin (1964a: 649). *Malleola vietnamensis* (Guillaumin) Guillaumin (1964b: 268).
Heterotypic synonym: *Malleola dentifera* Smith (1927b: 191), not *Robiquetia dentifera* J.J.Sm.

Robiquetia wariana (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Malleola wariana* Schlechter (1913: 982).

Robiquetia witteana (Rchb.f.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium witteanum* Reichenbach (1883: 618).
Homotypic synonym: *Malleola witteana* (Rchb.f.) J.J.Sm. & Schltr. in Schlechter (1913: 981).
Heterotypic synonyms: *Saccolabium kinabaluense* Rolfe in Gibbs (1914: 158); *Malleola kinabaluensis* Ames & Schweinfurth (1920: 225).

TAENIOPHYLLUM

Taeniophyllum Blume. Type species: *Taeniophyllum obtusum* Blume (1825: 355).
Alwisia Thwaites ex Lindley (1858, publ. 1859: 42). Type species: *Alwisia minuta* Thwaites ex Lindl.
Cryptorchis Makino (1893: 118), nom. invalid. Type species: *Cryptorchis aphylla* Makino.
Geissanthera Schlechter (1905: 231) Type species: *Geissanthera papuana* Schltr.
Microtatorchis Schlechter (1905: 224) Type species: *Microtatorchis perpusilla* Schltr.
Ankylocheilos Summerhayes (1943: 168). Type species: *Ankylocheilos coxii* Summerh.

Taeniophyllum species are small, leafless orchids with their pollinia divided into four equal bodies. In contrast, although also small and inconspicuous and with similar flowers, *Microtatorchis* species usually carry leaves and have two instead of four pollinia. Molecular analysis reveals that *Microtatorchis* is nested within *Taeniophyllum* (Kocyan in prep.). In addition, we can demonstrate that the leaf-bearing state of *Microtatorchis* has evolved twice indepently from the leafless condition in *Taeniophyllum*. Both genera are largely undercollected, and apart from the type collection many species are otherwise unknown; many were collected and described by Schlechter (1911–1914). Although we were able to analyse only a small fraction of the described species in this group, our results strongly support *Microtatorchis* being included in *Taeniophyllum*.

Below we first list the new combinations and then enumerate the *Microtatorchis* species that had already been included in *Taeniophyllum*. Hence, the last species do not require new combinations. By listing here all species treated as *Microtatorchis* we aim to facilitate future work in *Taeniophyllum* (Fig. 1J).

Taeniophyllum acsmithii Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis smithii* Kores (1989: 205); not *T. smithii* Kores & L.Jonss. in Kores (1989: 211).
Note: Named after A.C. Smith, who collected the type.

Taeniophyllum acuminatum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis acuminata* Schlechter (1913: 1004).

Taeniophyllum alatum (Ridl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis alata* Ridley (1916: 205).

Taeniophyllum amplebracteatum Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis bracteata* Schlechter (1913: 1007); not *T. bracteatum* Williams (1938a: 168).

Taeniophyllum brachyceras (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis brachyceras* Schlechter (1913: 1003).

Taeniophyllum bryoides (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis bryoides* Schlechter (1913: 1007).

Taeniophyllum carinatum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis carinata* Schlechter (1913: 1004).

Taeniophyllum ceratostylis (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis ceratostylis* Schlechter (1913: 1001).

Taeniophyllum chaetophorum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis chaetophora* Schlechter (1913: 1008).

Taeniophyllum clavicalcaratum Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis clavicalcarata* Smith (1929: 498).

Taeniophyllum clementsii (D.L.Jones & B.Gray) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis clementsii* Jones & Gray (2006: 201).

Taeniophyllum collinum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis collina* Schlechter (1913: 1002).

Taeniophyllum erosulum (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis erosula* Smith (1934: 211).

Taeniophyllum finisterrae (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis finisterrae* Schlechter (1913: 1005).

Taeniophyllum flaccidum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis flaccida* Schlechter (1913: 1006).

Taeniophyllum govidjoae (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis govidjoae* Schlechter (1913: 1006).

Taeniophyllum iboetii (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis iboetii* Smith (1945: 698).

Taeniophyllum javanicum (J.J.Sm.) Kocyan & Schuit. ***comb. nov.***
Basionym: *Microtatorchis javanica* Smith (1918: 115).
Heterotypic synonym: *Microtatorchis kaniensis* Schlechter (1913: 1000)

Taeniophyllum lamii (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis lamii* Smith (1929: 500).

Taeniophyllum laxum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis laxa* Schlechter (1919b: 130).

Taeniophyllum leeuwenii Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis doctersii* Smith (1935: 77); not *T. doctersii* Smith (1921: 329).

Note: Named after Dr. W. M. Docters van Leeuwen, who collected the type.

Taeniophyllum longicaule Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis triloba* Smith (1929: 499); not *T. trilobum* Schlechter (1911–1914: 1024).

Taeniophyllum luteum Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis flava* Smith (1935: 76); not *T. flavum* Dockrill (1960: 7).

Taeniophyllum minusculum Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis perpusilla* Schltr. in Schumann & Lauterbach (1905: 224); not *T. perpusillum* Guillaumin & Tixier in Guillaumin (1961: 435).

Taeniophyllum mirum-labellum Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis potamophila* Schlechter (1913: 999); not *T. potamophilum* Schlechter (1911: 210, as '*potamophylla*').

Taeniophyllum multiflorum (Ridl.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis multiflora* Ridley (1916: 205).
Heterotypic synonyms: *Microtatorchis longissima* Mansfeld (1929: 465); *Microtatorchis wilhelminae* Royen (1979: 789).

Taeniophyllum muriculatum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis muriculata* Schlechter (1913: 1002).

Taeniophyllum musciforme (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis musciformis* Schlechter (1913: 1002).

Taeniophyllum neotorricellense Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis torricellensis* Schlechter (1913: 1003); not *T. torricellense* Schltr. in Schumann & Lauterbach (1905: 223).

Taeniophyllum occultans (Schuit. & de Vogel) Kocyan & Schuit., ***comb. nov.***
Microtatorchis occultans Schuiteman & de Vogel (2012 (publ. 2011) : 11).

Taeniophyllum oreophilum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis oreophila* Schlechter (1906a: 89).
Heterotypic synonym: *Taeniophyllum balansae* Kraenzlin (1928: 142).

Taeniophyllum papillosum (J.J.Sm.) Kocyan & Schuit., comb.nov.
Basionym: *Microtatorchis papillosa* Smith (1918: 117).

Taeniophyllum platyrhachis (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis platyrhachis* Schlechter (1913: 1000).

Taeniophyllum podochiloides (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis podochiloides* Smith (1929: 501).

Taeniophyllum pterophorum (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis pterophora* Schlechter (1913: 1005).

Taeniophyllum rhombeum Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis rhomboglossa* Schlechter (1913: 1000); not *T. rhomboglossum* Schlechter (1906b: 51).

Taeniophyllum rudolfii Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis schlechteri* Garay (1972: 187); not *T. schlechteri* Mansfeld (1930: 93).
Homotypic synonym: Microtatorchis fasciola Schlechter (1906a: 88), nom. illeg.

Note: Named for Rudolf Schlechter.

Taeniophyllum rudolfii var. ***productilis*** (N.Hallé) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis schlechteri* var. *productilis* Hallé (1977: 393).

Taeniophyllum samoense (Schltr.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis samoensis* Schlechter (1911b: 111).

Taeniophyllum steenisii (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis steenisii* Smith (1931: 250).

Taeniophyllum sulawesiense Kocyan & Schuit., ***nom. nov.***
Replaced name: *Microtatorchis celebica* Schlechter (1911a: 208); not *T. celebicum* Rolfe (1899: 131).

Taeniophyllum taenioides (P.O'Byrne) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis taenioides* O'Byrne (1998: 47).

Taeniophyllum terrestre (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis terrestris* Smith (1929: 500).

Taeniophyllum triangulipetalum (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Microtatorchis triangulipetala* Smith (1935: 78).

The species listed below have already been included in *Taeniophyllum*.

Taeniophyllum bracteatum Williams (1938a: 168).
Homotypic synonym: *Microtatorchis aristata* Garay (1972: 187).

Taeniophyllum compactum Ames (1908: 247).
Basionym: *Microtatorchis compacta* (Ames) Schlechter (1911: 209).
Heterotypic synonym: *Microtatorchis taiwanianum* Ying (1977: 248).

Taeniophyllum hosokawae (Fukuy.) Williams (1939: 147).
Basionym: *Microtatorchis hosokawae* Fukuyama (1937: 903).
Homotypic synonym: *Geissanthera hosokawae* (Fukuy.) Hawkes (1952: 9).

Taeniophyllum paife Drake (1886: 311).
Basionym: *Microtatorchis paife* (Drake) Garay (1972: 187).

Taeniophyllum papuanum (Schltr.) Williams (1938a: 167).
Basionym: *Microtatorchis papuana* (Schltr.) Schlechter (1911b: 112).
Homotypic synonym: *Geissanthera papuana* Schltr. in Schumann & Lauterbach (1905: 232).

Taeniophyllum tubulosum (J.J.Sm.) Williams (1938a: 167).
Basionym: *Microtatorchis tubulosa* (J.J.Sm.) Schlechter (1911b: 112).
Homotypic synonym: *Geissanthera tubulosa* Smith (1908: 24).

THRIXSPERMUM

Thrixspermum Loureiro (1790: 519). Type species: *Thrixspermum centipeda* Lour.
Dendrocolla Blume (1825: 286). Type species: *Dendrocolla hystrix* Blume.
Orsidice Reichenbach (1854: 93). Type species: Not designated.
Cylindrochilus Thwaites (1861: 307). Type species: *Cylindrochilus pulchellus* Thwaites.
Ridleya (Hook.f.) Pfitzer (1900: 16). Type species: *Ridleya notabilis* (Hook.f.) Pfitzer.
Cordiglottis Smith (1922: 95) Type species: *Cordiglottis westenenkii* J.J.Sm.
Cheirorchis Carr (1932: 40) Type species: *Cheirorchis breviscapa* Carr.
Thylacis Gagnepain (1932: 599). Type species: Not designated.

Cordiglottis was separated from *Thrixspermum* based on its 'non-saccate lip, long bent column, the nearly equal pollinia and the large stigma' (Smith 1922) and terete or laterally flattened leaves. However, the discovery of new *Cordiglottis* species made differences in floral characters appear less reliable; in addition, several *Thrixspermum* species with terete leaves are now known. Hence, a distinction based on morphological characters is difficult to maintain. Moreover, our molecular systematic studies found *Cordiglottis* deeply nested in *Thrixspermum*. With our current knowledge of the genus, *Cordiglottis* cannot be kept separate unless *Thrixspermum* is split into several smaller genera. We prefer, however, a more broadly circumscribed *Thrixspermum* (Fig. 1F). All species have ephemeral flowers, often lasting only a few hours.

Thrixspermum breviscapum (Carr) Kocyan & Schuit., ***comb. nov.***
Basionym: *Cheirorchis breviscapa* Carr (1932: 41).
Homotypic synonym: *Cordiglottis breviscapa* (Carr) Garay (1972: 176).

Thrixspermum longipedicellatum (Joongku Lee, T.B.Tran & R.K.Choudhary) Kocyan & Schuit., ***comb. nov.***
Basionym: *Cordiglottis longipedicellata* Lee, Tran & Choudhary (2013: 95).

Thrixspermum majus (Carr) Kocyan & Schuit., ***comb. nov.***
Basionym: *Cheirorchis major* Carr (1932: 43).
Homotypic synonym: *Cordiglottis major* (Carr) Garay (1972: 176).

Thrixspermum pulverulentum (Carr) Kocyan & Schuit., ***comb. nov.***
Basionym: *Cheirorchis pulverulenta* Carr (1932: 45).
Homotypic synonym: *Cordiglottis pulverulenta* (Carr) Garay (1972: 176).

Thrixspermum westenenkii (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Cordiglottis westenenkii* Smith (1922: 95)

TRACHOMA

Trachoma Garay (1972: 207). Type species: *Trachoma rhopalorhachis* (Rchb.f.) Garay.

Trachoma (Fig. 1K) is characterised by abbreviated, swollen inflorescenes that carry successive clusters of one to a few ephemeral flowers. A column foot is lacking. Flowers of *Trachoma* are superficially similar to those of *Tuberolabium*, and the two genera have been confused, although *Tuberolabium* differs in several respects. *Tuberolabium* has elongated, pendent inflorescences; flowers last up to several weeks, and individual flowers mostly possess a prominent column foot. Based on these slight differences Wood (1990) united *Tuberolabium* with *Trachoma* but placed those *Tuberolabium* species with a column foot in *Parapteroceras* Aver. in Averyanov & Huyen (1990: 723). Molecular systematic studies show a clear distinction between *Trachoma* and *Tuberolabium*. We therefore accept *Trachoma* and consider *Parapteroceras* to be a synonym of *Tuberolabium*.

Trachoma binchinae (P.O'Byrne & J.J.Verm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Tuberolabium binchinae* O'Byrne & Vermeulen (2005b: 75).

Trachoma candida (P.O'Byrne) Kocyan & Schuit., ***comb. nov.***
Basionym: *Tuberolabium candidum* O'Byrne (2001: 58).

Trachoma gamma (P.O'Byrne & J.J.Verm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Tuberolabium gamma* O'Byrne & Vermeulen (2007: 274).

Trachoma latriniforme (P.O'Byrne & J.J.Verm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Tuberolabium latriniforme* O'Byrne & Vermeulen (2002: 65).

Trachoma minuta (W.Suarez) Kocyan & Schuit., ***comb. nov.***
Basionym: *Tuberolabium minutum* Suarez (2011: 53).

Trachoma phillipsii (Choltco) Kocyan & Schuit., ***comb. nov.***
Basionym: *Tuberolabium phillipsii* Choltco (2007: 220).

Trachoma rumphii (J.J.Sm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Saccolabium rumphii* Smith (1914b: 44).
Homotypic synonym: *Tuberolabium rumphii* (J.J.Sm.) Wood (1990: 482).

Trachoma sinapicolor (P.O'Byrne & J.J.Verm.) Kocyan & Schuit., ***comb. nov.***
Basionym: *Tuberolabium sinapicolor* O'Byrne & Vermeulen (2007: 280).

The species enumerated below have already been transferred to *Trachoma*; they are listed here to facilitate future studies of this genus.

Trachoma brevirhachis (L.O.Williams) Garay (1972: 208).
Basionym: *Saccolabium brevirhachis* Williams (1938b: 109).
Homotypic synonym: *Tuberolabium brevirhachis* (L.O.Williams) Wood (1990: 481).

Trachoma celebicum (Schltr.) Garay (1972: 208).
Basionym: *Saccolabium celebicum* Schlechter (1911: 198).
Homotypic synonym: *Tuberolabium celebicum* (Schltr.) Wood (1990: 481).

Trachoma coarctatum (King & Pantl.) Garay (1972: 208).
Basionym: *Saccolabium coarctatum* King & Pantling (1897: 592).
Homotypic synonym: *Tuberolabium coarctatum* (King & Pantl.) Wood (1990: 481).

Trachoma guamense (Ames) Garay (1972: 208).
Basionym: *Saccolabium guamense* Ames (1914: 15).
Homotypic synonym: *Tuberolabium guamense* (Ames) Wood (1990: 482).

Trachoma papuanum (Schltr.) M.A.Clem., J.J.Wood & D.L.Jones in Clements (1989: 145).
Basionym: *Saccolabium papuanum* Schlechter (1913: 978).
Homotypic synonyms: *Tuberolabium papuanum* (Schltr.) J.J.Wood in Lewis & Cribb (1989: 150); *Parapteroceras papuanum* (Schltr.) Szlachetko (2003: 67).
Heterotypic synonyms: *Sarcochilus societatis* Moore (1933: 24); *Trachoma societatis* (J.W.Moore) Hallé (1980: 1481); *Saccolabium subluteum* Rupp (1953: 1); *Trachoma subluteum* (Rupp) Garay (1972: 208).

Trachoma rhopalorrhachis (Rchb.f.) Garay (1972: 208).
Basionym: *Dendrocolla rhopalorrhachis* Reichenbach (1857: 40).
Homotypic synonyms: *Sarcochilus rhopalorrhachis* (Rchb.f.) Reichenbach (1863: 500); *Thrixspermum rhopalorrhachis* (Rchb.f.) Reichenbach (1868: 121); *Saccolabium rhopalorrhachis* (Rchb.f.) Smith (1905: 644).

Heterotypic synonyms: *Tuberolabium rhopalorrhachis* (Rchb.f.) Wood (1990: 482); *Sarcochilus brachyglottis* Hooker (1890: 34); *Thrixspermum brachyglottis* (Hook.f.) Kuntze (1891: 682); *Thrixspermum brachyglottis* (Hook.f.) Ridley (1907: 182); *Dendrocolla brachyglottis* (Hook.f.) Ridley (1924: 189).

Trachoma sarcochiloides (Schltr.) Suarez & Cootes (2007b: 20).
Basionym: *Saccolabium sarcochiloides* Schlechter (1911e: 61).
Homotypic synonym: *Tuberolabium sarcochiloides* (Schltr.) Garay (1972: 210).
Heterotypic synonyms: *Saccolabium loheri* Ames (1915: 228); *Saccolabium epichysiochilum* Kraenzlin (1916: 63).

Trachoma speciosum D.L.Jones, B.Gray , M.A.Clem. & J.J.Wood in Clements (1989: 145).
Homotypic synonyms: *Tuberolabium speciosum* (D.L.Jones, B.Gray , M.A.Clem. & J.J.Wood) Wood (1990: 482); *Parapteroceras speciosum* (D.L.Jones, B.Gray, M.A.Clem. & J.J.Wood) Szlachetko (2003: 67).

Trachoma stellatum M.A.Clem., D.L.Jones, B.Gray & J.J.Wood in Clements (1989: 146).
Homotypic synonym: *Tuberolabium stellatum* (M.A.Clem., D.L.Jones, B.Gray & J.J.Wood.) Wood (1990: 482).

TRICHOGLOTTIS

Trichoglottis Blume (1825: 359). Type species: *Trichoglottis retusa*.
Ceratochilus Blume (1825: 358) Type species: *Ceratochilus biglandulosus* Blume.
Synptera Llanos (1851: 98). Type species: *Synptera subviolacea* Llanos.
Stauropsis Reichenbach (1860: 117). Type species: *Stauropsis philippinensis* (Lindl.) Rchb.f.
Staurochilus Ridley (1896: 351). Type species: *Staurochilus fasciatus* (Rchb.f.) Ridl.
Sarothrochilus Schlechter (1906b: 50). Type species: *Sarothrochilus dawsonianus* (Rchb.f.) Schltr.
Ventricularia Garay (1972: 211) Type species: *Ventricularia tenuicaulis* (Hook.f.) Garay.

Molecular phylogenetic studies indicate that the generic bounderies of *Trichoglottis* (Fig. 1L, M) should be altered (Topik *et al.* 2005, Kocyan in prep.). We propose to include the small genera *Ceratochilus* and *Ventricularia*, and it has become clear that the disputed genus *Staurochilus* is part of *Trichoglottis*. *Ceratochilus* has never before been considered to be closely related to *Trichoglottis*. However, in our analysis it is sister to *T. pusilla* (Teijsm. & Binn.) Reichenbach (1856: 325) with strong bootstrap support. If *Ceratochilus* is excluded from *Trichoglottis* then *T. pusilla* should be excluded as well. We consider this unwarranted. *Ventricularia* is similar to *Trichoglottis*, differing only in some floral details. It is not surprising to find that it is nested within *Trichoglottis. Staurochilus* was previously separated from *Trichoglottis* by the presence of mostly strap-shaped leaves and elongate, racemose or paniculate inflorescences with many flowers opening at the same time (e.g. Seidenfaden 1988) whereas others (e.g. Garay 1972) did not distinguish the two genera. In our analysis *Staurochilus* emerges as a polyphyletic group nested within *Trichoglottis*.

Trichoglottis biglandulosa (Blume) Kocyan & Schuit., ***comb. nov.*** Basionym: *Ceratochilus biglandulosus* Blume (1825: 358).

Trichoglottis borneensis (J.J.Wood) Kocyan & Schuit., ***comb. nov.*** Basionym: *Ventricularia borneensis* Wood (1998: 175).

Trichoglottis ventricularis Kocyan & Schuit., ***nom. nov.***
Replaced name: *Saccolabium tenuicaule* Hooker (1890: 64).
Homotypic synonyms: *Gastrochilus tenuicaulis* (Hook.f.) Kuntze (1891: 661); *Uncifera tenuicaulis* (Hook.f.) Holttum (1947: 292); *Ventricularia tenuicaulis* (Hook.f.) Garay (1972: 211), not *Trichoglottis tenuicaulis* (King & Pantl.) Smith (1912b: 109).

TUBEROLABIUM

Tuberolabium Yamamoto (1924: 209). Type species: *Tuberolabium kotoense* Yamam.
Parapteroceras Averyanov (1990: 723). Type species: *Parapteroceras elobe* (Seidenf.) Aver.

Tuberolabium was established in 1924 by Yamamoto, but the same author moved it two years later to *Saccolabium* (Yamamoto 1926). Garay (1972) then re-instated *Tuberolabium*. The taxonomic history of *Tuberolabium* has been confused, in particular with respect to the genus *Trachoma*. To distinguish those species with a column foot, *Parapteroceras* has been proposed (Averyanov & Huyen 1990, Wood 1990). However, the results of our molecular work show that *Tuberolabium* and *Trachoma* are distinct (unless much wider generic boundaries are drawn), whereas *Parapteroceras* should be subsumed in the former. In *Tuberolabium* no formal recombinations are needed because all species that we believe belong to the genus already have names under *Tuberolabium*. In order to clarify = boundaries between *Trachoma* and *Tuberolabium* we here list all species we consider to belong in the latter.

Tuberolabium carnosum Seidenfaden (1988: 327).
Homotypic synonym: *Parapteroceras carnosum* (Seidenf.) Aver. in Averyanov & Huyen (1990: 723).

Tuberolabium elobe (Seidenf.) Seidenfaden (1988: 327).
Basionym: *Pteroceras elobe* Seidenfaden (1969: 149).
Homotypic synonym: *Parapteroceras elobe* (Seidenf.) Aver. in Averyanov & Huyen (1990: 723).

Tuberolabium erosulum (J.J.Sm.) Garay (1972: 210).
Basionym: *Saccolabium erosulum* Smith (1925: 13).
Homotypic synonym: *Parapteroceras erosulum* (J.J.Sm.) Wood (1990: 485).

Tuberolabium escritorii (Ames) Garay (1972: 210).
Basionym: *Saccolabium escritorii* Ames (1915: 227).
Homotypic synonym: *Parapteroceras escritorii* (Ames) Wood (1990: 485).

Tuberolabium kotoense Yamamoto (1924: 209).
Homotypic synonym: *Saccolabium kotoense* (Yamam.) Yamamoto (1926: 6).

Tuberolabium odoratissimum (J.J.Sm.) Garay (1972: 210).
Basionym: *Saccolabium odoratissimum* Smith (1905: 645).
Homotypic synonym: *Parapteroceras odoratissimum* (J.J.Sm.) Wood (1990: 485).

Tuberolabium pendulum O'Byrne & Vermeulen (2007: 277).

Tuberolabium quisumbingii (L.O.Williams) Christenson (1992: 92).
Basionym: *Saccolabium quisumbingii* Williams (1938b: 110).
Homotypic synonym: *Parapteroceras quisumbingii* (L.O.Williams) Wood (1990: 485).
Heterotypic synonym: *Tuberolabium quisumbingii* var. *xanthum* Choltco (2007: 221).

Tuberolabium woodii Choltco (2006: 924).

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