

REVISIONS IN COELOGYNINAE (ORCHIDACEAE) III* THE GENUS PHOLIDOTA

E.F. DE VOGEL

Rijksherbarium, Leiden, The Netherlands

Drawings by J.J. Vermeulen

SUMMARY

This article presents a taxonomic revision of the genus *Pholidota* (9 sections, 29 species, 7 varieties). *Acanthoglossum* is reduced to section level, section *Repentes* is newly described. One species (*P. mediocris*) is described new. 3 species names are reduced to variety level (*P. camelostalix* var. *vaginata*, *P. carnea* var. *parviflora*, *P. carnea* var. *pumila*). 28 species names and 8 variety names are for the first time reduced to synonymy. Keys are provided to the sections, species and varieties. Synonymy, description, distribution, habitat notes, colour descriptions and detailed illustrations are given for each species and variety.

INTRODUCTION

The genus *Pholidota* was established by W.J. Hooker in January 1825 when he described *P. imbricata*, adopting a manuscript name of Lindley ('*Philodota*' in text, sphalm.).

Later in 1825 D. Don published *Ptilocnema* with one species: *P. bracteata*, which is by almost all later authors considered synonym with *Pholidota imbricata*. Still later that year Blume published three genera which are now reckoned to belong to *Pholidota*: *Acanthoglossum* (with *A. nervosa*) and *Crinonia* (with *C. carnea* and *C. globosa*) are in this work both considered distinct sections. Blume's third genus, *Chelonanthera*, was divided by him in 3 sections which are not named but numbered. Section 1 embraces two species (*C. gibbosa* and *C. ventricosa*) which are in this work placed in *Pholidota* sect. *Chelonanthera*, and one (*C. sulphurea*) that was later distinguished as *Chelonistele*; the two other sections belong to *Coelogyne*. Lindley in Gen. & Sp. Orch. (1830) already reduced these four genera to *Pholidota*, without distinguishing sections.

Reichenbach f. reduced *Pholidota* in 1861 (in Walp., Ann. 6) to *Coelogyne*, distinguishing 7 sections: *Crinonia*, *Chelonanthera*, *Chinenses*, *Undulatae*, *Imbricatae*, *Articulatae* and *Camelostalix*. Of these only sect. *Undulatae* is here reduced. The species composition of most sections is however somewhat different in this work.

Bentham and Hooker (Gen. Pl., 1883) divided *Pholidota* into two sections: *Eupholidota* and *Otochiloides*. Pfitzer (in E. & P., Nat. Pfl. Fam. ed. 1, 1888) distin-

* Part I in Blumea 28 (1983) 413-418, fig 1-2; part II in Orchid Monographs 1 (1986) 17-86, fig. 8-27, pl. 2c-4d.

guished the same two sections, but used the name *Articulatae* Rchb. f. instead of *Otochiloides* Benth. & Hook.

Pfitzer and Kraenzlin in 1907 (Pfl. R. Heft 32) adopted again the concept of splitting *Pholidota* up in smaller genera. They recognised *Pholidota*, which contains most species, next to re-establishing Blume's genera *Crinonia* and *Chelonanthera*. Pfitzer described a new genus *Camelostalix* to accommodate *Pholidota camelostalix* which always had an uncertain status in the past. He renamed this species *Camelostalix reichenbachii*. This concept was only followed by Ridley in 1924 (Fl. Malay Peninsula).

Most other authors, including J.J. Smith, Schlechter, Ames, Carr, Seidenfaden, Holttum and Butzin did not follow this concept and considered these genera to belong in *Pholidota*. They did not even distinguish sections, except Butzin (Willdenowia 7, 1974, in Schlechter, Orch. ed. 3, 1986), who elaborated on the section division, reducing *Camelostalix*, *Chelonanthera* and *Crinonia* to section level, next to the sections *Pholidota* and *Otochiloides*. He overlooked in his first article that Carr in 1933 (J. Mal. Br. R. As. Soc. 11) in a note under *P. vaginata* also proposed the reduction of *Camelostalix*; this was corrected by him in 1986.

Pholidota is characterised by the relatively short, boat-shaped hypochilium of which the sides are erect and in front usually drawn out into lobes which continue towards the back of the lip. The flowers are rather small, and the column is rather short and compact. Differences with the related genera *Bracisepalum*, *Chelonistele*, *Entomophobia*, *Geesinkorchis* and *Nabaluia* were outlined by me in 1986 (Orchid Monographs 1).

Thanks are due to the directors and curators of the following herbaria for the loan of dried specimens, material on alcohol and other material for this study and for the hospitality during personal visits by the author (these herbaria marked *): AMES, B, BKF, BM*, BO*, BR, BRI, BRSL, C, CAL, CGE*, E, FI, G, HBG, HK, K*, KLU, KYO, L*, LAE, MEL, NY, OXF, P, PNH, S, SAN, SING*, TI, U*, W, WRSL.

Specimens will be cited separately in (Flora Malesiana) 'Identification Lists of Malaysian specimens'.

Living plants of the following *Pholidota* species were grown and studied in the Leiden Hortus Botanicus: *P. articulata*, *P. cantonensis*, *P. carnea* var. *carnea*, *P. carnea* var. *pumila*, *P. chinensis*, *P. clemensii*, *P. gibbosa*, *P. globosa*, *P. imbricata*, *P. pallida*, *P. schweinfurthiana*, *P. ventricosa*. I am much obliged to the Scientific Director of the Hortus for his efforts to obtain and cultivate the plants, and to the keepers and directors of the Botanic Gardens in Bogor, Kew, Edinburgh and Singapore who supplied cuttings of specimens in their collections.

Field trips on which populations and specimens of *Pholidota* were studied in their natural habitats were made possible by grants from the following organisations: WOTRO, the Netherlands Foundation for the Advancement of Tropical Research (1979, 1985); Treub Maatschappij: Maatschappij voor Wetenschappelijk Onderzoek in de Tropen (1985); Ministry of Education, The Netherlands (1985, 1986). The following areas were visited:

Celebes: Sulawesi Utara, Sulawesi Tengah, Sulawesi Selatan
Sumatra: Sumatera Barat

Java: Jawa Barat
Borneo: Sabah

Dr. J.F. Veldkamp was so kind to translate the diagnoses of the new sections and species into Latin.

SELECTED GLOSSARY

Terminology used in this revision follows in general Dressler, *The Orchids* (1981). This glossary contains some additional terms used in this work.

Hamulus. Pollinium stalk derived from the top of the rostellum, consisting of a strip of tissue of the entire thickness of the median stigma lobe, thus covered on two sides with epidermis tissue; often the top recurved and that part entirely covered with epidermis. Rasmussen (*Opera Botanica* 65, 1982), proposed this term for the *recurved* apex of the rostellum which breaks off and serves as a pollinium stalk when the pollinia are removed, in his definition the hamulus is covered on all sides by epidermis (except, of course, where it breaks off from the rostellum). In *Tropidia* removal of the hamulus results in a V-shaped slit in the rostellum; its large top part is covered on all sides with epidermis, the basal part only on two sides. In *Pholidota* section *Acanthoglossum* the rostellum top is not recurved, the pollinium stalk splits off median from the rostellum (e.g. see fig. 1g) and consequently its sides are not covered by epidermis. Rasmussen's definition is above modified to include this type of pollinium stalk. No new term is proposed here, in order not to overload orchid literature with terms for morphologically only slightly deviating structures.

Heteranthous inflorescence. The vegetative shoot from which the inflorescence sprouts never developing leaf or leaves, the terminal internode of this shoot never enlarging into a pseudobulb. The older inflorescence and infructescence seemingly lateral on the rhizome, its base covered by scales or the scales eroded. See fig. 25.

Hysteranthous inflorescence. Inflorescence developing on top of a pseudobulb in full-grown state, with full-grown leaves. Rhizome part and pseudobulb covered by scales, or the scales eroded. See fig. 11, 12 and 15.

Proteranthous inflorescence. Inflorescence developing on top of a vegetative shoot of which the leaf or leaves and the terminal internode are not yet developed, in this stage its base is covered by scales. After anthesis and during fruit setting the terminal internode from which it sprouts develops into a pseudobulb and on its top the leaf or leaves grow out, rhizome part and pseudobulb covered with scales, or the scales eroded. See fig. 6, 20, 28.

Synanthous inflorescence. Inflorescence developing on top of a vegetative shoot of which the terminal internode is not yet developed, but the leaf or leaves are developing simultaneously. In this stage its base is covered by scales from which also the young leaves are protruding to various extent. After anthesis and during fruit setting the terminal internode from which it sprouts develops into a pseudobulb and on top the leaves grow out, rhizome part and pseudobulb covered with scales, or the scales eroded. See e.g. fig. 1, 3, 7, 8, etc.

PHOLIDOTA Lindley ex W.J. Hooker

Pholidota Lindley ex W.J. Hooker, *Exotic Fl.* (1825) 138; Lindley, *Gen. & Sp. Orch.* (1830) 36; Benth. & Hooker f., *Gen. Pl.* 3 (1883) 520; Pfitzer, in E. & P., *Pfl. Fam.*, II, 6 (1889) 127; Hooker f., *Fl. Brit. India* 5 (1890) 855; J.J. Smith, *Orch. Java* (1905) 150; Pfitzer & Kraenzlin, *Pfl. R. Heft* 32 (1907) 142; J.J. Smith, *Bull. Dép. Agr. Ind. Néerl.* 43 (1910) 10; Ridley, *Fl. Malay Pen.* 4 (1924) 139; Gagnep., *Fl. Gen. I.-C* 6 (1933) 323; Holttum, *Orch. Malaya* ed. 3 (1964) 236; Backer & Bakh. f., *Fl. Java* 3 (1968) 284; Hu, Shiu Ying, *Quart. J. Taiwan Mus.* 24 (1971) 192, map 17; Bechtel, Cribb & Launert, *Orch. Atlas* (1980) 400; Butzin, *Willdenowia* 7 (1974) 258; id. in Schlechter, *Orch.* ed. 3 (1986) 955; Seidenf. & de Vogel, *Opera Bot.* 89 (1986) 96. – *Coelogyne* sect. *Imbricatae* Rchb. f., *Walp. Ann.* 6 (1861) 238. – *Pholidota* sect. *Eupholidota* Benth. & Hooker f., *Gen. Pl.* 3 (1883) 520 (nom. illeg.). – Type species: *Pholidota imbricata* W.J. Hooker

Ptilocnema D. Don, *Prodr. Fl. Nepal* (1825) 33. – Type species: *Ptilocnema bracteata* D. Don = *Pholidota imbricata* W.J. Hooker.

Acanthoglossum Blume, *Bijdr.* (1825) 381. – Type species: *Acanthoglossum nervosum* Blume = *Pholidota nervosa* (Blume) Rchb. f. For further synonymy and literature, see under sect. *Acanthoglossum*.

Chelonanthera sect. 1 (p.p.) Blume, *Bijdr.* (1825) 382. – *Coelogyne* sect. *Chelonanthera* (Blume) Rchb. f., *Walp. Ann.* 6 (1861) 236. – Type species: lecto *Chelonanthera gibbosa* Blume, syn. *Coelogyne gibbosa* (Blume) Rchb. f. = *Pholidota gibbosa* (Blume) de Vriese, indirectly chosen in 1907 by Pfitzer & Kraenzlin. For further synonymy and literature, see under sect. *Chelonanthera*.

Crinonia Blume, *Bijdr.* (1825) 338. – *Coelogyne* sect. *Crinonia* (Blume) Rchb. f., *Walp. Ann.* 6 (1861) 236. – Type species: not designated, lecto *Crinonia carnea* Blume = *Pholidota carnea* (Blume) Lindley, here chosen. For further synonymy and literature, see under sect. *Crinonia*.

Coelogyne sect. *Articulatae* Rchb. f., *Walp. Ann.* 6 (1861) 238. – *Pholidota* sect. *Otochiloides* Benth. & Hooker f., *Gen. Pl.* 3 (1883) 520 (see note 2). – Type species: *Coelogyne articulata* (Lindley) Rchb. f. = *Pholidota articulata* Lindley, see note 1. For further synonymy and literature, see under sect. *Articulatae*.

Coelogyne sect. *Camelostalex* Rchb. f., *Walp. Ann.* 6 (1861) 238. – *Camelostalex* Pfitzer, *Pfl. R. Heft* 32 (1907) 159. – Type species: *Coelogyne camelostalex* (Rchb. f.) Rchb. f., syn. *Camelostalex reichenbachii* Pfitzer = *Pholidota camelostalex* Rchb. f. For further synonymy and literature, see under sect. *Camelostalex*.

Coelogyne sect. *Chinenses* Rchb. f., *Walp. Ann.* 6 (1861) 237. – Type species: *Coelogyne chinensis* (Lindley) Rchb. f. = *Pholidota chinensis* Lindley, see note 3. For further synonymy and literature, see under sect. *Chinenses*.

Coelogyne sect. *Undulatae* Rchb. f., *Walp. Ann.* 6 (1861) 238. – Type species: *Coelogyne undulata* (Lindley) Rchb. f. = *Pholidota rubra* Lindley, see note 2. For further synonymy and literature, see under sect. *Chinenses*.

Creeping or pendulous epiphytes, lithophytes or terrestrials, glabrous but the roots in some places villous with root hairs, in several species with scattered minute hairs on the floral bracts, the rachis and the sepals, in one species also on the petals. Roots which attach the plant to the substratum in species with a creeping rhizome present along the entire rhizome, in species with a pendulous rhizome only on its basal part; in the latter case aerial roots may be present. Rhizome creeping or pendulous, slender to rather sturdy. Scales of the young shoot imbricate, in plants which develop an elongated rhizome the lower ones differentiating into scales which surround the rhizome and the upper ones into scales which surround the developing pseudobulb, in plants with a short rhizome all surrounding the developing pseudobulb; either very long persistent, living or dry, or desintegrating entirely or partly with the basal parts of the nerves more or less long persistent as fibres. *Pseudobulbs* (rather) long persistent, consisting of one slender to distinctly swollen, more or less fleshy internode, small to large, approximate to distant along the rhizome; either arranged along the rhizome, then all

turned to one side or spirally arranged, or superposed, each younger one attached near the top of the former. *Leaves* one or two on the top of each pseudobulb. Petiole channelled, short to long. *Blade* small to large, ovate-oblong to linear; herbaceous to stiff and thick coriaceous; main nerves few, usually on the underside of the leaf more prominent than on the upper side, small nerves rather few to many, much less prominent to inconspicuous. *Raceme* with rather few to many flowers, never branched, either proteranthous, synanthous with the just emerging to entirely developed young leaf or leaves, hysteroanthous, or in one species heteranthous; flowers opening more or less simultaneously, or from base to top of the rhachis, or from the part above the middle of the rhachis to base and top. Scape consisting of one internode (occasionally one to few internodes of the rhachis distinctly elongated and seemingly belonging to the scape), short to long, elongating during fruit setting or not, terete to more or less flattened, longitudinally grooved or smooth, filiform or wiry and bent or erect, to rather sturdy and erect. Rhachis rather short to long, pendulous, curved or erect, zig-zag or more or less straight; internodes rather few to many, (rather) short, the side facing the flower often depressed; nodes hardly to distinctly pronounced, distinct all around the rhachis or only on one side of it. Sterile bracts absent or up to 13 at the base of the rhachis, similar to the floral bracts but often larger or smaller, caducous at anthesis or persistent even in cases when the floral bracts are caducous and then remaining closely imbricate. *Floral bracts* imbricate in the young inflorescence, alternating, distichous, caducous at anthesis or persistent till long after fruiting, very broadly hastate to ligulate; papyraceous to pergamentaceous; nerves rather few to many, fine to rather coarse, either or not branched. *Flowers* alternating in two rows, neatly distichous but in several species turned more or less irregularly sideways to both sides or to one side only, resupinate or not but in the latter case the lip still more or less turned downwards due to curving of the rhachis, rather closed to widely open, in one species with recurved sepals and petals, in another only the petals recurved. Pedicel more or less straight to twisted or curved, terete to angular, in fruit not or hardly elongating. *Ovary* 3-locular, rather small, more or less tapering into the pedicel, with 3 or 6 low to elevated ribs, glabrous or in all 6 species of section *Acanthoglossum* with scattered minute hairs. *Median sepal* symmetric, rather broadly attached, more or less deeply concave, in one species convex with more or less recurved margins, broadly ovate to elliptic; rather few-nerved, nerves branched or not, midrib either or not prominent. *Lateral sepals* more or less distinctly asymmetric, more or less deeply concave, in one species convex with more or less reflexed margins, ovate to ovate-oblong, in some species the basal part of the lower margins clasped in a groove in the hypochilium, in some species sinuate halfway; nerves few, branched or not, midrib pronounced or not or developed into a more or less distinct, rounded to thin, wing-like keel. *Petals* symmetric to rather asymmetric, flat to somewhat concave, in two species rolled backwards, ovate or obovate to linear; nerves one to few, either or not branched, midrib not to somewhat pronounced. *Lip* sessile, more or less broadly attached, not or hardly mobile, more or less distinctly sigmoid to almost straight, divided into a distinct hypochilium and epichilium, in two species the epichilium only slightly developed. *Hypochilium* more or less deeply saccate to boat-shaped, rather short to short, in some species outside with a longitudinal groove; lateral margins mostly erect, either or not developed into more or less pronounced, vertical, in front more or less

abruptly lowering lateral lobes, in two species with reflexed lateral margins and in front with rather horizontal to recurved lateral lobes; inside at the back without keels or with few rounded to high and thin lamellate keels, in one species the upper margins of the keels at the back joined together and to the back of the hypochilium by a strip of tissue; in four species in front with more or less pronounced, laterally slanting keels which continue on the basis of the epichilium; in one species with a more or less fleshy rim in front of the junction of each lateral lobe and the saccate part. *Epichilium* distinctly developed or only slightly so; the well developed epichilium more or less distinctly recurved, two-lobed or entire, undulate or not, without ornamentation or with two more or less swollen calli, in two species with distinct keels, in one species with minute papillae, in another with 5 swollen keels; the slightly developed epichilium present in two species, small and not recurved, without ornamentation. *Column* short, in two species relatively long, without or with a distinct but small column foot; hood large and wide or small, in the first case thin, enlarged around the entire column, in the second case only enlarged near the column top and then lower down present as a narrow seam. *Anther* inserted on the top margin of the column hood or between the top margin and the stigma, flexibly attached at the base by a very short, thin filament, transversely elliptic to narrowly triangular, without ornamentation; two-locular, the thecae opening transversely by a slit. Pollinia 4, rather soft, in outline pear-shaped, more or less distinctly oblique, flattened or not, smooth, the narrowing part with a distinct, more or less deep hole and the top with a rather slender conical caudicle by which they loosely adhere together or to a hamulus. *Stigma* oblique, more or less deeply cup-shaped with more or less distinctly drawn-out margins; rostellum small to relatively large, narrow band-like to ligulate, in all 6 species of section *Acanthoglossum* a hamulus splits off consisting of a strip of tissue of the entire thickness of the rostellum which is removed together with the pollinia to which it remains attached, leaving a more or less narrow median slit. *Fruit* a dehiscent capsule, hard leathery when mature, 3–6-ribbed; body more or less ellipsoid, on top the perianth or its remnants or at least (part of) the swollen column persistent; jugae narrow, flat and band-like, smooth or carinate, valvae smooth, either or not with a low, more or less pronounced median keel. Seeds numerous, minute, fusiform; embryo ellipsoid.

Distribution. Tropical South-east Asia, Malasia, Australia, in the Pacific up to Tonga or Fiji (see note 12 under *P. imbricata*).

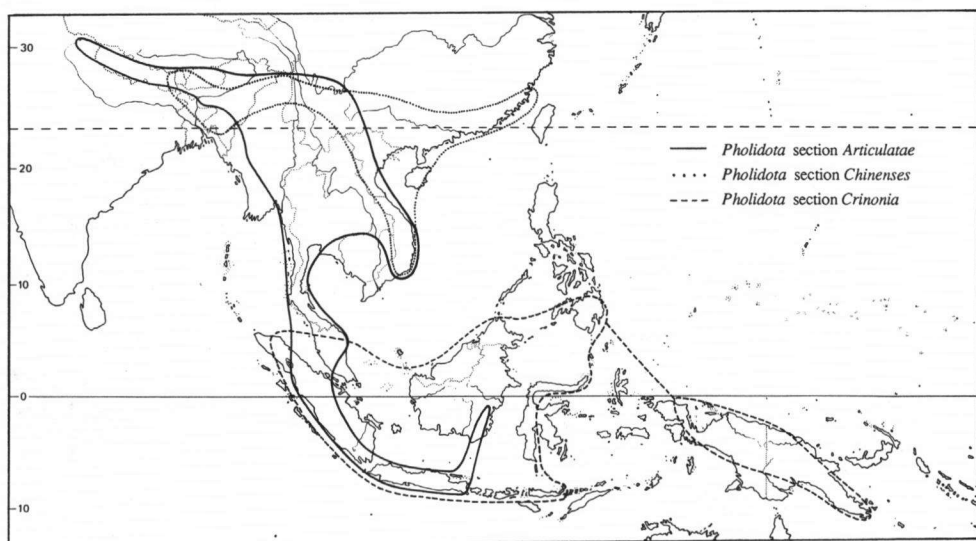
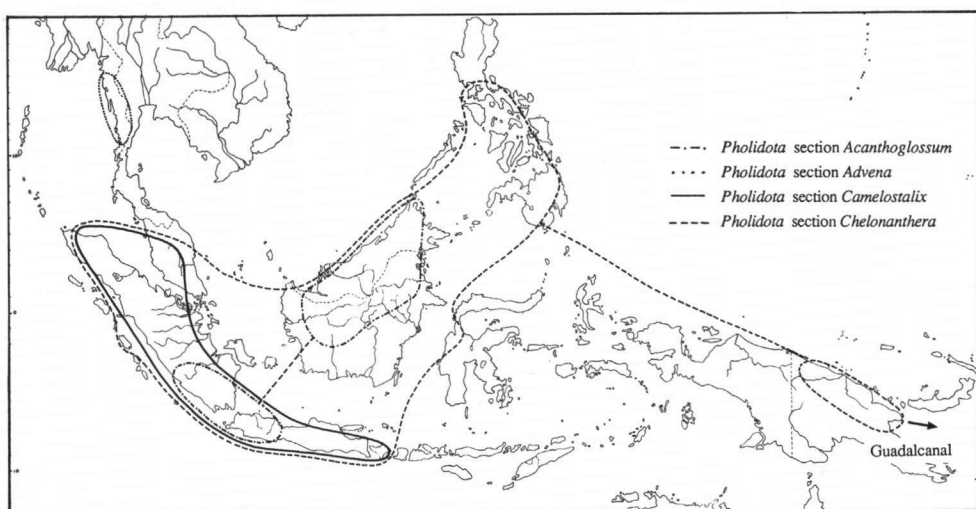
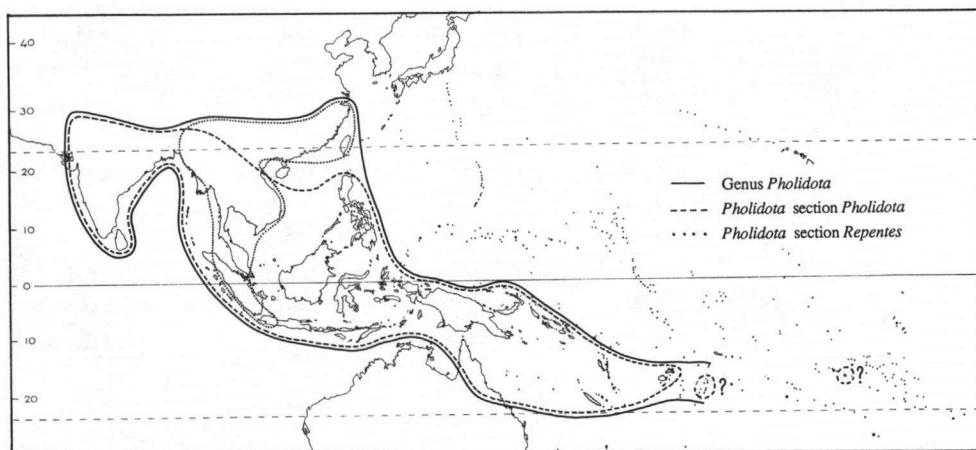
Ecology. Epiphytes, lithophytes or sometimes terrestrials in primary, dense to open forest, sometimes on exposed lava flows or on bare rock.

Notes. 1. According to Art. 54.1 of the Code the name *Articulatae* should be retained.

2. According to Art. 22.4 of the Code no lectotypification is required for sect. *Undulatae*, because the name of this section is derived from the epithet of one of its constituent species.

KEY TO THE SECTIONS OF PHOLIDOTA

- 1a. Each new young shoot develops from near the apex of the last developed pseudobulb: stems consisting of 'superposed' pseudobulbs (see fig. 8–10)
sect. *Articulatae* (Rchb. f.) Pfitzer (p. 20)



Distribution maps of the genus *Pholidota* and its 9 sections.

- b. Each new young shoot sprouts from the base of a pseudobulb (usually the last developed one): pseudobulbs arranged along a (often short to very short) rhizome (see fig. 1-7 and 11-31).....2
- 2a. Pedicel and ovary more or less densely covered with minute hairs which are often glued together by secretion (hand lens!); usually hairs on the outside of the sepals as well. Rostellum after removal of the pollinia and hamulus with a longitudinal slitsect. **Acanthoglossum** (Blume) de Vogel (p. 9)
- b. Pedicel, ovary and outside of the sepals glabrous. Rostellum after removal of the pollinia without a longitudinal slit; hamulus not present3
- 3a. Rhizome pendulous, only at the base attached to the substratum by roots; aerial roots often present on the pendulous part of the rhizome. Pseudobulbs turned to all sides of the rhizome4
- b. Rhizome creeping, along most of its length attached to the substratum by roots; aerial roots absent. Pseudobulbs turned to one side of the rhizome5
- 4a. Median sepal less than 5 mm long, often much smaller. Sepals and petals not recurved. Hood of the column hardly developed or small, enlarged only near the top of the columnsect. **Crinonia** (Blume) Butzin (p. 49)
- b. Median sepal longer than 5 mm, often much longer. Sepals and petals recurved to rolled backwards. Hood of the column widened along the entire length of the column, irregularly orbicular in outlinesect. **Chelonanthera** (Blume) Butzin (p. 35)
- 5a. Pseudobulbs with one leafsect. **Pholidota** (p. 57)
- b. Pseudobulbs with two leaves6
- 6a. Bracts persistent during anthesis.....7
- b. Bracts caducous at anthesis, usually falling off but sometimes remaining clasped around the flower8
- 7a. Hypochilium at the base with short, high, lamellate keels. Epichilium with five low, swollen keelssect. **Advena** de Vogel (p. 18)
- b. Keels on the hypochilium absent or low and swollen. Keels on the epichilium, if present, at most 2sect. **Chinenses** (Rchb. f.) de Vogel (p. 41)
- 8a. Margins of the hypochilium recurved, lateral lobes spreading more or less horizontally. Hood of the column very broad, wing-like, widened along the entire length of the columnsect. **Chelonanthera** (Blume) Butzin (p. 35)
- b. Margins of the hypochilium (and lateral lobes, if present) turned upright. Hood of the column, if widened, only so near the column top.....9
- 9a. Pseudobulbs (rather) widely spaced along the rhizome. Base of the epichilium without warts or papillaesect. **Repentes** de Vogel (p. 67)

- b. Pseudobulbs close together along the rhizome. Base of the epichilium either minutely papillose or with two more or less distinct swollen warts10
- 10a. Petals about one to one and a half times as long as wide. Column stunted, wider than long.....sect. **Crinonia** (Blume) Butzin (p. 49)
- b. Petals at least two times as long as wide. Column rather slender, longer than widesect. **Camelostalix** (Rchb. f.) Carr (p. 27)

SECTION ACANTHOGLOSSUM (Blume) de Vogel, *stat. nov.*

Acanthoglossum Blume, Bijdr. 8 (1825) 381; Tab. & Pl. (1825) t. 2; Lindley, Gen. & Sp. Orch. (1833) 179; Miq., Fl. Ind. Bat. 3 (1855) 669; Bentham & Hooker, Gen. Pl. 3 (1883) 520, in note.— Type species: *Acanthoglossum nervosum* Blume = *Pholidota nervosa* (Blume) Rchb. f.
Gastroglottis Rchb. f., Bonplandia 5 (1857) 43.— Type species: *Gastroglottis montana* Rchb. f. = *Pholidota nervosa* (Blume) Rchb. f.

Creeping epiphytes or sometimes terrestrials, entirely glabrous except for root hairs, and minute hairs on floral bracts, pedicel, ovary and sepals, and sometimes on the rhachis. Roots which attach the plant to the substratum present along the entire rhizome, long, thin, usually branched. Rhizome creeping, the parts between the pseudobulbs short. Scales of the young shoot later all enclosing the developing pseudobulb, 5-13, persistent till after flowering, then often disintegrating into thin fibres which remain long persistent around the pseudobulb; stiff herbaceous; nerves many, fine, all about equal. *Pseudobulbs* close together, all turned to one side of the rhizome. *Leaves* one or two per pseudobulb, large to rather small. *Blade* lanceolate to linear, either or not plicate, herbaceous to subcoriaceous, many-nerved, main nerves 5-9. *Raceme* proteranthous to synanthous with the just emerging young leaf or leaves, rather few- to many-flowered; flowers opening from base to top of the rhachis or all more or less simultaneously. Scape short to long, wiry or rather sturdy, irregularly ribbed to more or less flattened. Rhachis more or less erect or pendulous, rather short to long, about straight to rather zig-zag, rather angular in section; sometimes slightly hairy. Sterile bracts 0-3. *Floral bracts* persistent or caducous, more or less folded along the midrib, more or less ligulate to broadly ovate; nerves rather few to many, fine, all about equal; with scattered, minute, 1-2-celled (groups of) hairs. *Flowers* alternating in two rows, neatly distichous or more or less turned to one side, opening not very wide, either or not resupinate but lip turned more or less downwards. Pedicel curved and twisted or straight, terete to somewhat angular, more or less densely minutely hairy. Ovary angular due to the ribs, hairy like the pedicel. *Median sepal* more or less deeply concave, ovate to broadly ovate; midrib prominent; outside entirely minutely hairy, or only so at the base. *Lateral sepals* rather shallowly to deeply concave, at the base more or less saccate around the base of the lip, either or not sinuate about halfway, ovate to ovate-oblong; midrib somewhat elevated or with a more or less rounded keel; hairy as the median sepal. *Petals* ovate, elliptic, obovate, oblong to ovate-oblong, slightly asymmetric, glabrous. *Lip* rather broadly inserted, more or less distinctly sigmoid. *Hypochilium* rather shallowly to deeply saccate, with or without lateral lobes, inside at the back without keels, inside in front without keels or with 2

keels which do or do not continue on the epichilium, outside at the back either or not with a longitudinal groove. *Epichilium* recurved, entire or two-lobed; keels absent or with two longitudinal ridges or two more or less elongated, thin or broad and swollen, more or less elevated keels on the junction with the hypochilium. *Column* without column foot, short, its top with a small, sometimes 3-lobed hood which is shorter or longer than the rostellum. *Anther* inserted near the top margin of the hood by which it is more or less enclosed, transversely elliptic to irregularly orbicular, ovate to heart-shaped in outline. Pollinia more or less pear-shaped to about orbicular, more or less flattened. *Stigma* obliquely cup-shaped; rostellum more or less triangular to narrowly triangular, after removal of the hamulus 2-lobed; hamulus lanceolate to linear-lanceolate, attached to the caudiculae of the pollinia. *Fruit* (only of *P. pectinata* seen) ellipsoid, part of the column persistent on top; ribs 3, distinct, composed of the 3 flat and band-like jugae, the valvae smooth, without a median keel. Seeds not seen.

Distribution. West Malesia: Sumatra, Java, Borneo. 6 species.

Ecology. Epiphytes in primary hill and montane forest and epiphytic and terrestrial in rather open Kerangas forest; altitude 1100–2400 m.

KEY TO THE SPECIES OF SECTION ACANTHOGLOSSUM

- 1a. Pseudobulbs less than 2.5 cm long. Scape wiry, up to 1 mm thick.....2
- b. Pseudobulbs 3 cm long or longer. Scape rather sturdy, more than 1.5 mm thick
.....3
- 2a. Flowers 5–8. Hypochilium in front drawn out into small but distinct lateral lobes; keels thin, lamellate, about as high as long5. ***P. schweinfurthiana*** L.O. Williams
- b. Flowers (9–)15–35(–40). Hypochilium without lateral lobes; keels much longer than high, broad, more or less swollen4. ***P. pectinata*** Ames
- 3a. Epichilium emarginate, top with two distinct lobes; on the junction of the hypochilium and the epichilium with two longitudinal, more or less small keels (rarely the keels almost absent)4
- b. Epichilium more or less ligulate, not lobed although the tip may be somewhat retuse; without keels on the junction of hypochilium and epichilium5
- 4a. Epichilium more than 3.5 mm long, subdivided in a more or less narrow, sometimes tapering claw and a more or less abruptly widened terminal part; keels relatively minute. Hood without distinct lobes6. ***P. sulcata*** J.J. Smith
- b. Epichilium at most 2.5 mm long, not constricted near the junction with the hypochilium; keels relatively large, about 0.3–0.5 mm high. Hood distinctly three-lobed.....3. ***P. nervosa*** (Blume) Rchb. f.
- 5a. Sepals more than 9 mm long. Epichilium of the lip more than 6 mm long.....
..... 1. ***P. clemensii*** Ames
- b. Sepals less than 6 mm long. Epichilium of the lip less than 4.5 mm long.....
..... 2. ***P. mediocris*** de Vogel

1. *Pholidota clemensii* Ames – Fig. 1, Plate 1a, cover.

Pholidota clemensii Ames, Orch. 6 (1920) 66; J.J. Smith, Mitt. Inst. allg. Bot. Hamb. 7 (1927) 35, fig. 25; Carr, Gard. Bull. S.S. 8 (1935) 221.– Type: Clemens 390 (holo BM, not seen).

? *Pholidota dentiloba* J.J. Smith, Bull. J. Bot. Btzg 3, 11 (1931) 107.– Type: Winkler 994 (not seen, see note).

Plant (26–)35–70 cm high. Roots 2–3 mm diam. Scales of the young shoot (5–)9(–13); smallest one about 0.5 cm long, longest one 6.5–12.5 cm long; nerves 42–56, all about equal. *Pseudobulbs* usually slender, 3–7 cm long, when dried finely wrinkled. *Leaf* one per pseudobulb. Petiole 10–24.5 by 3–4 mm. *Blade* lanceolate to linear-lanceolate, plicate, (12.5–)24–40(–44) by (2.2–)3.7–6.5(–7.5) cm; top acute; stiff herbaceous to subcoriaceous; main nerves 5–7, very prominent below, slightly so above, small nerves 85–140, rather inconspicuous, above more or less prominent, less so below. *Raceme* proteranthous, rarely synanthous with the just emerging very young leaf, (12–)18–25-flowered. Scape erect, rather sturdy, more or less elliptic in section, beyond the scales 0–6 cm by 2.5–4 mm, possibly elongating after anthesis. Rhachis erect, 5–10.5 cm long, with few scattered hairs; internodes 4–7 mm long. Sterile bracts absent or possibly one present at the base of the rhachis, but caducous together with the fertile bracts. *Floral bracts* caducous at anthesis, ligulate, 15–22 by 6.3–9 mm; top obtuse to acute; stiff herbaceous; nerves c. 50–60. *Flowers* somewhat fleshy. Pedicel angular, twisted, 3.5–6 by 0.4–0.7 mm, ovary slender, more or less triangular in section, 4–8 by 1.2–2 mm. *Median sepal* ovate, 9–11.5 by 5–7 mm; top acuminate, its tip more or less obtuse to acute; margins slightly rolled inwards; nerves (5–)7, the midrib prominent. *Lateral sepals* deeply concave, at the base saccate around the base of the lip and there clasped in a longitudinal fold of the hypochilium, beyond halfway sinuate by a widening of the blade which is pressed against the lower side of the base of the epichilium, more or less irregularly ovate, 9–12 by 5–8 mm; top acute, usually apiculate; nerves 5–6. *Petals* more or less elliptic to oblong, 7.5–10 by 3.5–5 mm; top acuminate, recurved, its tip more or less acute; nerves 5–7, the lateral ones sometimes branched. *Lip* not extending from the lateral sepals. *Hypochilium* laterally somewhat compressed, 3–4 mm long, 2(–3) mm wide, 3(–4) mm high, without distinct lateral lobes. *Epichilium* rather distinctly separated from the hypochilium, ligulate, usually widest in the middle, curved with recurved margins, 6.3–9 by 3–3.7 mm, in the centre with a longitudinal depression which separates two longitudinal, more or less conspicuous, low, rounded, elevated ridges; top narrowed, tip truncate, retuse, rounded or acute, sometimes apiculate, its lateral margins folded to above; nerves 5. *Column* more or less widening towards the top, 1.3–3.5 by 1–2.5 mm; hood small, 3-lobed, midlobe retuse, lateral lobes triangular. *Anther* irregularly orbicular in outline, c. 1–1.2 by 1.2–1.5 mm; top more or less retuse, broad. Pollinia irregularly orbicular in outline, more or less flattened, c. 0.4–0.5 mm wide and long. *Stigma* c. 2 by 1.3 mm, including the 1–1.2 mm long rostellum; rostellum lobes narrowly triangular, curved, acute, rarely each laterally with an additional small triangular lobe; hamulus ovate-oblong, c. 0.8 by 0.3 mm. *Fruit* not seen.

Distribution. Borneo: Sarawak (4th Division). Sabah (West Coast Residency, Interior Residency). Kalimantan (Kalimantan Tengah, see note). 27 collections (AMES, B, BM, BO, K, L, LAE, NY).

Ecology. Epiphytes, in more or less open Kerangas also growing terrestrial; altitude 1300–2350 m. Fl. Nov. to July.

Collector's notes. Floral bracts pink. Flowers white, sometimes pinkish. Once recorded details: pedicel and ovary brownish; two tiny pinkish eyes in the throat; brown dot on the lip; anther brownish; hypochilium filled with nectar; hardly scented.

Note. The type specimen of *P. dentiloba* J.J. Smith, Winkler 994, could not be studied; it is not present in BO, HBG or L so it is probably lost. According to the description and drawings by J.J. Smith it has slightly larger flowers (median sepal 1.4 mm long), and the epichilium is abruptly contracted at about one third from the base, so that a small triangular extension is formed on either side. Further it matches *P. clemensii* in all other aspects. The differences are here judged insufficient to maintain the status of species for this plant. More material from the type locality is needed to determine whether the lateral lobes on the epichilium are a constant character.

2. *Pholidota mediocris* de Vogel, *spec. nov.* – Fig. 2.

Flores externe pilis minutis dispersis. Sepala lateralialia ad 6 mm longa, basi circa hypochilium saccato. Epichilium plus minusve lingulstum 4.5 mm minus, sine lobis lateralibus nec carinis ad articulum hypochilio. Typus: R. Geesink 9108 (holo L).

Plant 30–45 cm high. Roots 1–2.5 mm diam. Scales of the young shoot 7–9; smallest one 1 cm long, longest one 6–9.5 cm long; top obtuse to acute; nerves 35–45. *Pseudobulbs* more or less swollen to slender, 3.5–5 cm long, when dried finely wrinkled. *Leaf* one per pseudobulb. Petiole 4–6.5 cm by 2–5 mm. *Blade* lanceolate to linear-lanceolate, more or less plicate, 23–35 by 3.3–6.2 cm; top acute to acuminate; herbaceous; main nerves 5–7, prominent below, above sunken, small nerves inconspicuous, below and above hardly prominent. *Raceme* proteranthous or synanthous with the just emerging very young leaf, 22–30-flowered. Scape erect, slightly flattened, beyond the scales 2–7.5 cm, 1.5–3 mm diam., after anthesis elongating. Rhachis erect, 7–12.5 cm long, with few scattered hairs; internodes 3–6 mm long. Sterile bracts absent. *Floral bracts* dropped at anthesis, ligulate, 10–17 by 4.5–5 mm; top truncate, tip more or less acuminate; papyraceous; nerves 26–30. *Flowers* more or less turned to one side, lowest ones somewhat earlier open than the higher ones, resupinate, somewhat fleshy. Pedicel terete to somewhat angular, curved and twisted, 2–5 by 0.5–1 mm, ovary irregularly terete in section, 2.7–5 by 1.5–2 mm. *Median sepal* ovate, 5.7–6 by 3.5 mm; top more or less acute; margins slightly rolled inwards; nerves 5. *Lateral sepals* deeply concave, at the base saccate around the hypochilium of the lip, beyond halfway sinuate, there pressed against the lower side of the base of the epichilium, ovate, 5.8–6 by c. 3.3 mm; top more or less acute; nerves 5. *Petals* ovate, 5–5.3 by 2.3–2.8 mm; top acuminate, slightly recurved; nerves 5. Lip slightly extended from the lateral sepals or not. Hypochilium laterally somewhat inflated, 1.7–2 mm long, 2–2.5 mm wide, 1.7–2 mm high, without distinct lateral lobes. *Epichilium* gradually passing into the hypochilium, reflexed, curved, ligulate, broadest at the base, 3.8–4 by 2–2.7 mm; margins recurved; top truncate, tip more or less acuminate, margins folded to above; keels not present; nerves 9, midrib pronounced. *Column* somewhat widening towards the top, 2.5–3 mm long; hood small, 3-lobed, midlobe

more or less retuse, lateral lobes triangular. *Anther* irregularly orbicular in outline, c. 0.8 by 0.8 mm; top retuse. Pollinia broadly ovate in outline, rather flattened, c. 0.3 by 0.25 mm. *Stigma* 1.3–1.5 by 0.8–0.9 mm including the 0.3–0.5 mm long rostellum; rostellum lobes triangular, curved, acute; hamulus ovate-oblong, c. 0.5 by 0.2 mm. *Fruit* not seen.

Distribution. Borneo: Sarawak (5th Division). Kalimantan. (Kalimantan Timur). 3 collections: Burt & Martin 5199 and 5338 (E), Geesink 9108 (L).

Ecology. Epiphytes; altitude 1350–1950 m. Fl. July, Sept., Oct.

Collector's notes. Bracts pinkish. Flowers white, pedicel and ovary with brownish scurfy dots. Scent sweet.

Note. The epithet *mediocris* is given because the flowers are small and very simply built, among the least spectacular in Pholidota.

3. *Pholidota nervosa* (Blume) Rchb. f. – Fig. 3, Plate 1b.

Pholidota nervosa (Blume) Rchb. f., Bonpl. 5 (1857) 43; J.J. Smith, Orch. Java (1905) 156; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 148; J.J. Smith, Orch. Java, Fig.-Atlas (1909) f. 116; Koord., Exk. Fl. Java 1 (1911) 366; J.J. Smith, Fedde, Rep. 32 (1933) 174; Backer, Bekn. Fl. Java (em. ed.) 12, 1(1952) 138; Backer & Bakh. f., Fl. Java 3 (1968) 286; J.B. Comber, Orch. Digest (1983) 73, fig., phot. – *Acanthoglossum nervosum* Blume, Bijdr. (1825) 382; Lindley, Gen. & Sp. Orch. (1833) 179; Miq., Fl. Ind. Bat. 3(1859) 669. – *Coelogyne nervillosa* Rchb. f., Walp. Ann. 6 (1861) 236. – Type: Blume s.n. (lecto L, here chosen; iso P).

Gastroglottis montana Rchb. f., Xenia Orch. 2 (1863) 96, t. 129. – Type: Kuhl & v. Hasselt s.n., not seen, probably lost (lecto: the plate in Xenia Orch. 2 (1863) t. 129, here chosen).

Plant to 40 cm high (see note 1). Scales of the young shoot 10–11; smallest one c. 0.7 cm long, longest one c. 11 cm long; nerves c. 52, towards the midrib less conspicuous. *Pseudobulbs* rather slender to more or less swollen, to 6 cm long, when dry finely wrinkled. *Leaves* two per pseudobulb. Petiole 4.5–6.5(–18) cm by 2–3 mm. *Blade* linear-lanceolate, more or less plicate, 20–27(–46) by 2.5–4.5 cm; top acute to acuminate; rather stiff herbaceous; main nerves 5, very prominent below, slightly so above, small nerves c. 96, rather inconspicuous, below and above hardly prominent. *Raceme* proteranthous, 25–40-flowered. Scape erect, somewhat flattened, entire length including the part enclosed by the scales 6–15 cm by 3(–4) mm. Rhachis erect, more or less distinctly zig-zag to about straight, 8.5–17.5 cm long, with a few scattered, minute hairs; internodes 3(–4) mm, the lowest ones longer. Sterile bracts absent. *Floral bracts* either or not dropped at anthesis, more or less ovate to ligulate, 11–16 by 6–7 mm, the lowest one to 27 mm long; top acute; papyraceous; nerves 25–43. *Flowers* more or less clearly turned to one side, rather membranous. Pedicel angular, curved, more or less flattened, c. 3.5–6 by 0.3–0.5 mm, ovary irregularly triangular in section, 5–6 by 1.3–1.7 mm. *Median sepal* ovate, 3.8–5.3 by 2.3–3 mm; top more or less acuminate; nerves (3–)5. *Lateral sepals* asymmetric, more or less deeply concave, at the base more or less saccate around the hypocotyl of the lip, ovate, 4.2–5.5 by 2.4–3 mm; top acuminate; nerves (3–)5. *Petals* more or less forming a hood with the upper sepal, ovate-oblong, 3.2–4.7 by 2.3–1.8 mm; top acuminate; nerves (2–)3; inside at the base with few scattered hairs. *Hypochilium* laterally somewhat inflated, at the back distinctly swollen, outside with a median longitudinal groove, 1.5–2.2 mm long, 1.8–2(–2.5)

mm wide, 2–2.2(–2.7) mm high including the lateral lobes; lateral lobes erect, obliquely triangular, concave, 0.5–1 by 1–1.5 mm, with broadly rounded top; lateral nerves swollen into more or less conspicuous, low rounded ridges and two more or less conspicuous median keels. *Epichilium* gradually passing into the hypochilium, 2-lobed, slightly widening to the top, reflexed, somewhat curved, with more or less recurved margins, 2–2.5 by 2.5–3.4 mm; top more or less deeply retuse, sometimes the tip apiculate; lateral lobes semi-elliptic, with recurved margins; at the junction with the hypocotyl with two distinct, wide apart, short, more or less triangular, to band-like erect keels 0.3–0.5 mm high; nerves not distinct. *Column* somewhat widened towards the top, 1.7–2 mm long; hood small, 3-lobed, midlobe more or less retuse to truncate, with irregular margin, lateral lobes triangular. *Anther* irregularly ovate in outline, c. 1.1–1.5 by 0.9–1.2 mm; top acute to rounded. Pollinia pear-shaped, 0.3–0.5 by 0.25–0.3 mm. *Stigma* c. 1–1.5 mm long, 0.5–1 mm wide, including the 0.6–0.8 mm long rostellum; rostellum lobes narrowly triangular, curved, acute; hamulus 0.6–0.8 mm long. *Fruit* not seen.

Distribution. Sumatra (Benkulu). 2 collections (BO, L). Java (Jawa Barat). 3 collections (BO, L, P, W). Cultivated, origin not known. 8 collections (BO, K, L, SING, U).

Ecology. Not known. Fl. Aug. Sept. (twice recorded).

Collector's notes. Flowers pale greenish or whitish. Lip yellowish or greenish white, between the keels on the junction of epichilium and hypochilium with a dark yellow blotch. Column dark brown with a paler base. Ovary, pedicel and sepals black furfuraceous due to a blackish mucilage which covers the hairs.

Notes. 1. The description of the vegetative parts is partly copied from J.J. Smith, Orch. Java (1905) 156, who studied living plants. Of 13 herbarium specimens available only 2 are more or less complete.

2. The large leaf of the lectotype (L) bears indument on the lower surface, it does not belong to *Pholidota*. The leaf of the isotype (P), although glabrous, does not belong to *P. nervosa*.

4. *Pholidota pectinata* Ames – Fig. 4; Plate 1c.

Pholidota pectinata Ames, Orch. 6 (1920) 69, 248, pl. 86; J.J. Smith, Bull. Jard. Bot. Btzg III, 11 (1931) 108; L.O. Williams, Bot. Mus. Leaflet 6 (1938) 61. – Type: Clemens 273 (holo BM?, not seen; iso E, K, S, SING).

Plant 17–58 cm high. Roots to more than 10 cm by 0.5–1 mm. Scales of the young shoot 6–8, soon dry but long persistent or desintegrating into long persistent fibres; longest one (2.5–)4–13.5 mm long; top acute; herbaceous; nerves rather inconspicuous. *Pseudobulbs* erect to ascending, more or less angular, more or less swollen, 1.5–3 cm long, when dried longitudinally wrinkled, hidden by the persistent pseudobulb scales or fibres. *Leaf* one per pseudobulb. Petiole (3.5–)6.5–17 cm by 0.7–1.5 mm. *Blade* narrowly linear, (8.5–)10.5–30 by 0.5–3 cm; top acute, the tip acute to rounded; main nerves 5–9, above and below somewhat prominent, small nerves many, rather inconspicuous. *Raceme* synanthous with the just emerged to c. halfway developed young leaf, (9–)15–35(–40)-flowered. Scape wiry, somewhat angular, beyond the scales

(0.7-)9.5-24 cm long, 0.4-1 mm diam., long ones in fruit somewhat elongating, short ones very much elongating. Rhachis pendulous, (2-)4-8.5(-10) cm long, slightly zigzag; internodes 1.5-3 mm long. Sterile bracts (1-)2(-3). *Floral bracts* persistent during anthesis and fruit setting, patent, lateral margins incurved, when flattened ovate to very broadly ovate, 5-9 by 5-9 mm; top acute to obtuse; membranous; hairy all over or inside at the base and outside at the top only; nerves numerous, rather fine. *Flowers* not resupinate, ovary and base of the perianth enclosed by the bracts. Pedicel angular by the ribs, 0.5-1.5 by 0.5-1 mm, ovary angular by the ribs, 2.5-4 by 0.5-1.2 mm. *Median sepal* ovate, 3-4.3 by 1.7-3.3 mm; top obtuse to acute; nerves 3-5, midrib slightly prominent. *Lateral sepals* rather deeply concave, ovate, 3.7-4.5 by 1.7-3.3 mm; top acute; nerves 3, midrib distinct, somewhat elevated, rounded, rarely to the tip keel-like. *Petals* more or less irregularly ovate to obovate, 2.8-4 by 1.7-2.8 mm; top acute to more or less obtuse, tip sometimes acute to acuminate, more or less recurved; nerves 3-5, the lateral ones sometimes branched. *Lip* in natural position 2.3-3.5 mm long. *Hypochilium* 1-1.5 mm long, 0.7-2 mm wide, 0.5-1.2 mm high; lateral lobes not present; nerves 5 or 7, the median one somewhat swollen, two lateral ones swollen, in front developed into more or less swollen, elevated keels 1-2 mm long and 0.5-0.8 mm high which continue to about halfway on the epichilium; sometimes at the back with a transverse callus. *Epichilium* recurved with recurved margins, when flattened more or less broadly spatulate, gradually widening to the top, not or only slightly lobed, 2.2-3 by 2-3 mm when flattened; top truncate, sometimes shallowly retuse, at the tip folded; keels to about halfway. *Column* short, in front view somewhat widened to the top, 1.5-2 by 0.7-2 mm including the projecting rostellum; hood small, top part truncate with few shallow notches, lateral wings broadly rounded. *Anther* ovate to heartshaped in outline, 0.7-1 by 0.5-1 mm; top acute, its tip more or less rounded, base retuse. Pollinia more or less globose to pear-shaped in outline, (0.2-)0.3-0.5 by (0.2-)0.3-0.5 mm. *Stigma* ovate in outline, shallow, 0.7-1.3 by 0.5-1 mm including the 0.4-0.8 mm long rostellum; rostellum lobes narrowly triangular, curved; hamulus 0.4-0.8 by c. 0.1-0.15 mm. *Fruit* body c. 6 by 2.5 mm; ribs 3, consisting of the flat and bandlike jugae; valvae smooth, not keeled. Seeds not seen.

Distribution. Borneo: Sarawak (4th Division). Sabah (West Coast- and Interior Residency). Kalimantan (Kalimantan Timur). 9 collections (BO, E, K, L, S, SING).

Ecology. Terrestrial and epiphytic in low oak-laurel ridge forest (once recorded), low open mossy Kerangas forest (3 records); altitude 1600- 2400 m. Fl. Oct.-Jan.

Collector's notes. Scape light green. Bracts dull pale pinkish to pale ochrish red. Sepals, petals, lip and column white to creamy- white, pinkish white to tannish, keels on lip light pinkish, in front of the keels with a yellow, faint pale ochrish to pink blotch. Anther pinkish, pinkish-orange or brown-red.

Note. The plants are very variable in size, especially the length and width of the leaves. All Sabah specimens have a long scape, the inflorescence overtops the leaves when stretched. The collection from Kalimantan, Endert 4233, is relatively small and fits the vegetative parts of the type very well, but the scape is very short and the inflorescence, when stretched, reaches only about halfway the leaves. The flowers are in all parts somewhat smaller, the epichilium is relatively larger and broader, and the keels of the (rather badly preserved) flowers seem much thinner. A similarly small scape is present in the only collection from Sarawak, but the flowers of that plant are not dif-

ferent from those of Sabah plants. More and better preserved material is needed from Kalimantan and Sabah to become better acquainted with the variability of this species.

5. *Pholidota schweinfurthiana* L.O. Williams – Fig. 5; Plate 1d.

Pholidota schweinfurthiana L.O. Williams, Bot. Mus. Leafl. 6 (1938) 60. – Type: SF (Moulton) 6678 (holo AMES; K, SING).

Plant 14–28 cm high excluding the inflorescence. Roots to more than 10 cm by 0.2–0.7(–1) mm. Scales of the young shoot 5–6, soon dry but very long persistent, sometimes desintegrating into long persistent fibres; longest one 2.7–4.5 cm long; top acute; herbaceous; nerves rather inconspicuous. *Pseudobulbs* ascending, slender, 1.2–2 cm long, when dried longitudinally wrinkled, hidden by the persistent pseudobulb scales or fibres. *Leaf* one per pseudobulb. Petiole 3–10 cm by 0.5–1 mm. *Blade* linear, usually widest above the middle, 6.5–15 cm by 7–9 mm; top acute (to acuminate); main nerves 5, above hardly prominent, below more so, small nerves 24–36, inconspicuous. *Raceme* synanthous with the more than halfway developed young leaf, overhanging, 5–8-flowered. Scape wiry, terete to somewhat angular, beyond the scales 7–14 cm long, 0.2–0.4 mm diam. Rhachis pendulous, distinctly zig-zag, 2–2.7 cm long; internodes 3–4 mm long. Sterile bracts 1–2, like the floral bracts but more appressed. *Floral bracts* persistent during anthesis, patent, when flattened ovate, 6–9 by 4.5–6 mm; top acute to acuminate; membranous; in- and outside with scattered (groups of) minute hairs; nerves many, rather fine, the lateral ones branched. *Flowers* not resupinate. Pedicel angular by the ribs, 0.8–1.2 by 0.4–0.7 mm, ovary distinctly angular by the ribs, 2–4 by 0.7–1 mm. *Median sepal* more or less forming a hood with the lateral petals, broadly ovate, 2.5–3 by 1.5–2.5 mm; top acute; nerves 3, midrib slightly prominent. *Lateral sepals* rather shallowly concave, broadly ovate, 2.5–4 by 1.8–2.5 mm; top acute; nerves 3–4, midrib slightly prominent. *Petals* irregularly ovate, 2.5–3 by 2–2.3 mm; top acute to somewhat acuminate; nerves 3, the lateral ones sometimes branched. *Lip* in natural position 1.5–2.4 mm long. *Hypochilium* more or less thickened in the back, 1.5–2.2 mm long, 1–2.2 mm wide, 0.7–1.5 mm high; lateral lobes small, triangular to narrowly triangular with acute top, 0.2–0.5 mm long, with entire to irregular margins; nerves 5–7, (the central) 5 somewhat sturdy and slightly swollen in the back, the lateral ones near the junction with the epichilium each raised into a short high triangular to semi-orbicular, 0.5–0.6 by 0.5–0.6 mm big keel with rounded top. *Epichilium* strongly recurved, when flattened irregularly transversely elliptic to orbicular to almost quadrangular, 1–1.7 by 1.2–2.5 mm; top truncate to somewhat retuse, tip shortly acute to rounded; margins entire to irregular; main nerves converging, sparsely branched. *Column* short, widened to the top, 1.5–2 mm long including the projecting rostellum; hood small, in front with two more or less triangular lateral lobes with irregular margins, top margin with irregular small teeth. *Anther* narrowly triangular in outline with a broadened basal part, c. 1.5 by 0.4–0.7 mm; top narrowly triangular, base retuse. Pollinia more or less globose to broadly ovate, 0.25–0.3 by 0.2–0.3 mm. *Stigma* irregularly elliptic to ovate in outline, narrowing into the rostellum, shallow, 1–1.5 by 0.7–1 mm including the 0.4–0.7 mm long rostellum; rostellum lobes more or less narrowly triangular, hardly curved; hamulus 0.4–0.7 by 0.12–0.15 mm. *Fruit* not seen.

Distribution. Borneo. Sarawak (4th division). Brunei. Sabah (West Coast and Interior Residency). 8 collections (K, L, SING).

Ecology. Ridge top forest with *Agathis alba* (2 records), low open Kerangas forest (4 records); altitude 1300–1700 m. Fl. Oct.– Dec.

Collector's notes. Floral bracts very pale greenish and reddish in the centre to dirty pink or salmon coloured. Ovary and pedicel dirty pale pinkish. Sepals whitish to dirty pale pinkish. Petals whitish to (dirty) cream-coloured. Lip whitish, junction of epi- and hypochilium bright yellow. Column in front orange, anther orange.

6. *Pholidota sulcata* J.J. Smith – Fig. 6.

Pholidota sulcata J.J. Smith, Icon. Bog. 2 (1903) 27, t. 107A; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) f. 50L.– Type: Bogor, cult. Hort. (Hallier) s.n. (1901) (holo BO; later dupl. BO, L).

Plant 25–65 cm high. Roots 1–3 mm diam. Scales of the young shoot 6–8, persistent till long after flowering, smallest one to 1 cm long, longest one 6.5–7.5(–10) cm long; nerves c. 45, sometimes inconspicuous. *Pseudobulbs* rather slender to rather swollen, 3–6.5 cm long, when dried rather finely to coarsely wrinkled. *Leaves* two or occasionally one per pseudobulb (N.B. the left specimen of the holotype has one pseudobulb with two leaves, another with one!). Petiole 5–18 cm by 1.5–3 mm. *Blade* linear-lanceolate, 20–40 by 1.8–4.2 cm; top acute; herbaceous; main nerves 5, prominent below, slightly so above, small nerves more or less inconspicuous, below and above hardly to somewhat prominent. *Raceme* proteranthous, 25–55-flowered. Scape more or less flattened, beyond the scales c. 1.5–8 cm, total length 3–15.5 cm. Rhachis erect, rather zig-zag, especially to the top, 8–21.5 cm long, glabrous; internodes 2–5 mm, lowest one up to 1 cm long. Sterile bracts absent. *Floral bracts* ligulate, 7–21 by 3–10 mm; top very broadly acute to truncate, those from the top of the inflorescence acute; papyraceous; nerves 35–65. *Flowers* more or less turned to one side. Pedicel more or less terete, twisted, 2–6 by 0.3–0.5 mm, ovary irregularly terete in section, 2–5 by 0.7–1 mm. *Median sepal* ovate, 4.5–6.5 by 2.7–4.5 mm; top acute, tip sometimes truncate; nerves 5–7, the lateral ones sometimes branched. *Lateral sepals* asymmetric, deeply concave, at the base saccate around the hypochilium of the lip, about halfway sinuate and there more or less pressed against the lower side of the claw of the epichilium, ovate-oblong, 5.7–7.2 by 2.3–3.2 mm; top acute; nerves 5–7. *Petals* ovate-oblong, slightly asymmetric, 4.5–5.5 by 1.7–2.5 mm; top rounded to acuminate; nerves 3–5, the lateral ones sometimes branched. *Hypochilium* deeply saccate, sometimes laterally somewhat compressed, at the back swollen, outside with a median longitudinal groove or line, c. 2 mm long, 1.7–2.8 mm wide, 2–3 mm high; with or without somewhat developed lateral lobes, the margins more or less broadly rounded and erect or more or less laterally recurved. *Epichilium* when flattened about spatulate, more or less recurved with recurved margins, subdivided into a more or less narrow, sometimes tapering claw and a widened terminal part; claw c. 1–2 mm long, shallowly and broadly channelled lengthwise by which two longitudinal convex ridges are formed, each ridge with a short, low, narrow keel on the junction of epichilium and hypochilium, rarely the keels inconspicuous; terminal part two-lobed, deeply and more or less widely retuse in front, c. 2.5–4.5 by 3.5–5.5 mm when flattened; tip either or not recurved and obtuse to

acute; lobes obliquely semi-elliptic, c. 1.1–3.5 mm wide, with rounded top, either or not at the base with a small triangular lobe 0.2 by 0.2 mm. *Column* hardly to somewhat widened to the apex, 2–2.5 mm long; hood small, truncate, top margin more or less irregularly notched, without distinct lateral lobes. *Anther* more or less irregularly orbicular to transversely elliptic in outline, c. 0.8–1.8 by 0.8–1.2 mm; top obtuse to retuse. Pollinia obliquely pear-shaped, c. 0.3–0.5 by 0.25–0.4 mm. *Stigma* c. 1.5–2 by 0.5–1.3 mm including the 0.5–1.4 mm long rostellum; rostellum lobes narrowly triangular, curved, acute; hamulus ovate-lanceolate, c. 0.5 by 0.14 mm. *Fruit* not seen.

Distribution. Borneo: Sabah (Interior Residency). Sarawak (1st and 5th Division). Kalimantan (Kalimantan Barat). 5 collections: Bogor, cult. Hort. (Hallier s.n., 107) (BO, L, U); Moulton 132 (SING); Museum collectors s.n. (XI-1909) (K); Vermeulen & Duistermaat 913, 1108 (L).

Ecology. Once recorded epiphytic on the base of a tree trunk or terrestrial in very low open undisturbed kerangas with dense bushes and patches of open higher forest with a.o. *Eugenia*, *Ficus* and *Tristania*; altitude 1100–1500 m. Fl. March, Nov., Dec.

Collector's notes. Pseudobulbs olive green, tinged red near the base, to somewhat yellowish green. Leaves medium green. Inflorescence and bracts (very) pale green. Flowers entirely white, lip occasionally with a yellow dot between the lobes of the epichilium. Column white to yellowish, top margin dark (yellowish) brown. Ovary and pedicel cream-coloured, sometimes brownish-black furfuraceous due to a blackish mucilage which covers the hairs.

SECTION ADVENA de Vogel, *sect. nov.*

In partibus vegetabilibus *Pholidotae chinensi* similis, sed multo divergens in ornameto labelli, quod proximaliter 3 vel 5 carinas breves lamellatas gaudet, quarum margines superiores ligula telae distaliter juncti cum simul tum dorso hypochilii. Epichilium in parte basali et centrali 5 carinis gerens, quarum 2 plusminusve distinctiores transversaliter in junctura epichilii hypochiliique positae, et 3 elevatae tumidae plusminusve undulatae epichilii apicem versus convergentes. – Typus: *Pholidota avena* (Par. & Rchb. f.) Hook. f.

Creeping epiphytes, entirely glabrous except for root hairs and minute hairs on the floral bracts. Roots which attach the plant to the substratum present along the entire rhizome, long, thin. Rhizome creeping, the parts between the pseudobulbs short. Scales of the young shoot later all enclosing the pseudobulb, 5, soon desintegrating; thin herbaceous; nerves many, rather conspicuous. *Pseudobulbs* close together, all turned to one side of the rhizome. *Leaves* two per pseudobulb, rather small. *Blade* lanceolate; herbaceous; main nerves 3–5, small nerves many. *Raceme* synanthous with the about halfway developed young leaves, rather few-flowered; flowers opening more or less simultaneously. Scape short, wiry, in fruit somewhat elongating. Rhachis more or less pendulous, more or less zig-zag. Sterile bracts absent. *Floral bracts* persistent, ovate to ovate-lanceolate; thin herbaceous; nerves rather few, all about equal; inside with scattered (groups of) minute hairs. *Flowers* turned more or less to one side, not resupinate, remaining rather closed. Pedicel more or less straight, ovary in section about star-shaped by the 6 high, narrow ribs. *Median sepal* rather deeply concave, ovate; midrib with a low rounded keel. *Lateral sepals* rather deeply concave, ovate-oblong; midrib with a low keel. *Petals* irregularly obovate to obovate-oblong to about

spathulate. *Lip* slightly sigmoid, broadly inserted. *Hypochilium* boat-shaped, with distinct lateral lobes; keels 3–5, inside at the back of the hypochilium, short, high, their upper margins at the back joined together and to the back of the hypochilium by a strip of tissue. *Epichilium* somewhat recurved, two-lobed with distinctly retuse top; junction with the hypochilium marked by 2 transverse, more or less pronounced keels, central part with 3 swollen, elevated, more or less wavy keels which converge to the top of the epichilium. *Column* without column foot, short, its top with a rather small, hardly lobed hood which is shorter than the stigma. *Anther* inserted near the top margin of the hood, in outline more or less transversely elliptic. Pollinia pear-shaped. *Stigma* shallow, in outline more or less elliptic to almost rectangular; rostellum rather pronounced, hamulus absent. *Fruit* and seeds not seen.

Distribution. South-east Asia: Burma, Tenasserim. 1 species.

Ecology. See under the species.

Note. Related to sect. *Chinenses* but much deviating in the ornamentation of the lip.

7. *Pholidota advena* (Par. & Rchb. f.) Hooker f. – Fig. 7.

Pholidota advena (Par. & Rchb. f.) Hooker f., Fl. Brit. India 5 (1890) 846; Grant, Orch. Burma (1895) 160; Pfitzer & Kraenzlin., Pfl. R. Heft 32 (1907) 151; Hundley & Chit, List trees etc. Burma, ed. 3 (1961) 264. – *Coelogyne* (*Pholidota*) *advena* Par. & Rchb. f., Otia Bot. Hamb. 1 (1878) 47–Type: Parish 296 (holo K; iso W).

Plant 11–18 cm high. Roots to more than 15 cm by 0.5–1 mm. Scales of the young shoot 5, longest one 2.2–4.5 mm long; top acute; membranous; nerves 15–37, rather conspicuous. *Pseudobulbs* close together, slender fusiform, 2.2–5 cm long, when dried finely longitudinally wrinkled. *Leaves* two per pseudobulb. Petiole 0.7–2 by 0.1–0.3 mm. *Blade* lanceolate, 7.5–11 by 1.8–2.8 cm; top acute (to acuminate); herbaceous; main nerves 3–5, above somewhat prominent, below more so, small nerves 28–40, slightly prominent. *Raceme* synanthous with the about halfway developed young leaves, c. 10-flowered. Scape wiry, beyond the scales 0.5–1.5 cm long, c. 1 mm diam., in fruit elongating to c. 3 cm. Rhachis 5–5.5 cm long; internodes c. 5–6 mm long. Sterile bracts absent. *Floral bracts* persistent, patent, when flattened ovate to ovate-lanceolate, 8–12 by 4–7.5 mm; top acute to obtuse; membranous; inside with scattered (groups of) minute hairs; nerves 9–11, rather prominent. *Flowers* laxly distichous, not resupinate, remaining rather closed. Pedicel angular by the ribs, c. 2 by 0.5–1 mm. Ovary with 6 high, narrow ribs, 4–4.5 by 1.7–2.5 mm; glabrous or with scattered hairs. *Median sepal* ovate, 8–9 by 4–5 mm; top obtuse to acute; nerves 5, midrib with a low rounded keel. *Lateral sepals* ovate-oblong, towards the top somewhat twisted, 8–9 by 3.7–4 mm; top acute; nerves 3–4, lateral ones sometimes branched, midrib with a low keel. *Petals* irregularly obovate to obovate-oblong to about spathulate, towards the base narrowed, c. 7–8 by 3–4.2 mm; top acuminate, its tip rounded; midrib prominent, with two branches. Lip 7–8 mm long. *Hypochilium* 5–6 mm long, 3.5–4.5 mm wide, 3.7–4 mm high; lateral lobes more or less erect, the margins turned lateral, in front lowering and there rounded; main nerves 5, central one distinctly swollen, next two prominent, lateral ones less prominent, each nerve or only the central three at the back

of the hypochilium elevated into a short, high, lamellate keel, at the back all joined together by a small horizontal strip of tissue. *Epichilium* two-lobed, 2.3–2.5 by 5–6 mm; top retuse, tip more or less acute; lateral lobes semi-orbicular, c. 2 by 2.5–3.3 mm, each with several radiating nerves; junction with the hypochilium marked by two transverse, more or less pronounced keels; central part with three elevated, swollen, more or less wavy keels which converge to the top of the epichilium and which are the continuation of the 3 central nerves. *Column* without column foot, 4.5–5 mm long; hood wing-like, laterally appressed against anther and stigma which are covered for about half their length by it, its top margin irregular. *Anther* in outline more or less transversely elliptic, at the base somewhat wider, c. 3 by 2–2.3 mm; base and top retuse. Pollinia pear-shaped (see also note 1). *Stigma* more or less narrowly elliptic in outline, 3–3.5 by 1.3–2 mm; rostellum more or less broadly band-like, semi-orbicular to semi-elliptic, 1.5–2 by 1.3–2 mm. *Fruit* and seeds not seen.

Distribution. Burma (Tenasserim). 2 collections: Parish 296 (W), Rule 5348 (K).

Ecology. Not known.

Collector's notes. Sepals and petals light green. Lip white. Anther (?orange-)brown.

Note. According to the drawing by Parish (a copy on the sheet in W) the pollinia bear long caudicles which end into a swollen gland, and the relatively large fruit bears six strong keels.

SECTION ARTICULATAE (Rchb. f.) Pfitzer

Pholidota sect. *Articulatae* (Rchb. f.) Pfitzer, Pfl. Fam. II, 6 (1888) 128; *Coelogyne* sect. *Articulatae* Rchb. f., Walp. Ann. 6 (1861) 238.– *Pholidota* sect. *Otochiloides* Benthām, in Benthām & Hooker, Gen. Pl. 3 (1883) 520; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 144; Butzin, Willdenowia 7 (1974) 259; in Schltr, Orch. 1 ed. 3 (1986) 956.– Type species: *Pholidota articulata* Lindley.

Pendulous epiphytes or occasionally lithophytes, entirely glabrous except for root hairs and often minute hairs on the bracts. Roots which attach the plant to the substratum rather short, present only on the basal part of the stems and along the rhizome, more or less profusely branched; aerial roots from the nodes below some of the pseudobulbs, without or with few branches. Rhizome very short, creeping. Stems one or several, pendulous, sometimes branched, each formed by several 'superposed' pseudobulbs: each new shoot develops from near the apex of the last developed pseudobulb. Scales of the young shoot 2–7, later all enclosing the base of the developing pseudobulb, rather soon desintegrating; nerves rather few to many, sometimes inconspicuous. *Pseudobulbs* placed on top of each-other, attached below the top of the former. *Leaves* two per pseudobulb. *Blade* (ob-)ovate to linear-lanceolate, herbaceous, many-nerved, main nerves 3–9. *Raceme* synanthous with the young leaves, rather few-to many-flowered; flowers opening more or less simultaneously. Scape short to rather short, wiry. Rhachis more or less pendulous, rather short, either or not zig-zag. Sterile bracts 0–3. *Floral bracts* either or not turned secund, persistent or caducous, transversely elliptic to oblong, either or not oblique; nerves many, fine, all about equal. *Flowers* rather closed to widely open, alternating in two rows, either or not turned secund, not resupinate but lip more or less directed downwards. Pedicel more or less

terete to angular, curved, ovary more or less angular due to the ribs. *Median sepal* rather concave, (ob-)ovate to ovate-oblong; midrib more or less prominent, sometimes with a rounded keel. *Lateral sepals* somewhat asymmetric, more or less deeply concave, ovate to ovate-lanceolate; midrib with a more or less distinct keel. Petals symmetric to slightly asymmetric, ovate to linear. *Lip* narrowly to rather broadly inserted on the column, hardly to distinctly sigmoid. *Hypochilium* concave, more or less boat-shaped; lateral margins either or not lobe-like; inside at the back with 3–7 keels. *Epichilium* small to large, hardly to distinctly recurved, hardly to distinctly two-lobed, without or with 4 keels. *Column* without column foot, short, its top with a somewhat developed hood which is shorter or longer than the rostellum and which has laterally on either side a more or less distinct lobe. *Anther* inserted halfway or on the top margin of the hood, elliptic to about heart-shaped; top retuse to triangular. Pollinia about pear-shaped in outline, either or not distinctly flattened. *Stigma* more or less obliquely cup-shaped; rostellum either (narrowly) triangular or short and band-like. *Fruit* ellipsoid, on top the perianth usually persistent; jugae smooth, band-like, either or not with a longitudinal ridge, valvae either or not centrally with a longitudinal keel.

Distribution. South-east Asia: N. India, Nepal, Sikkim, Bhutan, SE. China, Burma, Thailand, Laos, Cambodia, Vietnam. Malesia: Malay Peninsula, Sumatra, Java, Borneo, Celebes. 3 species.

Ecology. Epiphytes in primary lowland to upper montane forest, sometimes lithophytic on boulders; altitude 150–2700 m.

KEY TO THE SPECIES OF SECTION ARTICULATAE

- 1a. Floral bracts asymmetric, all secund to the side opposite to the flowers and there partly overlapping, persistent till after fruiting. Lip simple, epichilium hardly to somewhat developed, not or very slightly recurved10. **P. recurva** Lindley
- b. Floral bracts symmetric, distichous, not secund, dropped before fruit is set. Lip subdivided in a distinct hypochilium and epichilium, the latter more or less distinctly recurved.....2
- 2a. Margins of the hypochilium drawn out into distinct erect lateral lobes. Keels of the hypochilium 3, the lateral two continuing far on the epichilium; in addition two short lateral keels present on the epichilium.....9. **P. guibertiae** Finet
- b. Margins of the hypochilium not drawn out into lobes. Keels (3–)5(–7), only present in the basal half of the hypochilium8. **P. articulata** Lindley

8. *Pholidota articulata* Lindley – Fig. 8, Plate 2a & b.

Pholidota articulata Lindley, in Wall. Cat. (1829) 1992 (nom. nud.); Gen. & Sp. Orch. (1830) 38; Bot. Reg. 25, Misc. 57 (1839) 44; Steudel, Nomencl. Bot. (1841) 324; Loudon, Hort. Brit. Suppl. 3 (1850) 607; Rchb.f., Bonpl. 4 (1856) 329; Lindley, J. Proc. Linn. Soc. (Bot.) 1 (1857) 173; Drury, Handb. Ind. Fl. 3 (1869) 340; B. & H., Gen. Pl. 3 (1883) 520; Pfitzer in E. & P., Pfl. Fam. II, 6 (1888) 128, fig. 126; Hooker f., Fl. Brit. India 5 (1890) 884; Stein, Orch.-b. (1892) 515, fig.; Kerchove, Livre Orch. (1894) 162, 184, fig.; Grant, Orch. Burma (1895) 161; King & Pantl., Ann. R. Bot. Gard. Calc. VIII, 1 (1898)

- 146; Ibid. VIII,3 (1898) pl. 205; J.J. Smith, Orch. Java (1905) 155; Duthie, Ann. R. Bot. Gard. Calc. 9 (1906) 116; Ridley, Mat. Fl. Malay Pen. 1 (1907) 136; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 156, fig. 2; Finet, Not. Syst. 1 (1909) 257; J.J. Smith, Orch. Java, Fig.-Atlas (1909) fig. CXV; Koord., Exk. Fl. Java 1 (1911) 366; Schltr., Orch. (1915) 156; Gagnep., Fl. Gen. I.-C. 6 (1933) 320; J.J. Smith in Fedde, Rep. 32 (1933) 171; Backer, Bekn. Fl. Java (em. ed.) 12, 1 (1952) 137; Holttum, Orch. Malaya (1953) 233; Mitra, Fl. Pl. East. India 1 (1958) 307; Seidenf. & Smit., Orch. Thail. II,1 (1959) 139 f. 108; Hô & Du'o'ng, Fl. Vietnam (1960) 608, 609, fig. (Vietnamese); Seidenf. & Smit., Orch. Thail. IV,2 (1964) 759; H. Teuscher, Amer. Orch. Soc. Bull. 41 (1972) 217; Backer & Bakh.f., Fl. Java 3 (1968) 285; Seidenf., Bull. Mus. Hist. Nat. Paris III, 71, Bot. 5 (1972) 141; Hô, Ill. Fl. S. Vietnam ed. 2,II (1972) 1016, f. 5020 (Vietnamese); Banerji & Thapa, J. Bombay Nat. Hist. Soc. 68 (1972) 664; Hara, Stern & Will., En. Fl. Pl. Nepal 1 (1978) 53; Pradhan, Ind. Orch.: Guide 2 (1979) 294, 626, fig.; J.B. Comber, Orchid Dig. (1983) 76, fig., phot.; Seidenf. & de Vogel, Opera Bot. 89 (1986) 96, fig. 54, pl. 7c.-*Coelogyne articulata* Rchb.f., Walp. Ann. 6 (1861) 238.- Type: Wallich 1992 (lecto K, here chosen; iso G, K).
- Pholidota khasiyana* Rchb. f., Bonpl. 4 (1856) 329.- *Coelogyne khasiyana* ('khasiyana') Rchb. f., Walp. Ann. 6 (1861) 238.- Type: Lobb 53 (holo W; iso K).
- Pholidota griffithii* Hooker f., Ic. Pl. III,9 (1889) pl. 1881; Fl. Brit. India 5 (1905) 845; Pfitzer & Kraenzlin, Pfl. R. Heft. 32 (1907) 157, fig. 54 A-C; Schltr., Orch. (1915) 156; Gagnep., Fl. Gen. I.-C. 6 (1933) 329; Seidenf. & Smit., Orch. Thail. (1959) 140, pl. 33; Hô & Du'o'ng, Fl. Vietnam (1960) 608 (Vietnamese); Seidenf. & Smit., Orch. Thail. (1964) 759, pl. 33; Arora, Bull. Bot. Survey India 11 (1969) 438, fig.; Banerji & Thapa, J. Bombay Nat. Hist. Soc. 68 (1972) 664; Hô, Ill. Fl. S. Vietnam ed. 2 (1972) 1017, f. 5022 (Vietnamese); Tuyama in Ohashi, Fl. E. Himal. 3 (1975) 163; Hara, Stern & Will., En. Fl. Pl. Nepal 1 (1978) 53; Pradhan, Ind. Orch.: Guide-2 (1979) 294, 626, fig.- *Pholidota articulata* var. *griffithii* (Hooker f.) King & Pantl., Ann. R. Bot. Gard. Calc. VIII,1 (1898) 147; Ibid. VIII,3 (1898) pl. 204; Duthie, Ann. R. Bot. Gard. Calc. 9 (1906) 116; Gagnep., Not. Syst. 14 (1951) 123; Babu, Herb. Fl. Dehra Dun (1977) 495.- Syntypes: Hooker s.n., Sikkim, Jerai (lecto K, here chosen; iso K), Griffith s.n., Kew Distr. no. 5045 (K), Clarke 11810 (K).
- Pholidota obovata* Hooker f., Fl. Brit. India 5 (1890) 845; Pfitzer & Kraenzlin, Pfl. R. Heft. 32 (1907) 157; Mitra, Fl. Pl. East. Ind. 1 (1958) 308; Hundley & Chit, List of trees etc., Chit, List trees Burma ed. 3 (1961) 265.- *Pholidota articulata* var. *obovata* (Hooker f.) Tang & Wang, Acta Phytotax. Sin. 1 (1951) 40, 79.- Syntypes: Griffith 5034 (lecto K, here chosen), Simons s.n., Icon. (CAL, dupl. K).
- Pholidota repens* Rolfe, Kew Bull. 56 (1891) 199; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 156.- Type: O'Brien s.n., cult. (holo K).
- Pholidota lugardii* Rolfe, Kew Bull. 73 (1893) 6; J. Linn. Soc. Bot. 36 (1903) 24; Pfitzer & Kraenzlin, Pfl. R. Heft. 32 (1907) 156; Schltr., Fedde Rep. Beih. 4 1919) 189.- Type: Lugard s.n., Chin Hills (holo K).
- Pholidota decurva* Ridley, J. Linn. Soc. 32 (1896) 328; Pfitzer & Kraenzlin, Pfl. R. Heft. 32 (1907) 158; Ridley, Fl. Malay Pen. 4 (1924) 139.- Type: Curtis s.n. (IX-1890) (holo SING).
- Pholidota minahassae* Schltr., Fedde Rep. 10 (1911) 20; Ibid. 21 (1925) 134.- *Pholidota articulata* var. *minahassae* (Schltr.) J.J. Smith, Bull. J. Bot. Btzg III, 1 (1919) 95.- Syntypes: Schlechter 20453 (holo lost; lecto K, here chosen), Schlechter 20627 (not seen).
- Pholidota* sp. (GT 426), Seidenf. in Seidenf. & Smitin., Orch. Thailand (1959) 140, f. 109. Specimen: GT 426 (C).

Plants (13-)24-53(-85) cm long. Aerial roots (2-)7-10 cm long, 1-2 mm diam. Pseudobulb scales (2-)5-6(-7); smallest one (1-)2-5(-8) mm long, more or less lignified, longest one (9-)10-30(-33) mm long; papery-herbaceous, more or less wrinkled when dried; top obtuse to rounded, sometimes acute; (12-)15-50 nerved. *Pseudobulbs* more or less slender to rather swollen, (1.4-)3.5-9(-14) cm long; when dried not shining, with several sharp coarse folds and more or less wrinkled. Petiole (5-)7-15(-21) by (1-)1.5-3(-5) mm. *Leaf blade* (ob)ovate to linear-lanceolate, (3.5-)6-13(-21) by (1-)1.5-3.5(-5) cm; top acute to acuminate, sometimes obtuse; herbaceous; main nerves (4-)5-7(-9), slightly prominent above and below, small nerves

(18-)23-59, hardly prominent. *Raceme* synanthous with the just emerging to almost entirely developed young leaves, (6-)10-30(-35)-flowered. Scape (4-)14-35(-65) mm beyond the scales, 0.5-1 mm diam., in fruit elongating to (2-)3.5-5(-6) cm. Rhachis almost straight to distinctly zig-zag, more or less curved, (1-)3.5-7(8.5) cm long; internodes (1-)1.5-5(-8) mm long. Sterile bracts absent. *Floral bracts* distichous, not secund, not overlapping each other, usually soon shed after opening of the flowers, almost orbicular, (ob)ovate to oblong, 5-15(-19) by 3-10(-14) mm; top rounded to acute; papyraceous-herbaceous; nerves (8-)9-21(-25), some branching near the base but most only towards the top; often inside all over with scattered hairs. *Flowers* opening somewhat to rather wide, resupinate. Pedicel more or less terete to angular, curved, (0.5-)1-5(-10) by 0.2-0.5(-1) mm. Ovary (1.3-)2-5(-7) by (0.5-)0.7-2(-2.5) mm. *Median sepal* ovate to ovate-oblong, (3-)4-9(-10.7) by (1.5-)1.8-4(-5.5) mm; top rounded to obtuse (to acuminate); nerves (3-)5(-7), midrib prominent, sometimes a low rounded keel. *Lateral sepals* ovate to ovate-lanceolate, (3.5-)4-9.5(-11) by (1.2-)1.5-4.5(-5) mm; top acute to acuminate; midrib a more or less raised keel, additional nerves (2-)3-4(-6). *Petals* ovate to ovate-lanceolate, sometimes slightly asymmetric, (3-)4-8(-9.2) by (1.1-)1.5-3.5(-4.5) mm; top obtuse to acuminate, mostly acute; nerves (1-)3-5. *Lip* broadly inserted, constricted at the junction of epichilium and hypochilium, (3.2-)4-8(-10) mm long. *Hypochilium* boat-shaped, more or less inflated, more or less tapering to the top, (2-)3-6.5(-8) mm long, (1-)1.3-4(-5) mm wide, (1-)1.5-3.5 mm high; lateral margins not drawn out into lobes, more or less laterally recurved, where passing into the epichilium more or less broadly rounded; nerves (7-)9-11; keels (3-)5(-7) in the basal half of the hypochilium, free or fused at the back. *Epichilium* more or less recurved, rarely decurved, more or less two-lobed, 1.5-4(-5) by 2-5(-7.5) mm; top retuse; lobes rounded, 1.5-2 by 1.5-2.5(-4) mm; sometimes finely papillose. *Column* stunted, shortly club-shaped to shortly spatulate in outline, (1-)1.5-4.5(5) mm long; hood small to rather pronounced; top margin irregular, with 2 more or less conspicuous lateral lobes, each of these often with one tooth. *Anther* inserted about halfway the hood, more or less heart-shaped, 0.6-1.5(-2.5) by (0.5-)0.7-1.75(-2.5) mm; top about triangular, recurved. Pollinia more or less flattened, about pear shaped, sometimes rather angular to almost orbicular, (0.25-)0.3-0.75(-0.9) by 0.25-0.6(-0.75). *Stigma* orbicular to elliptic in outline, (0.3-)0.5-1(-1.8) mm diam.; rostellum (narrowly) triangular, (0.3-)0.5-1.5(-2) by 0.5-1.5(-2) mm, with acute to acuminate top. *Fruit* 10-21 by 5-10 mm; jugae with a longitudinal low ridge; valvae centrally with a longitudinal keel. Seeds to 0.4 mm long; embryo to 0.2 mm long.

Distribution. India (Dehra Dun, Garhwal, Kumaun, Darjeeling, Assam, Manipur). 57 collections (AMES, BM, BR, C, E, G, K, L, MEL, NY, OXF, U, S, SING, W). Nepal. 12 collections (BM, E, K, KYO). Sikkim. 8 collections (AMES, BM, FI, G, K, L, MEL, W). Bhutan. 4 collections (BM, E, K). China (Yunnan). 22 collections (AMES, E, K, NY, W). Burma (Kachin State, Chin, Shan State, Tenasserim). 16 collections (AMES, BM, E, K, W). Thailand (all provinces). 77 collections (BKF, BO, BRI, C, G, K, L, P, SING, TI). Laos. 3 collections (P). Cambodia. 1 collection (NY, P). Vietnam (Gia Lai-Cong Tum = Kontum, Lam Dong = Lang Biang = Tuyen Duc). 7 collections (K, NY, P). According to Averyanov also in Vinh Phu. Malay

Peninsula (Pahang, Perak). 2 collections (SING). Sumatra (Sumatera Utara, Sumatera Barat, Lampung). 11 collections (AMES, BO, L). Java (Jawa Barat, Jawa Tengah, Jawa Timur). 15 collections (BO, K, L, WRS�). Borneo (Kalimantan Selatan). 2 collections (K, L). Celebes (Minahassa). 2 collections (K).

Ecology. Epiphytes, especially in Yunnan lithophytes on boulders; altitude (150–)300–2000 m, in Yunnan up to 2700 m. Fl. & fr. all year round; a distinct flowering season is present from May to Sept.

Collector's notes. Sepals and petals whitish, cream- coloured, greenish white to pink, sometimes the tips recorded darker so; several times recorded translucent. Lip similarly coloured or somewhat darker; keels to buff- coloured; junction of hypochilium and epichilium usually with a (greenish- yellow, ochrish to yellowish- brown, more or less large blotch; epichilium sometimes recorded white. Column similarly coloured as the sepals or darker so, to purplish red. Anther sometimes bright red. Pollinia yellow. Fragrant (6 records), 4 times defined as chocolate smell.

Notes. 1. Small- flowered specimens (often referred to as *P. griffithii*, but the types of this name all belong to the large- flowered form) have a median sepal of which the length varies between 4 and 5.3 mm. The hypochilium is rather slender. The flowers do not open widely. The rhachis of the inflorescence is distinctly zig- zag. This form occurs in the Himalaya, Assam, the Malay Peninsula, Sumatra and Java.

In the large- flowered form (*P. articulata* s.s.) the length of the median sepal varies in general between 6 and 9 mm. The rhachis is usually much less zig- zag, but especially in specimens with a median sepal between 6 and 6.5 mm distinctly zig- zag rhachi occur as well. The flowers of this form usually open rather widely, and the hypochilium is usually rather to much inflated. This form occurs over the entire area, and several plants have been given specific rank.

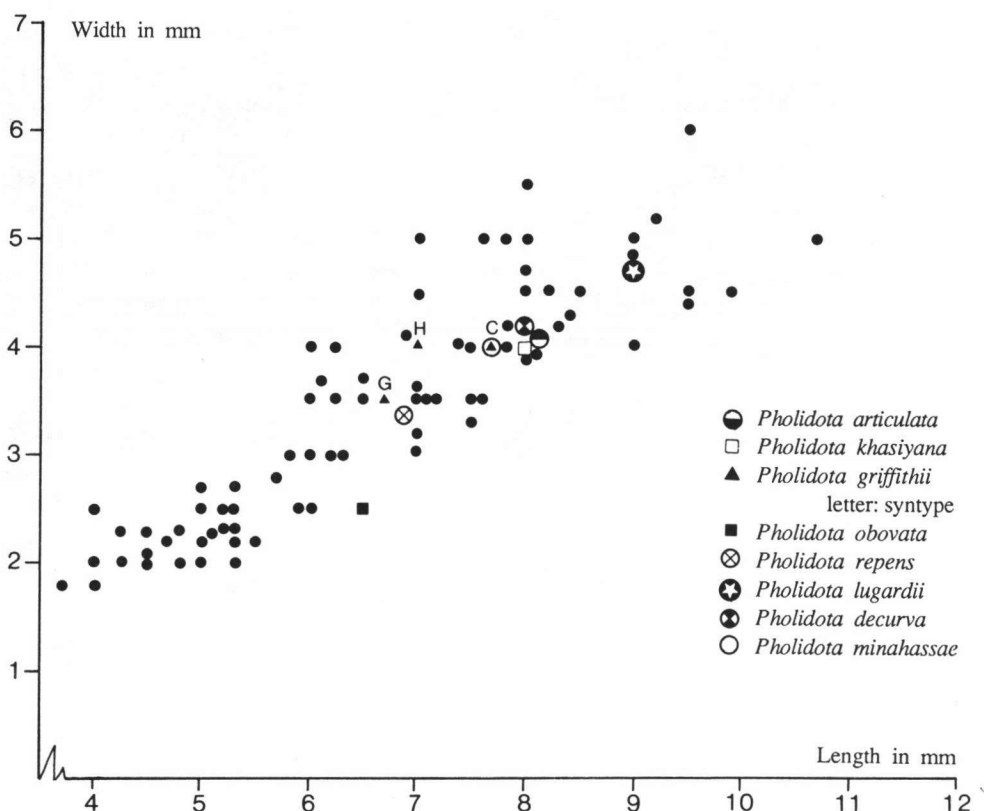
As part of their training in herbarium taxonomy two students, Mr. M. Kruk and Mr. G. Stehouwer, studied the material of this species in order to find out whether the two groups could be kept separate. They found intermediates in 'zig- zagness' and in inflation of the hypochilium. In addition they measured length and width of the median sepal, the lateral sepals, the petals, the lip, the floral bracts and the column. It appeared that several specimens neatly filled the gap between the two groups, see diagram 1, where the length of the sepal is plotted against its width. Diagrams for the quantitative data of other organs gave similar results: intermediate specimens exist linking the two groups. For this reason no varieties are distinguished under *P. articulata*.

2. Based on different specimens altogether 7 names were proposed for *P. articulata*. All types of these belong to the large- flowered group, including the 3 syntypes of *P. griffithii* (see diagram).

9. *Pholidota guibertiae* Finet. – Fig. 9.

Pholidota guibertiae Finet, Not. Syst. 1 (1910) 255; Gagnep., Fl. Gen. I.- C. 6 (1933) 327; Hô & Du'o'ng, Fl. Vietnam (1960) 608, 609, ill. (Vietnamese); Hô, Ill. Fl. S. Vietnam 2, ed. 2 (1972) 1016, f. 5021 (Vietnamese). Type: Guibert 18 (holo P).

Plant over 25 cm long. Roots c. 3 mm diam. Pseudobulb scales 5; smallest one c. 2 m long, longest one c. 22 mm long; top obtuse; subcoriaceous, wrinkled when dried;



Scatter diagram of the dimensions of the median sepal in *Pholidota articulata*: width plotted against length. The symbols indicate the dimensions of the types of this species and its synonyms. The letters indicate the three syntypes of the synonym *P. griffithii*.

nerves not visible. *Pseudobulbs* rather slender, 1.6–4.2 cm long; when dried not shining, rather irregularly wrinkled. Petiole c. 18 by 1.5 mm. *Leaf blade* linear-lanceolate, c. 13 by 2.5 cm; top acute; herbaceous; main nerves 7–9, especially below prominent, small nerves 30–52, much less prominent. *Raceme* synanthous with the young, about halfway developed leaves, 10-flowered. Scape flexuous, 68 mm beyond the scales, 0.8 mm diam. Rhachis not zig-zag, c. 4.5 cm long; internodes 3–6 mm long. Sterile bracts absent. *Floral bracts* not secund, shed before anthesis, obovate, c. 14 by 11 mm; top obtuse; herbaceous; nerves c. 20; glabrous. *Flowers* widely opening, not resupinate. Pedicel c. 3.5 by 0.5 mm. Ovary c. 3 by 1 mm. *Median sepal* ovate-oblong, c. 12 by 5.5 mm; top acute; nerves 7. *Lateral sepals* ovate-oblong, c. 11.5 by 4 mm; top acute; nerves 5, midrib a distinct keel. *Petals* linear, c. 11.5 by 1 mm; top acute; nerves 3, midrib to the top, lateral ones much shorter. *Lip* narrowly attached, when flattened violin-shaped, c. 12 by 9 mm. *Hypochilium* with distinct high lateral lobes, 4.5 mm long; lateral lobes erect, in front rounded; keels 3, low, somewhat swollen, at the back fused into a c. 1 mm high lobed structure with on each side an additional triangular lobe, the two lateral keels continuing on the epichilium, the central one up to the junction of hypochilium and epichilium. *Epichilium* recurved, transversely elliptic, c. 5.7

by 9.7 mm; top slightly retuse, tip more or less acuminate; keels 4, the central 2 continuing to c. 2 mm from the top margin, somewhat higher than on the hypochilium, the lateral 2 shorter, on the junction of hypochilium and epichilium, c. 2.3 mm long. *Column* shortly club-shaped, c. 5 by 2 mm; hood not distinctly developed; top margin laterally on each side with a triangular short tooth. *Anther* inserted near the top margin of the hood, about transversely elliptic in outline, c. 1.5 by 2 mm; top obtuse. Pollinia about pear-shaped, c. 1 by 0.8 mm. *Stigma* more or less cup-shaped, the basal rim and the triangular, c. 1 by 1 mm big rostellum pronounced. *Fruit* not seen.

Distribution. Vietnam (Binh Dinh, Tuyen Duc). Only the type seen from P (see note), but collections from two other localities cited by Hô (1972).

Ecology. Not known.

Note. The type collection consists of one plant and a detached inflorescence. The first impression is that the two parts do not belong together, because the lip of the flower is quite different from that in other species of this section as well as all other species of *Pholidota*. However, Hô published an illustration of this species which is evidently made from living material, so it must be concluded that the parts belong together.

10. *Pholidota recurva* Lindley – Fig. 10.

Pholidota recurva Lindley, Gen. & Sp. Orch. (1830) 37; B. & H., Gen. Pl. 3 (1883) 520; Hooker f., Ic. Pl. 3,9 (1889) pl. 1878; Fl. Brit. India 5 (1890) 844; King & Pantl, Ann. R. Bot. Gard. Calc. 8,1 (1898) 147; Ibid. 8,3 (1898) pl. 206; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 158; Gagnep., Fl. Gen. I.-C. 6 (1933) 329; Mitra, Fl. Pl. E. India 1 (1958) 308; Seidenf. & Smit., Orch. Thail. 4,2 (1964) 759, fig. 566; U.C. Pradhan, Ind. Orch.: Guide 2 (1979) 293, 627, fig.; Seidenf. & de Vogel, Opera Bot. 89 (1986) 97, fig. 55, pl. 7d. – *Coelogyne recurva* (Lindley) Rchb.f., Walp. Ann. 6 (1861) 237. – Type: Wallich s.n. (holo K; iso ?BM '1819', C, K).

Plants 14–45(?–100) cm long. Aerial roots to more than 10–17 cm long, 0.5–1.5 m diam. Pseudobulb scales 6–7; smallest one 3–5 mm long, longest one 13–20(–35) mm long; top acute; herbaceous, more or less wrinkled when dried; 25–45-nerved. *Pseudobulbs* rather swollen to very slender, (1–)2–6.5(–11.5) cm long; when dried shining, smooth, angular with several coarse sharp folds. Petiole (2–)3–5(–13) by 1–2 mm. *Leaf blade* lanceolate to linear-lanceolate, 3–7(–10.5) by 0.9–1.8 cm; top acute; (stiff) herbaceous; main nerves 3–5, slightly prominent above and below, small nerves 16–34(–46), hardly prominent. *Raceme* synanthous with the young and somewhat emerging to more than 3/4 developed leaves, 24–35(–42)-flowered. Scape 6–15(–33) mm beyond the scales, 0.5–1 mm diam., in fruit elongating to 2–3 cm. Rhachis more or less distinctly curved, not zig-zag, 4–6.5 cm long; internodes c. 2 mm long. Sterile bracts 0–3, like the floral bracts but more appressed. *Floral bracts*, distichous, on the side opposite to the flowers, partly overlapping each-other, persistent till after fruiting, more or less transversely semi-elliptic, somewhat oblique, 4–6.5(–8) by 6–8(–9) mm; top broadly rounded to truncate; herbaceous; nerves 11–22, some of these near the base but most only towards the top branching; sometimes inside on the lateral- and top margin with few minute, scattered (pairs of) hairs. *Flowers* rather closed to sometimes rather widely opened, all turned to one side. Pedicel 1–1.5(–2) by 0.3–0.8 mm. Ovary

2–3.5(–4) by 0.7–1.2 mm. *Median sepal* (ob)ovate, 3.2–4 by 1.8–2.3 mm; top obtuse (to acute); nerves 3–5. *Lateral sepals* ovate to ovate-oblong, 3.3–4(–4.3) by 1.5–2.2 mm; top acute, the tip sometimes apiculate; midrib a somewhat raised, rounded low keel, additional nerves 1–2(–3). *Petals* ovate-oblong, 2.7–3.3 by 0.6–1(–1.3) mm; top more or less rounded (to truncate); nerve(s) 1(–3). *Lip* broadly inserted, (3–)3.5–4 mm long. *Hypochilium* wide, rather shallowly broadly concave, (2–)2.5–3.3 mm long, 2.5–3.5 mm wide, 0.5–1.2(–1.8) mm high, lateral margins not lobe-like, where passing to epichilium broadly rounded; nerves 5, in the basal half of the hypochilium all or only the 3 central ones swollen into low and rounded (to rather high and narrow) keels which are fused at the base. *Epichilium* hardly to somewhat developed, not recurved, faintly to rather distinctly two-lobed, 0.7–1 by 2–2.5 mm; top (usually broadly) retuse; lobes more or less broadly rounded, semi-orbicular to transversely elliptic, 0.4–0.8 by 0.7–1(–1.5) mm. *Column* shortly club-shaped, 2.3–3 mm long; hood only slightly widened, hardly wing-like, the lateral margins turned to the front, the top truncate to retuse, usually irregular. *Anther* inserted near the top margin of the hood, irregularly elliptic in outline, 0.5–0.7 by 0.8–1.2 mm; top retuse to truncate. Pollinia 0.3–0.4 by 0.2–0.25 mm. *Stigma* more or less semi-orbicular in outline, 0.7–1.2 by 0.9–1.2 mm; rostellum broad, rather narrow, truncate, 0.3–0.5 by 0.9–1.2 mm; margin somewhat swollen. *Fruit* body c. 5 by 4 mm; jugae flat, valvae not carinate. Seeds not seen.

Distribution. Nepal. 1 collection (C, K, BM). Sikkim. 1 collection (BM, BR, C, FI, G, K, L, W). Burma (Tenasserim). 1 collection (E, K). Thailand (North, Northeast, Eastern). 17 collections (AMES, BKF, BO, C, G, L, SING). Vietnam. 1 collection (P).

Ecology. Epiphytes; altitude 700–1800 m. Fl. & fr. July–Dec.

Collector's notes. Flowers (pale) pinkish-brown to orange-brown. Pollinia yellow.

SECTION CAMELOSTALIX (Rchb. f.) Carr

Pholidota sect. *Camelostalix* (Rchb. f.) Carr, J. Mal. Br. R. As. Soc. 11 (1933) 73; Butzin, Willdenowia 7 (1974) 258; in Schltr, Orch. 1 ed. 3 (1986) 955. – *Coelogyne* sect. *Camelostalix* Rchb. f., Walp. Ann. 6 (1861) 238. – *Camelostalix* Pfitzer, Pfl. R. Heft 32 (1907) 159. – Type species: *Pholidota camelostalix* Rchb. f.

Creeping epiphytes, entirely glabrous except for root hairs. Roots which attach the plant to the substratum present along the entire rhizome, sometimes branched. Rhizome creeping, sturdy, usually the parts between the pseudobulbs rather short, rather often with some branches. Scales enclosing the rhizome inconspicuous to rather distinct, 2(–5), often not much different from but smaller than the 2(–5) usually soon eroding scales enclosing the pseudobulb; nerves (rather) inconspicuous. *Pseudobulbs* usually close together, sometimes more distant, rather slender to swollen, large to rather small, all turned to one side of the rhizome. *Leaves* one or two per pseudobulb, petiolate. Petiole either or not sometimes with wing-like margins. *Blade* linear, sometimes ovate-lanceolate, large to rather small, herbaceous, rarely subcoriaceous, nerves rather few to many, main nerves 3–9. *Raceme* proteranthous, synanthous with the just emerging to almost fully developed leaves, or hysternanthous, rather few- to many-flowered; flowers opening from base to top of the rhachis or from about halfway to

base and top. Scape short to long, wiry, erect; when short distinctly enlarging in fruit. Rhachis flexible, pendulous, rather short to long, either or not zig-zag; nodes oblique, thickened with a narrow rim. Sterile bracts 0–13, usually persistent till long after fruiting. *Floral bracts* caducous at anthesis, more or less folded along the midrib, ovate, elliptic to (ovate-)oblong; nerves 3–9, rather coarse; stiff herbaceous to pergamentaceous, more or less shining. *Flowers* neatly distichous or more or less turned to one side, rather closed to widely open, not resupinate but lip more or less turned downwards, somewhat fleshy or very tender. Pedicel terete to somewhat angular due to the ribs, short. Ovary usually angular due to the ribs. *Median sepal* concave, ovate to ovate-oblong; midrib prominent, sometimes more keel-like. *Lateral sepals* rather deeply concave, ovate to ovate-oblong; midrib a prominent keel which may be rounded or wing-like. *Petals* slightly concave, slightly asymmetric, elliptic, ovate or ovate-oblong, sometimes narrowed in the top half. *Lip* rather narrowly to broadly inserted, hardly to distinctly sigmoid. *Hypochilium* boat-shaped, not abruptly separated from the epichilium, at the back sometimes saccate, lateral margins sometimes lobe-like, inside without keels. *Epichilium* slightly to distinctly recurved, entire, the lateral margins usually turned upwards, at the base without or with 2 sometimes laterally fused swollen calli. *Column* either or not with a short column foot, short to relatively long; its top with a short hood which is shorter or longer than the rostellum, with well pronounced to obscure lateral lobes. *Anther* transversely elliptic to more or less cordate, inserted on the top margin of the hood by which it is only partly enclosed. Pollinia (narrowly) pear-shaped. *Stigma* obliquely cup-shaped; rostellum either either a narrow rim or extended from the hood as a large, ligulate projection. *Fruit* globose to ellipsoid with the entire perianth persistent on top; ribs 6, rather distinct, the 3 jugae flat and band-like, the valvae smooth with in the centre a very low longitudinal keel. Seeds fusiform, almost entirely filled with the long-ellipsoid embryo.

Distribution. West Malesia: Malay Peninsula, Sumatra, Java, Lesser Sunda Islands. 4 species.

Ecology. Epiphytes in lower montane to montane forest, on trunks and branches of trees or shrubs, more or less shaded, sometimes in moss cushions or terrestrial on steep, very exposed cliffs in humus-rich soil or on lava boulders; altitude 1100–3200 m.

KEY TO THE SPECIES OF SECTION CAMELOSTALIX

- 1a. One leaf per pseudobulb13. **P. longibulba** Holttum
- b. Two leaves per pseudobulb.....2
- 2a. Epichilium about as long as the hypochilium or longer, minutely papillose, without calli14. **P. longilabra** de Vogel
- b. Epichilium much shorter than the hypochilium, not papillose, at the base with two more or less distinct calli which may be fused in front3
- 3a. Sterile bracts at the base of the rhachis usually not present, if present at most 2, dropped at anthesis, not differing from the fertile ones. Lateral sepals 3–4.5(–5) mm long, with a keel which is towards the tip distinctly wing-like and more or less

- serrate. Sepals and petals very delicate. Rostellum not extending beyond the hood of the column12. *P. globosa* (Blume) Lindley
- b. Sterile bract at the base of the rhachis 3–13, persistent till long after anthesis, closely imbricate, clasping each other. Lateral sepals (4.7–)5.2–10 mm long, with a rounded low keel. Sepals and petals rather fleshy. Rostellum extending beyond the hood of the column11. *P. camelostalix* Rchb. f.

11. *Pholidota camelostalix* Rchb. f. – Fig. 11–12, Plate 2c & d, 3a.

For literature, see under the varieties.

Plants usually rather sturdy. Roots long, 2–3 mm diam.; root hairs often present. Scales of the young shoot 4–6, not differentiated in rhizome scales and pseudobulb scales; top acute to acuminate; when dry finely wrinkled to almost smooth; midrib a more or less distinct keel, nerves rather inconspicuous. *Pseudobulbs* slender to somewhat swollen, when dry often finely wrinkled. *Leaves* two per pseudobulb. Petiole with thin, wing-like margins. *Blade* linear-lanceolate to linear; top acute to acuminate; main nerves 5–9, small nerves 40–80. Scape 7–22(–30) cm long. *Raceme* hysteranthous. Rhachis distinctly zig-zag. Sterile bracts 3–13, persistent till long after flowering; top usually acute; margin papyraceous, smooth; nerves 7–9, somewhat prominent. *Floral bracts* elliptic, ovate or oblong, with truncate to obtuse top, sometimes slightly apiculate; papyraceous; nerves (5–)7–9. *Flowers* somewhat fleshy. *Median sepal* more or less ovate; top acute, sometimes slightly cuspidate; lateral nerves quite often with some irregular branches. *Lateral sepals* ovate-oblong; top acute to somewhat cuspidate; midrib a prominent, wing-like keel. *Petals* elliptic to ovate or ovate and in the top half distinctly narrowed. *Lip* more or less parallel to the column, broadly inserted on the short column foot. *Hypochilium* sometimes saccate at the base, without keels; lateral margins drawn out into lobes or not. *Epichilium* usually more or less reflexed, about triangular, semi-orbicular or rectangular when flattened; top acute to acuminate, sometimes truncate, tip sometimes obtuse and thickened; at the base with two more or less distinct calli. *Column* short to rather long, with a more or less distinct column foot; hood small, with rather pronounced lateral lobes which are decurrent along the margins of the column body, its upper margin irregular. *Anther* in outline more or less cordate to ovate to tetragonous with rounded corners; top truncate to obtuse, sometimes the tip retuse. *Stigma* distinctly overtopping the hood; rostellum broad, rounded. *Fruit* not seen.

Distribution and Ecology: *see under the varieties.*

KEY TO THE VARIETIES OF PHOLIDOTA CAMELOSTALIX

- 1a. Sterile bracts 3–5. Lateral sepals 7–10 mm long. Petals not narrowed in the top half11a. var. *camelostalix*
- b. Sterile bracts (5–)7–11(–13). Lateral sepals 4.7–6.5(–7) mm long. Petals narrowed in the top half11b. var. *vaginata* (Carr) de Vogel

11a. var. camelostalix – Fig. 11, Plate 2c.

Pholidota camelostalix Rchb. f., Xenia Orch. 1 (1856) 217, t. 89; Bonpl. 5 (1857) 43; Bentham & Hooker, Gen. Pl. 3 (1882) 520; Pfitzer in E. & P., Pfl. Fam. 2, 6 (1888) 128. – *Coelogyne camelostalix* (Rchb. f.) Rchb. f., Walp. Ann. 6 (1861) 238. – *Camelostalix reichenbachii* Pfitzer, in Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 160. – Type: Zollinger 205 (holo W).

Pholidota camelostalix var. *grandiflora* J.J. Smith, Bull. J. Bot. Btzg 3, 3 (1921) 259; Backer, Bekn. Fl. Java (em. ed.) 12, 1 (1952) 138; Backer & Bakh. f., Fl. Java (1968) 285. – Syntypes: Backer 15865 (lecto L, here chosen; iso BO), Den Berger 632 (BO, L), Cibodas, cult. Hort. T. I W. 111 (BO, L), Docters v. Leeuwen-Reynvaan 188 (L), Koorders 31968 (BO, L), Koorders 40103 (Tirto) (not seen), Loerzing 595 (BO, L).

Plant 35–65 cm high including the inflorescence. Scales of the young shoot: smallest one 0.5–1 cm long, longest one 8–15 cm long. *Pseudobulbs* 6–11 cm long. Petiole 1.5–5 cm by 6–14 mm. *Leaf blade* 25–52 by 2.7–6(–10) cm. *Raceme* 25–70-flowered. Scape 10–22 cm long. Rhachis 15–37 cm long, internodes 5–8 mm long. Sterile bracts 3–5; the basal one the longest, 20–80 mm long. *Floral bracts* 14–19 by 7–13 mm. Pedicel 1–2.3 mm long. Ovary 10–20 mm long. *Median sepal* 6.2–8 by 4–6 mm. *Lateral sepals* 7–10 by 3.3–6 mm. *Petals* elliptic to ovate, (5.5–)6–7.2 by (2–)2.3–4.2 mm; top acute to minutely apiculate. *Lip* 6.5–7.3 mm long. *Hypochilium* 4–5 by 4–6 mm when flattened; lateral margins about equally high over the entire length, 1–1.5 mm high, in front not abruptly lowering. *Epichilium* more or less triangular to semi-orbicular, 1–2.5 by 1.2–3 mm; top acute, sometimes thickened or apiculate; calli swollen, sometimes somewhat keel-like. *Column* club-shaped, rather straight, rarely distinctly curved backwards, 4–6(–8) mm long including the (0–)0.5–1.7 mm long column foot; hood 1–2 by 1.5–2.3 mm. *Anther* 1.8–2.1 by 2–2.4 mm. Pollinia 1–1.2 by 0.4–0.6 mm. *Stigma* 1–2 by 0.8–1.7 mm.

Distribution. Sumatra (Lampung). 1 collection (BO). Java (Jawa Barat, Jawa Tengah, Jawa Timur). 15 collections (BO, K, L, S). Cultivated, origin not known. 4 collections (BO, W).

Ecology. Epiphytes and lithophytes, in lower montane forest to montane elfin forest and exposed on steep cliffs in humus-rich soil or on lava boulders; altitude 1100–2100 m. Fl. June to Oct. and Dec. to Jan., few records.

Collector's notes. Flowers pale yellowish sometimes tinged brownish or reddish, yellowish green, straw-coloured to ochrish yellow or light brown, twice recorded bright red, anther more or less orange to orange-brown. Without scent (two records).

Notes. 1. The three intact flowers of the type specimen in herbarium Reichenbach, Zollinger 205, differ from all other specimens studied in the recurved column, and in a small projecting seam basally in front of the column foot. Such a seam is also present in flowers of Dielm 170, in which the column is not recurved. These differences are judged insufficient to give these plants the rank of variety.

2. It seems that the perianth parts enlarge during development of the young fruit; mature fruits were not seen.

11b. var. vaginata (Carr) De Vogel, *stat. nov.* – Fig. 12, Plate 2d, 3a.

Pholidota vaginata Carr, J. Mal. Br. R. As. Soc. 11 (1933) 72, pl. 2 A, a–g. – Type: C.E. Carr 2056 (holo SING; iso K).

Pholidota camelostalix auct. non Rehb. f.: J.J. Smith, Orch. Java (1905) 157; Ibid, Fig.-Atlas (1909) f. 117; Bull. Dep. Agr. Ind. Neerl. 43 (1910) 13; Koord., Exk. Fl. Java 1 (1911) 366 in key; J.J. Smith, Bull. J. Bot. Btzg III, 5 (1921) 258; Koord., Fl. Tjib. 1, 2 (1922) 46; J.J. Smith, Bull. J. Bot. Btzg III, 5 (1922) t. 30 f. 1; J.J. Smith, Fedde, Rep. 32 (1933) 172; Backer, Bekn. Fl. Java (em. ed.) 12, 1 (1952) 128; Backer & Bakh. f., Fl. Java 3 (1968) 285; J.B. Comber, Orch. Digest (1983) 76, fig., phot.- Syntypes: v.d. Hegge-Zijnen 59, cult. (lecto BO, here chosen), Backer 9865 (BO), Burck 430 (not seen), v. Harreveld 33 (BO, L), v.d. Hegge-Zijnen 19, cult. (BO), Kerkhoven 26, cult. (BO), Wouters & J.J. Smith (not seen).

Plants similar to those of the type variety, but average in most parts somewhat smaller. *Leaf blade* 7.5–26 by 0.9–3.6 cm. *Raceme* 20–50(–65)-flowered. *Scape* 7–20(–30) cm long. *Rhachis* 7–27 cm long, with internodes 4–7 mm long. *Sterile bracts* (5–)7–11(–13), 9–2.6 mm long. *Floral bracts* 8.4–15 by 6–6.6(–7.5) mm. *Pedicel* 0.7–1.7 mm long. *Ovary* 1–2.3 mm long. *Median sepal* (4.5–)5–6.3 by 2–2.8 (–3) mm. *Lateral sepals* (4.7–)5.2–6.3(–7) by 2–3.2 mm. *Petals* more or less ovate, distinctly narrowed in the top half, (3.7–)4–5 by 1.2–1.8(–2) mm; top (more or less) long-cuspidate, its tip usually obtuse to retuse. *Lip* (4.2–)4.7–6.2 mm long. *Hypochilium* (2.3–)3.1–4.5 by 2–3.3(–4) mm when flattened; margins erect, usually only lobe-like in the basal 3/4 of the hypochilium, 1.5–4.5 by 0.5–3 mm, in front more or less abruptly lowering. *Epichilium* convex, more or less semi-orbicular, triangular or quadrangular when flattened, 1.2–2(–2.5) by 1.3–3(–3.7) mm; top acute to acuminate, sometimes truncate, tip often obtuse and thickened; lateral margins more or less erect, sometimes reflexed; calli more or less swollen and distinct. *Column* short, (1.7–)2.3–4 mm long including the 0.2–1 mm long column foot; hood 0.5–1 by 1–2 mm.

Distribution. Sumatra (Sumatera Utara, Sumatera Barat, Jambi). 9 collections (BO, K, L, SING, U). Java (Jawa Barat, Jawa Timur). 10 collections (BO, L). Lesser Sunda Islands: Flores. 1 collection (BO).

Ecology. Epiphytes, no other details known; altitude 1400–2500 m. Fl. Jan. to April, Sept. to Nov. (most collections).

Collector's notes. Flowers light brown, ochrish, to light green; anther reddish, epichilium light brownish (one record each).

Note. Specimens from Mt. Talang in Sumatra ('*P. talangensis*' J.J. Smith, not published) have a shorter hypochilium with very pronounced lateral lobes and a relatively large and broad epichilium compared with *P. camelostalix* var. *vaginata* from other areas. These differences are judged insufficient to give these plants variety rank.

12. *Pholidota globosa* (Blume) Lindley – Fig. 13, Plate 3b.

Pholidota globosa (Blume) Lindley, Gen. & Sp. Orch. (1830) 37; Steud., Nomencl. bot. (1841) 324; Rehb. f., Bonpl. 5 (1857) 43; Miq., Fl. Ind. Bat. 3 (1859) 669; Fernandez-Villar in Blanco, Fl. Filip. 4 (ed. 3), Nov. App. (1880) 237; J.J. Smith, Orch. Java (1905) 159; Ibid., Fig.-Atlas (1909) f. 119; Koord., Exk. Fl. Java 1 (1911) 366; Fl. Tjib. 1, 2 (1922) 47; Ames in Merr., En. Philip. 1 (1924) 301; J.J. Smith, Fedde Rep. 32 (1933) 173; Backer, Bekn. Fl. Java (em. ed.) 12, 1 (1952) 139; Holttum, Orch. Malaya (1953) 235; Backer & Bakh. f., Fl. Java 3 (1968) 286; Steen., Mount. Fl. Java (1972) pl. 38, f. 7; J.B. Comber, Orch. Digest (1983) 76, fig., phot.- *Crinonia globosa* Blume, Bijdr. (1825) 339; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 135, f. 46c.- *Coelogyne globosa* (Blume) Rehb. f., Walp. Ann. 6 (1861) 236.- Syntypes: Blume s.n. (lecto L, sheet H.L.B. 904, 44–199, here chosen); Blume s.n. (L, sheet H.L.B. 903, 16–2448); Blume s.n. (P).

Plant (7-)12-30 cm high. Roots long, usually branched, 1-1.5(-2) mm thick; without root hairs. Rhizome scales present, 2(-4), long persistent, 5-10(-25) mm long; top acute; subcoriaceous, finely wrinkled when dry; nerves indistinct. Pseudobulb scales 4-5, shortest one 0.7-3 mm long, longest one (1.5-)2-4.5(-5.5) mm long; top acute; herbaceous, finely cross-wrinkled when dry, margin papyraceous; nerves 12-25, not very conspicuous, sometimes indistinct. *Pseudobulbs* 5-15(-30) mm apart, swollen near the top, more or less tapering to the base, c. 1-3.5 cm high, when dry rather wrinkled. Leaves 2 per pseudobulb. Petiole 4-25 by 1-2 mm. *Blade* linear, 5-15(-25) cm by 4-10(-18) mm; top obtuse to acute, sometimes apiculate; herbaceous, subcoriaceous especially at higher altitude; main nerves 3(-5), above and below prominent, small nerves (12-)16-30, much less conspicuous, sometimes indistinct. *Raceme* proteranthous or synanthous with the just emerging to halfway developed young leaves, 20-40-flowered. Scape 1-5(-8) cm beyond the scales, 0.5-1 mm diam., in fruit enlarging to 7.5-17.5 cm. Rhachis sometimes slightly zig-zag, especially towards the top, 3.5-8.5 cm long; internodes more or less terete, 1.4-4 mm long. Sterile bracts rarely present, at most 2, caducous at anthesis, like the floral bracts but narrower. *Floral bracts* ovate, 4-7 by 3-5 mm; top acute to acuminate; membranous to papyraceous; nerves (5-)7(-9), prominent, midrib somewhat more prominent. *Flowers* very tender. Pedicel somewhat angular, 0.2-0.5 by 0.2-0.4 mm. Ovary short, in section more or less clearly 6-angular by the ribs, (1-)1.5-2 by 0.5-1 mm. *Median sepal* more or less ovate, (2-)2.3-3.3(-4) by (1-)1.4-2 mm; top obtuse to truncate. *Lateral sepals* at the base rather shallowly concave, towards the top more so, ovate-oblong, 3-4.5(-5) by (1.2-)1.5-2 mm; top acute; midrib with a rounded keel which towards the top enlarges into a much wider, wing-like, thin keel with an irregularly erose margin. *Petals* ovate to ovate-oblong, slightly asymmetric, (1.8-)2.1-3(-3.5) by 0.8-1.8 mm; top more or less obtuse; nerves 3, the midrib more prominent. *Lip* rather narrowly inserted on the column foot, (2.5-)3-4.5 mm long. *Hypochilium* at the back often somewhat saccate, 1.7-3.5 mm long, 0.6-1.5 mm wide, 0.4-1.2 mm high; lateral margins not drawn out into lateral lobes; nerves 3, more or less prominent. *Epichilium* sometimes recurved to reflexed, when flattened irregularly orbicular to cordate, (0.5-)1-1.7(-2) by 1.3-2.3 mm; top rounded, obtuse to apiculate; lateral margins more or less folded; on the junction with the hypochilium with 2, often fused, more or less distinct calli. *Column* very short, 1-1.3 mm long, extended into a distinct column foot 0.4-1 mm long; hood small, with laterally on each side a distinct triangular lobe, median part much shorter than the anther. *Anther* laterally more or less enclosed by the lateral lobes of the hood, more or less transversely elliptic in outline, 0.4-0.7 by 0.6-0.8(-1.3) mm; top truncate. Pollinia c. 0.3 by 0.2 mm. *Stigma* laterally enclosed by the lateral lobes of the hood, 0.3-0.5 by 0.3-0.8 mm; rostellum narrow, band-like. *Fruit* globose to ellipsoid, on top the entire perianth is persistent; body c. 3.2 x 3 mm.

Distribution. Sumatra (Aceh, Sumatera Utara, Sumatera Barat). 21 collections (BO, K, L, G, SING, W). Java (Jawa Barat, Jawa Tengah, Jawa Timur). 62 collections (BO, K, L, P). Lesser Sunda Islands: Bali. 2 collections. (BO). Cultivated, origin not known. 5 collections (BO, K, W).

Ecology. Epiphytes on trunks and branches of trees (*Casuarina* mentioned 3 times), or on shrubs, sometimes in moss cushions, in very shaded to exposed places in primary forest to open mountain top vegetation; occasionally growing lithophytic on

old lava streams; altitude 1400–2400 m. Fl. & fr. Jan.–April, Sept.–Nov. (most collections).

Collector's notes. Flowers white, sometimes pinkish or cream-coloured; lip red-brown, anther brown (each once recorded). Not fragrant.

Note. The record of this species for the Malay Peninsula by Holttum was based on the wrong assumption that *Pholidota elizabethiana* Ridley belongs to *Pholidota globosa*. It belongs, however, to *Pholidota carnea* var. *carnea*.

13. *Pholidota longibulba* Holttum – Fig. 14.

Pholidota longibulba Holttum, Gard. Bull. Sing 11 (1947) 286; Orch. Malaya ed. 3 (1964) 237. –Type: Holttum s.n. (VIII-1946) (SING).

N.B. The dimensions given by Holttum are indicated separately between brackets, see note.

Plant 30–45 cm high including the inflorescence. Roots sturdy, 2–3 mm thick. Rhizome scales 5–6; smallest one c. 5 mm long, longest one 20–45 mm long; top acute to acuminate; subcoriaceous, rather smooth when dry; nerves rather indistinct. Pseudobulb scales 2; longest one 7–11 mm long; top acute; herbaceous, rather smooth; nerves 21–25; soon desintegrating. *Pseudobulbs* 5–15 mm apart (H: 10–20), 2 to 8.5 cm long (H: 7–9), rather sturdy, more or less ovoid, probably angular, when dried smooth with a few sharp longitudinal folds, with a specific ochrish colour. *Leaf* 1 per pseudobulb. Petiole 30–40 by 2.5 mm (H: 25–40). *Blade* linear-oblongate, 20–30 by 2.8 cm (H: to 30 by 5.5); top acuminate; herbaceous; main nerves 5–7, above slightly prominent, below somewhat more so, small nerves 84–94, much less conspicuous. *Raceme* synanthous with the almost fully developed young leaf, 42–46-flowered. Scape wiry, thin, extending c. 9 cm beyond the scales (H: 18 cm long), c. 0.5 mm diam., in fruit elongating to 16–18.5 cm. Rhachis slightly to distinctly zig-zag, 16.5–21 cm long (H: 18); internodes somewhat angular, lowest one sometimes to 3.5 cm long, those in the basal part to 6 mm long, higher ones 3–5 mm long (H: 4). Sterile bracts 1–4, persistent or caducous at anthesis, c. 7 by 2 mm (once observed). *Floral bracts* caducous at anthesis, not seen (H: 9 by 5 mm). *Flowers* (one collection seen) tender. Pedicel angular, c. 1 by 0.3 mm. Ovary short, in section rather angular by the ribs, tapering to the base, c. 1 by 0.7 mm (H: 2.5). *Median sepal* more or less ovate-oblong, c. 3.8 by 1.8 mm (H: 4.5 by 3.5); top obtuse; nerves 5. *Lateral sepals* more or less ovate, c. 3.7 by 2 mm; top acute; midrib a rounded keel. *Petals* more or less ovate, c. 3 by 1.5 mm (H: 3.5 by 2); top part acuminate, the tips abruptly truncate and bent in front to cover the anther; nerves 2. *Lip* rather narrowly inserted on the column foot, c. 3.2 mm long. *Hypochilium* c. 2 by 1 mm (H: 3.5 by 2); nerves 3, relatively strong, at the base swollen; lateral margins hardly drawn out into lateral lobes. *Epichilium* somewhat recurved, when flattened more or less semi-orbicular, c. 1.4 by 1.7 mm (H: 3.5 by 2), at the junction with the hypochilium with 2 strong calli c. 0.7 mm long. *Column* 1.8 mm long (H: 2), in front extended into a short column foot c. 0.5 mm long; near the top widening into a short hood with laterally on each side a distinct triangular lobe, median part much shorter than the anther. *Anther* more or less heart-shaped, c. 1.2 by 1 mm; top acute. Pollinia c. 0.6 by 0.4 mm. *Stigma* large, basal part swollen and saccate, c. 1 by 0.4 mm including the large, much extending, ligulate, obtuse, 0.7 by

0.4 mm big rostellum which distinctly overtops the column hood. *Fruit* body ellipsoid, 7 by 4 mm (once observed), on top remnants of the lignified column persistent. Seeds not seen.

Distribution. Malay Peninsula (Pahang). 3 collections: Batten Pool s.n. (XI-1939-I-1940), Carr 272, Holtum s.n. (VIII-1946) (all SING).

Ecology. Not known; altitude 1300-1800 m. Fl. Sept., Nov.; fr. Nov.-Jan.

Collector's notes. Not available.

Note. No flowers are present on the type specimen. According to a note on the label these were put in alcohol by Holtum; they are probably lost since no alcohol sample was present in SING. From the vegetative parts it is clear that this is a distinct *Pholidota* species. The flowerless specimen Batten Pool s.n. was recognised by Holtum to belong to it. The specimen Carr 272 very much resembles both in the vegetative parts, and is without doubt conspecific. Holtum's description of the flower parts is not in contradiction with those of Carr 272 although the flower dimensions are larger. The flower description above is based only on Carr 272; Holtum's dimensions are given between brackets. Carr named this plant *P. plicata* on the label but this name was as far as could be ascertained never published.

14. *Pholidota longilabra* de Vogel, *nom. nov.* – Fig. 15.

Pholidota rupestris auct. non Hand.-Mazz.: J.J. Smith, *Blumea* 5 (1943) 300. – Syntypes: C.G.G.J. van Steenis 8578 (lecto L, here chosen); id. 8579 (L).

Plants (7.5-)10-16(-21) cm high including the inflorescence. Roots to 1.5-2 mm diam.; root hairs sometimes present. Scales of the young shoot persistent till after flowering, long clasping the pseudobulb even when dry, smallest one c. 4 mm long, longest one 2-2.5(-4) cm long; more or less pergamentaceous, when dried finely wrinkled; midrib a more or less distinct keel, nerves inconspicuous. *Pseudobulbs* rather swollen, 1.8-4.5(-5.5) cm long, when dried often finely wrinkled. *Leaves* two per pseudobulb. Petiole with thin, wing-like margins, 2-5(-10) by 1-1.5 mm. *Blade* ovate-lanceolate to linear, 3-6(-11) by 0.7-1.1(-1.7) cm; top acute, sometimes acuminate; herbaceous; main nerves 3-5, on both sides somewhat prominent, small nerves 24-38, less prominent. *Raceme* hysteranthous, 10-32-flowered. Scape 1.3-4.5(-7) cm by 0.3-0.5 mm. Rhachis more or less zig-zag, 5-8(-12.5) cm long; internodes more or less terete, (2.5-)4-5 mm long. Sterile bracts 2-6, like the floral bracts, persistent till after anthesis. *Floral bracts* ovate to ovate-oblong, 5.5-9.5 by 3-6.5 mm; top abruptly narrowed or obtuse, tip often acute; chartaceous; nerves 3-5(-9), only at the base prominent. Pedicel somewhat angular by 3 ribs, 0.5-1 by (0.3-)0.5-0.7 mm. Ovary rather swollen, angular in section by the 6 rather pronounced ribs, c. 1.5 by 1 mm. *Median sepal* ovate-oblong, 5-6.2 by 1.8-3 mm; top acute, sometimes obtuse, the tip usually apiculate; midrib a more or less conspicuous rounded keel. *Lateral sepals* ovate-oblong, 5.5-7.2 by 2-3 mm; top acute, slightly acuminate; midrib with a more or less rounded, prominent keel. *Petals* ligulate, slightly asymmetric, 4.5-6 by 1.7-2.5 mm; top obtuse to acute. *Lip* rather narrowly inserted on the column, 4.5-5.5 mm long. *Hypochilium* 2.2-2.7 mm long, 0.7-1(-1.5) mm wide, 1-1.5 mm high; lateral margins

rounded or drawn out in low lateral lobes 0.5–0.7 mm high which decrease gradually or abruptly in height near the front of the hypochilium; in the back with 3 somewhat swollen nerves, of which the lateral ones are swollen and minutely papillose near the front of the hypochilium and continue so to near the top of the epichilium. *Epichilium* more or less spatulate to almost rectangular when flattened, 2–3 by 1.2–2 mm, somewhat recurved, convex, without calli; top rounded to acute with obtuse tip. *Column* without column foot, short, contracted, 1.7–2.2 mm long, with laterally on each side a minute triangular lobe. *Anther* more or less cordate, 0.7–1 by 0.5–0.8(–1) mm; top truncate to retuse, base retuse. Pollinia (narrowly) pear-shaped, 0.3–0.4 by 0.2 mm. *Stigma* 0.7–1 by 0.6–0.7 mm; rostellum narrow, band-like. *Fruit* not seen.

Distribution. Sumatra (Aceh). 5 collections: Iwatsuki et al. 1248 (KYO), van Steenis 8578, 8579, de Wilde 14266, 16302 (all L).

Ecology. Epiphytes and lithophytes in upper montane elfin forest and in more exposed places on shrubs; altitude 2400–3200 m. Fl. Feb., April, Aug.

Collector's notes. Flowers creamy-white or white with orange-red column.

SECTION CHELONANTHERA (Blume) Butzin

Pholidota sect. *Chelonanthera* (Blume) Butzin, Willdenowia 7 (1974) 258; in Schltr, Orch. 1 ed. 3 (1986) 956. – *Chelonanthera* Blume, Bijdr. (1825) 382 (sect. 1, p.p.); Tab. & Pl. (1825) t. 2, fig. 51; Lindley, Gen. & Sp. Orch. (1833) 178 (p.p.); Endl. Gen. (1937) 200, n. 1436; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 141 (p.p.); Ridley, Fl. Malay Pen. 4 (1924) 138. – *Coelogyne* sect. *Chelonanthera* (Blume) Rchb. f., Walp. Ann. (1861) 236 (p.p.). – Type species: *Pholidota gibbosa* (Blume) de Vriese (lecto, indirectly chosen by Pfitzer & Kraenzlin).

Pendulous or creeping epiphytes, occasionally terrestrial, entirely glabrous except for root hairs, in one species with scattered minute hairs on the bracts and usually on the inside of sepals and petals. Roots which attach the plant either present along the entire rhizome, or present on the basal portion of the rhizome only and aerial roots if present more or less appressed to the rhizome, long, thin, branched. Rhizome either creeping, or pendulous and in the upper part usually curved upwards, the parts between the pseudobulbs short or rather long. Scales of the young shoot enclosing the rhizome 5–14, either all enclosing the pseudobulb when this develops or the lower 5–12 arranged along the rhizome and the upper two enclosing the pseudobulb, imbricate, soon disintegrating into long fibres or long persistent even after they are dry and then more or less inflated and finally disintegrating into fibres; herbaceous, when long persistent soon dry and papyraceous; nerves many, either all rather distinct, or fine, usually only partly conspicuous. *Pseudobulbs* close together or rather widely spaced, all turned to one side of the rhizome or spirally arranged, long persistent. *Leaves* two per pseudobulb. *Blade* ovate- or obovate-oblong to linear-lanceolate, rather large; herbaceous to sometimes stiff coriaceous; many-nerved, main nerves few, prominent or only slightly so, small nerves many, slightly prominent to rather inconspicuous. *Raceme* synanthous with the halfway to almost entirely emerged young leaves, rather many- to many-flowered; flowers secund, opening from base to top of the rhachis, few open simultaneously, or neatly distichous, opening from above the middle part of the rhachis to base and top of the rhachis, finally all open simultaneously. Scape rather

short to long, either erect, flattened, straight and sturdy or thin, wiry, curved, terete. Rhachis rather long to long, either erect, stiff, straight, or curved, pendulous, zig-zag. Sterile bracts absent to few, either caducous at anthesis or persistent. *Floral bracts* in the young inflorescence rather loosely imbricate, usually caducous at anthesis, either or not folded around the midrib, more or less transversely elliptic to ovate; papyraceous; nerves many, fine, all about equal. *Flowers* irregularly resupinate or not but then the lip still turned downwards, widely open with either only the petals or both sepals and petals recurved to rolled backwards. Pedicel either twisted or about straight, rather angular in section. Ovary more or less angular due to the ribs. *Median sepal* either rather deeply concave or rather convex with more or less reflexed margins, more or less ovate to ovate-oblong or elliptic; inside usually hairy or glabrous; midrib with a rounded keel or at most slightly prominent. *Lateral sepals* more or less asymmetric, rather deeply concave, or convex with more or less reflexed margins which are at their base clasped in a groove at the back of the hypochilium, more or less elliptic to oblong or about ovate; inside usually hairy or glabrous; midrib with a more or less prominent to rarely wing-like keel or not or slightly prominent. *Petals* slightly asymmetric, rolled backwards. oblong to linear; inside at the base usually hairy or glabrous; nerves 1(-3). *Lip* rather broadly or narrowly inserted on the column, rather to distinctly sigmoid. *Hypochilium* boat-shaped to saccate; margins recurved, in front on either side with a more or less horizontal to reflexed lateral lobe; outside with a median longitudinal groove; inside in the back either with 1 or with 3 low, rounded keels, inside in front without keels or with 2 laterally slanting, more or less backwards directed keels. *Epichilium* more or less recurved, without keels or calli; two-lobed, lobes in front either free or more or less overlapping. *Column* without column foot, large and wide; hood large, broad, thin, with entire to irregularly margin. *Anther* inserted about halfway between the top margin of the hood and the stigma, irregularly transversely elliptic to about orbicular in outline. Pollinia obliquely pear-shaped, in one species truncate near the opening and there the margin more or less drawn out. *Stigma* deeply obliquely cup-shaped, with a more or less elliptic to ovate opening; rostellum either more or less rectangular to rounded or about ligulate to triangular. *Fruit* (only of *P. gibbosa* seen) long ellipsoid, part of the swollen column persistent on top; ribs 6, consisting of the 3 flat, towards the base carinate jugae and the longitudinal, sharp keel on each of the 3 valvae. Seeds slender, fusiform, embryo elliptic.

Distribution. Malesia: Malay Peninsula, Sumatra, Java, Borneo, Philippines, Lesser Sunda Islands, New Guinea, Solomon Islands. 2 species.

Ecology. Epiphytes, sometimes terrestrials on poor soils or rock; altitude (?150-)450-2400m.

KEY TO THE SPECIES OF SECTION CHELONANTHERA

- 1a. Plant pendulous. Inflorescence curved. Sepals and petals recurved. Front part of the hypochilium with 2 erect, flat, more or less triangular (to semi-orbicular) keels15. *P. gibbosa* (Blume) de Vriese
- b. Plant creeping. Inflorescence erect. Only petals recurved. Front part of the hypochilium without keels16. *P. ventricosa* (Blume) Rchb. f.

15. *Pholidota gibbosa* (Blume) de Vriese – Fig. 16, Plate 3c; d.

- Pholidota gibbosa* (Blume) de Vriese, Ill. Orch. (1854) pl. 5, f. 1; *ibid.* (1855) pl. 19, f. 2; H. Witte, Ann. Hort. Bot. 3 (1860) 129, fig.; J.J. Smith, Orch. Java (1905) 152; *Ibid.*, Fig. Atlas (1909) f. 113; Ridley, Mat. Fl. Malay Pen. 1 (1907) 135; Koord., Exk. Fl. Java 1 (1911) 366; Fl. Tjib. 1, 2 (1922) 45; J.J. Smith, Fedde, Rep. 32 (1933) 173; Backer, Bekn. Fl. Java (em. ed.) 12, 1 (1952) 137; Holtum, Orch. Malaya (1953) 234; Backer & Bakh. f., Fl. Java 3 (1968) 285; Vaughan, Nat. Malays. 8 (1983) 5, phot.; J.B. Comber, Orchid Digest (1983) 76, fig., phot.; Seidenf., Nord. J. Bot. 6 (1986) 165, f. 10. – *Chelonanthera gibbosa* Blume, Bijdr. (1825) 383; Tab. & Pl. (1825) f. 51 (as *P. ventricosa*, wrong ident.); Lindley, Gen. & Sp. Orch. (1833) 178; Pfitzer & Kraenzlin, Pfl. R. Heft. 32 (1907) 142; Ridley, Fl. Malay Pen. 4 (1924) 139. – *Coelogyne gibbosa* (Blume) Rchb. f., Walpers Ann. 6 (1861) 237. – Syntypes: Blume s.n. (lecto L, sheet 903, 16-2444, here chosen; L, sheets 903, 16-2445, -2446, -2447).
- Pholidota clypeata* Lindley, J. Hort. Soc. 5 (1850) 37; Ridley, J. Linn. Soc. Bot. 31 (1896) 287; Ames in Merr., En. Born. (1921) 149. – *Coelogyne clypeata* (Lindley) Rchb. f., Walpers Ann. 6 (1861) 237. – *Chelonanthera clypeata* (Lindley) Pfitzer in Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 142. – Type: A. Kenrick s.n., bought from Messrs. Low & Co. in 1847 (holo K).
- Pholidota caduca* Ridley, J. Linn. Soc. Bot. 31 (1896) 288; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 145. – Type: Haviland s.n. (I-1898) (holo SING).

Plant over 35–50(–100) cm long, pendulous. Roots to more than 20 cm by 1–2.5 mm; aerial roots either or not present. Rhizome pendulous, sometimes branched, the portion between the pseudobulbs (1–)3.5–9 cm. Scales of the young shoot 7–14, widely spaced but overlapping, more or less inflated; herbaceous, when dry papyraceous; surface smooth, nerves 20–40, only towards the top and margins of the scales more or less visible, those in the upper scales somewhat more prominent; when dried usually with a dark brownish to blackish margin, sometimes entirely that colour, especially when old; smallest one 7–10 mm long, longest one 6–16(–19) cm long. *Pseudobulbs* spirally arranged along the rhizome, slender to sometimes rather swollen, more or less narrowed to base and top, (3–)4–8 cm long, when dried irregularly, rather coarsely wrinkled, often angular with rounded corners. Petiole 2–4(–5) cm by 1.5–2 mm. *Leaf blade* ovate- or obovate-oblong to linear, (9.5–)11.5–24 by 1.8–4.5(–5) cm; top acuminate; (rather stiff) herbaceous to sometimes stiff subcoriaceous; main nerves (3–)5–7, small nerves (28–)45–88. *Raceme* synanthous with the halfway to almost entirely emerged young leaves, (15–)30–42(–52)-flowered. Scape wiry, terete, beyond the scales (4–)7–14(–20) cm by 1–1.5 mm, after anthesis somewhat elongating. Rhachis pendulous zig-zag, (8–)15–28 cm long, internodes 5–7(–9) mm long. Sterile bracts often present, few, like the floral bracts, persistent, to 20 mm long. *Floral bracts* caducous at anthesis, more or less transversely elliptic to ovate, (9.5–)10.5–12.5 by (8–)9–11.5 mm; top obtuse to apiculate; papyraceous; nerves in the centre of the blade c. 40–110. *Flowers* not resupinate, with sepals and petals recurved to rolled backwards, glabrous. Pedicel usually dorsoventrally flattened, (0.5–)1–2 mm long, (0.4–)0.7–1.5 mm wide. Ovary more or less angular in section, (1.7–)2–4.5 by (0.8–)1–2 mm, 6-ribbed, or the ribs in the centre of the valves not pronounced, the jugae often somewhat concealed below the margins of the valves which are then laterally grown out. *Median sepal* when flattened more or less elliptic, (4.5–)5.5–9 by (2.5–)3–5 mm; top acute to obtuse, more or less rolled backwards; convex with more or less reflexed margins; nerves 5(–7), midrib sometimes slightly more prominent. *Lateral sepals* slightly asymmetric, when flattened more or less ovate, (5–)6–9 by (3–)3.5–6 mm; top acute to acuminate; more or less rolled backwards; convex with more or less reflexed margins; nerves 5(–7),

midrib sometimes slightly more prominent. *Petals* linear, (4.2–)5–9 by 0.7–1.5 mm; top rounded, somewhat widened, more or less rolled backwards; nerves 1(–3). *Lip* rather narrowly inserted on the column, subdivided into a saccate hypochilium which widens to the top and there extends laterally into two lateral lobes, and a two-lobed epichilium. *Hypochilium* boat-shaped to saccate, more or less narrowed at the base, (4–)5–8 mm long, (1.5–)2–4 mm wide, 1–2.5 mm high; margins recurved; lateral lobes more or less horizontal to reflexed, about triangular to more or less rounded, (1–)1.8–2.5 by (1.5–)2–4 mm, width over the lobes (3.7–)5.5–9 mm; keels in the saccate part of the hypochilium 3, low, rounded, the central one usually extending to the top of the hypochilium, sometimes hardly pronounced, the lateral ones only in the back of the hypochilium, sometimes not developed; keels in the front part of the hypochilium 2, on either side on the junction of each lateral lobe with the saccate part, high, short, more or less triangular (to semi-orbicular), more or less backwards curved, flat, laterally slanting, 1–2 by (0.5–)1–2 mm. *Epichilium* two-lobed, when flattened (1.3–)1.8–2.2(–2.5) by (2–)2.8–5.5 mm; lobes more or less semi-orbicular in outline, (1–)1.2–2.2 by (1–)1.2–2.3 mm. *Column* broadly spatulate to almost orbicular, (3.7–)4–7 by 4–8 mm; hood large, thin, abruptly narrowed near the base or not; top entire or irregularly serrate; often laterally on each side with a more or less conspicuous, more or less rounded lobe; on the margin where the nerves end often minutely apiculate, sometimes there notched. *Anther* partly hidden behind the rostellum, dorsoventrally somewhat flattened, irregularly transversely elliptic, c. (1–)1.5–1.8 by (1.3–)1.7–2.3 mm; top triangular, recurved, its tip rounded. Pollinia obliquely pear-shaped, truncate near the opening and there the margin more or less drawn out, (0.5–)0.7–1.2 by (0.3–)0.5–1 mm. *Stigma* including the rostellum (1.7–)2–3 by (0.8–)1–2 mm; rostellum about ligulate to triangular, sometimes with two small lateral teeth, (1–)1.2–2 by 1–2 mm. *Fruit* body ellipsoid, c. 11 by 6 mm; remnant of the column persistent, swollen, 3 by 2.2 by 1.6 mm; jugae flat, towards the base carinate, 1.5 mm wide; valvae smooth, with a longitudinal, sharp keel. Seeds fusiform, to 0.8 mm long.

Distribution. Malay Peninsula (according to Holttum in Perak, Selangor, Pahang). No collections seen. Sumatra (Aceh, Sumatera Utara, Sumatera Barat, Bengkulu, Lampung). 9 collections (BO, L, U). Java (Jawa Barat, Jawa Tengah, Jawa Timur). 25 collections (BO, G, K, L, P, W). Lesser Sunda Islands (Bali). 1 collection (BO). Borneo. Sarawak (1st Division, 4th Division, 5th Division). Brunei. Sabah (West Coast Residency). Kalimantan (Kalimantan Selatan, Kalimantan Timur). 25 collections (AMES, B, BO, E, G, K, L, NY, SING). Celebes (Sulawesi Tengah). 3 collections (L). Solomon Islands (Guadalcanal). 1 collection (K, see note). Cultivated, origin not known. 3 collections (BO, G).

Ecology. Epiphytes in primary hill and montane forest and in (sometimes *Agathis*-dominated) kerangas, occasionally terrestrial on bare rock, rarely in loam in rock crevices along newly constructed roads; altitude 600–1900 m. Fl. probably all year long, most records in June to Nov.

Collector's notes. Flowers greenish cream, cream-coloured to pale salmon; the base of the lip, the column and the ovary often tinged pink to pale brownish red, the hood often with a narrow brown margin. Lip sometimes with ochrish spots. Bracts pinkish to greenish brown, when old brown.

Note. It is peculiar that *P. gibbosa* occurs in Guadalcanal which is so far remote

from its main range, and apparently does not occur in New Guinea because it has never been collected there. No evidence was found, however, that the plant was wrongly labelled.

16. *Pholidota ventricosa* (Blume) Rchb. f. – Fig. 17, Plate 4a, b.

Pholidota ventricosa (Blume) Rchb. f., Bonpl. 5 (1857) 43; H. Zoernig., Engl. Bot. Jahrb. 33 (1904) 717, f. 55; J.J. Smith Orch. Java (1905) 154; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 146 in note, 148, f. 51; Ames, Orch. 2 (1908) 75; Philip. J. Sc. Bot. 4 (1909) 665; J.J. Smith, Orch. Java, Fig. Atlas (1909) f. 114; Bull. Dep. Agr. Ind. Neerl. 43 (1910) 13; Koord. Exk. Fl. Java 1 (1911) 366; Schltr., Orch. (1915) 156; Ames, Orch. 5 (1915) 66; in Merr., En. Born. (1921) 150; Koord., Fl. Tjib. 1 (1922) 45; Ames in Merr. En. Philip. 1 (1924) 301; J.J. Smith, Mitt. Inst. allg. Bot. Hamb. 7 (1927) 34; Bull. J. Bot. Btzg. III, 11 (1931) 107; Fedde, Rep. 32 (1933) 175; Backer, Bekn. Fl. Java (em.ed.) 12, 1 (1952) 137; Holttum, Orch. Malaya (1953) 235; Backer & Bakh. f., Fl. Java 3 (1968) 285; H. Teuscher, Amer. Orch. Soc. Bull. 41 (1983) 218, phot.; J. Comber, Orchid Digest (1983) 73, fig., phot. – *Chelonanthera ventricosa* Blume, Bijdr. (1825) 383; Lindley, Gen. & Sp. Orch. (1833) 178; Miq., Fl. Ind. Bat. 3 (1859) 673. – *Coelogyne ventricosa* (Blume) Rchb. f., Walpers Ann. 6 (1861) 237. – Type: Blume s.n. (holo L, sheet 903, 16-2466).

Pholidota sesquitorta Kraenzlin, Xenia Orch. 3 (1893) 114, t. 266 I, f. 1-7; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 146, 149, f. 50 F. – Syntypes: ?Micholitz (Eisgrub, cult. Hort.) and ?Micholitz (Berlin, cult. Hort.), both probably lost (lecto: the plate in Xenia Orch. 3, 1893, t. 266, f. 1-7, here chosen).

Pholidota grandis Ridley, J. As. Soc. S.S. 49 (1908) 32; Ridley, Fl. Malay Pen. 4 (1924) 140. – Type: Ridley s.n. 1905, Semangkok Pass (holo SING).

Pholidota sororia Schltr., in Fedde Rep. Beih. 1 (1911) 108; Ibd. 21 (1925) t. 42, no. 144. – Type: Schlechter 20277 (holo lost, lecto the plate in Fedde, Rep. Beih. 21, 1923-1928, t. 42, no. 144, here chosen).

Pholidota sororia Schltr. var. *djamuensis* Schltr., Fedde Rep. Beih. 1 (1911) 109; ibid. 21 (1925) t. 42, no. 145. – Type: Schlechter 16612 (holo lost, lecto BO, here chosen).

Plant 43-95 cm high. Roots along the entire rhizome, more than 16 cm by 1.5-3 mm. Rhizome creeping. Scales of the young shoot 8-14, rather loosely imbricate; smallest one 1-1.5 cm long, longest one 11.5-21 cm long; top acute; herbaceous; nerves 53-112, rather distinct, all more or less equal, soon desintegrating into stiff, long, thin, rather long persistent fibres. *Pseudobulbs* close together, turned to one side of the rhizome, rather slender to sometimes stunted, 4-14 cm long, when dried with a smooth surface and rather few coarse, sharp ridges, almost always with a specific ochrish to yellowish colour when dried. Petiole (4-)6-10(-24) cm by (2.5-)4-8 mm. *Leaf blade* lanceolate to linear-lanceolate, 21-62 by (2-)3.5-7.5(-9.5) cm; top acute; stiff (sub)coriaceous; main nerves 5, below very prominent, above much less so, small nerves 100-250, rather to very inconspicuous. *Raceme* synanthous with the usually less than about halfway to rarely almost entirely emerged young leaves, 30-80(-93)-flowered, flowering from base to the top. Scape erect, straight, irregularly longitudinally grooved, rather flattened, beyond the scales (4-)19-25(-30) cm long, 2-5 mm diam, in fruit not elongating. Rhachis straight, erect, stiff, 10-27 cm long; internodes 2-6 mm long, the lowermost ones sometimes to 2.5 cm long, rather angular, above the insertion of the flower with a longitudinal depression. Sterile bracts absent, rarely one present. *Floral bracts* caducous at anthesis but sometimes still present during the early period of anthesis, ovate, (14-)18-30 by (8-)10-12 mm; top acute, sometimes obtuse; papyraceous; nerves 25-70; inside, especially at the base, with scattered, solitary, minute, uniseriate hairs. *Flowers* rather open, more or less irregularly resupinate, more

or less turned to one side. Pedicel twisted, 4–7.5 by 0.4–1 mm. Ovary rather slender, in section about terete to triangular, angular by the ribs of which 3 are rarely wing-like, 3–6 by 0.8–2 mm. *Median sepal* more or less ovate to ovate-oblong, 6–11 by (1.2–)3–5.5 mm; top acute, sometimes obtuse; rarely the lateral margins and the top somewhat recurved; nerves 5–7, midrib a more or less pronounced rounded keel; usually inside at the base with few, scattered, minute, uniseriate, solitary or grouped and radiating hairs. *Lateral sepals* more or less elliptic to oblong, 6–11 by 3–5.5 mm; top acute; nerves 5(–7), midrib a rounded keel but occasionally less pronounced, rarely wing-like; usually inside hairy as the median sepal. *Petals* slightly asymmetric, more or less rolled backwards, oblong to ligulate to linear, 6–10 by (0.7–)1–4 mm; top truncate, obtuse or acute; nerves 3, midrib somewhat pronounced; inside at the base hairy as the median sepal. *Lip* rather narrowly inserted on the column, more or less S-shaped. *Hypochilium* boat-shaped, narrowed at the base, 4–7 mm long, 2–4 mm wide in the back part, width over the front lobes (3.4–)5–9 mm, 1.2–2 mm high; margins recurved; in front on each side with a more or less horizontal to reflexed, about triangular to rounded lobe 1–3 by 1–2.5 mm with more or less rounded top and entire back margin, front margin usually irregularly undulating to serrate (sometimes this lobe almost absent); outside with a median longitudinal groove which appears inside as a rounded, somewhat elevated keel which extends to between the lateral keels at which place it is sometimes pronounced; in front on the junction of each lateral lobe and the saccate part with a more or less elongated, rather fleshy rim with an irregular margin, rarely these rims almost wanting or in the back and front part drawn out more or less triangularly. *Epichilium* more or less recurved, two-lobed, 2–5.5 by 4–9 mm; lobes not overlapping, more or less semi-orbicular in outline, 2–4 by 2–5 mm. *Column* semi-orbicular, broadly spatulate to almost wedge-shaped in outline, 3.5–5 by 3.5–5.5 mm; hood large, and wide, thin, gradually narrowing to the base of the column, its top broadly rounded, irregular, sometimes laterally with more or less pronounced, rounded to triangular lobes separated from the median part by sometimes deep incisions. *Anther* irregularly transversely elliptic to about orbicular, dorso-ventrally somewhat flattened, usually wider than high, 1–1.7 by 1.2–1.7 mm; top triangular, recurved, its tip truncate. Pollinia obliquely pear-shaped, 0.6–0.8 by 0.4–0.5 mm. *Stigma* with a more or less elliptic opening, 1–2 by 0.8–2 mm; rostellum more or less rectangular to rounded, 0.5–1.5 by 0.6–2 mm. *Fruit* and seeds not seen.

Distribution. Malay Peninsula (Perak, Selangor). 1 collection (SING). Sumatra (Sumatera Utara, Sumatera Barat, Lampung). 16 collections (BO, L, SING, U). Java (Jawa Barat, Jawa Tengah, Jawa Timur). 38 collections (AMES, BO, L, S, U). Borneo: Sarawak (3rd and 4th division). Sabah (West Coast Residency). Kalimantan (Kalimantan Barat, Kalimantan Tengah, Kalimantan Timur). 15 collections (AMES, BM, BO, E, G, K, L, NY). Philippines (Luzon, Leyte, Mindanao). 4 collections (AMES, L, PNH, S). Celebes (Sulawesi Tengah). 1 collection (L). New Guinea. Papua New Guinea (E. Sepik, S. Highlands, Morobe). 12 collections (BO, K, L, LAE).

Ecology. Epiphytes, sometimes growing terrestrial, especially in open kerangas, sometimes on limestone; altitude (?150–)450–2400 m. Fl. all year round, but a distinct flowering season in Oct.–Nov.

Collector's notes. Flowers white, often tinged yellowish green or light green or cream-coloured, and then the lip and the column may be white. A purple spot on the

lip, a yellow honeymark with darker margins, and brown pollinia were once recorded. Fragrant flowers were reported four times.

Notes. 1. No material annotated as *Pholidota sesquitorta* is present either in B or in W. The (not very detailed) illustrations by Kraenzlin are in all probability *P. ventricosa*. The Reinwardt drawing (original in W, copy in K), which is according to Kraenzlin identical with *P. sesquitorta* depicts without doubt *P. ventricosa*. J.J. Smith (1905, Orch. Java, p. 154) reduced *P. sesquitorta* to *P. ventricosa*; Kraenzlin, however, maintained that that species is different (1907, Pfl. R. Heft 32, p. 146). Schlechter (1911, in Fedde, Rep. Beih. 1 p. 109) studied original material from the Botanic Garden in Berlin, and concluded that it could not be distinguished from *P. ventricosa*. All evidence thus agrees with the conclusion by J.J. Smith and Schlechter that both species are conspecific.

2. The type specimen of *P. grandis* Ridley entirely fits in the variation of *P. ventricosa*, and is here considered the same species.

3. I have not seen the type of *P. sororia*, this is probably lost. According to Schlechter, *P. sororia* is closely related to *P. ventricosa*, but differs in the column which is broader than in that species, and is in addition almost parallel to the lip which is stronger lobed. The flowers are white instead of cream-coloured. Schlechter admitted that some time he was inclined to regard Schlechter 20277, the type, as a variety of *P. ventricosa*. Based on the above mentioned characters, and in addition to the fact that New Guinea is far remote from the area where *P. ventricosa* was found up to that time, he concluded *P. sororia* to be a different species. However, the description of *P. sororia* entirely fits in the variation found in *P. ventricosa* from W. Malesia, and is here considered conspecific. More recent collections all belong to this species.

4. Of *P. sororia* var. *djamuensis* only the isotype in BO is extant. The Bogor specimen fits entirely in the variability of *P. ventricosa*, even the pseudobulbs have the same specific ochrish-yellow colour. Compared with the drawing of the holotype (Fedde, Rep. Beih. 21 t. 42, nr. 145) the lateral lobes of the lip of the Bogor specimen are much more pronounced, and the lobes of the epichilium are much larger and more rounded. When such differences occur in specimens of one collection this variation belongs probably to the natural variation in one population. For these reasons *P. sororia* var. *djamuensis* is considered conspecific with *P. ventricosa*, and not different at variety level.

5. The specimen Leiden, cult. Hort. (de Vogel) 25649 from Java (see plate 4b) differs from average *P. ventricosa* in the shorter, 18-flowered inflorescence with the flowers all open simultaneously. The petals are hardly recurved and a yellow honey mark with ochrish margins is present on the lip, giving the plant a deviating appearance.

SECTION CHINENSES (Rchb. f.) de Vogel, *stat. nov.*

Coelogyne sect. *Chinenses* Rchb. f., Walp. Ann. 6 (1861) 237 (p.p.).— Type species: *Pholidota chinensis* Lindley.

Coelogyne sect. *Undulatae* Rchb. f., Walp. Ann. 6 (1861) 238.— Type species: *Pholidota undulata* Lindley = *Pholidota rubra* Lindley

Creeping epiphytes, glabrous except for root hairs and sometimes with minute hairs

on the inside of the floral bracts and/or inside the hypochilium. Roots which attach the plant to the substratum present along the entire rhizome, long, thin, usually branched. Rhizome creeping, the parts between the pseudobulbs rather short to short. Scales enclosing the rhizome 3–4, more or less spaced, soon dry, either or not long persistent, finally desintegrating into thin fibres; membranous to herbaceous; many-nerved. Scales enclosing the pseudobulb more or less appressed, like the rhizome scales but larger. *Pseudobulbs* close together to more or less distinctly apart, all turned to one side of the rhizome, often spindle-shaped. *Leaves* normally two, exceptionally one per pseudobulb, medium-size to rather large. *Blade* (ob)ovate to linear-lanceolate, more or less plicate, herbaceous, occasionally rather stiff, many-nerved, main nerves 3–9. *Raceme* proteranthous to synanthous with the up to halfway developed young leaves, few- to many-flowered; flowers opening rather simultaneously. Scape very short to short, wiry, in fruit distinctly elongating. Rhachis more or less pendulous, short to long, in section more or less terete, almost straight to zig-zag. Sterile bracts absent, exceptionally one present. *Floral bracts* caducous or persistent, in the latter case either or not dropped during development of the fruit, more or less patent to reflexed, ovate to hastate to transversely elliptic; folded along the midrib, boat-shaped or margins in-rolled; nerves rather few to rather many, all about equal; inside without or with few to many scattered hairs. *Flowers* neatly distichous or more or less turned to one side, remaining rather closed to opening wide, not resupinate but lip turned more or less downwards. Pedicel more or less straight, more or less angular. Ovary angular to more or less star-shaped in section due to the ribs. *Median sepal* more or less shallowly concave, about elliptic or obovate; midrib more or less prominent. *Lateral sepals* rather shallowly concave, either or not patent to recurved or reflexed, ovate or obliquely elliptic to ovate-oblong; midrib more or less swollen or with a thin or somewhat flattened keel. Petals ovate to linear, margin entire or finely papillose. *Lip* rather broadly to rather narrowly inserted, more or less distinctly sigmoid. *Hypochilium* more or less deeply saccate, with or without lateral lobes, in the latter case margins either or not recurved, inside without or with 1, 3 or 5–7 more or less swollen keels, glabrous or inside at the back with scattered minute hairs. *Epichilium* more or less distinctly recurved, entire or two-lobed, without keels or warts. *Column* without column foot, pronounced, more or less spatulate; hood pronounced, distinctly widened and/or enlarged above the stigma. *Anther* inserted about halfway the hood or near or on its margin, more or less transversely elliptic to broadly cordate. Pollinia about pear-shaped in outline, either or not flattened. *Stigma* more or less (semi-)orbicular or elliptic or almost triangular; rostellum entire, semi-orbicular, more or less triangular or more or less broadly seam-like. *Fruit* (only of *P. chinensis* and *P. rubra* seen) ellipsoid to (ob-)ovoid, on top the perianth or at least (part of) the column persistent; ribs 6, the 3 jugae band-like, either or not with a more or less pronounced longitudinal keel, valvae smooth, median with a longitudinal keel. Seeds shortly fusiform; embryo ellipsoid.

Distribution. South-east Asia: Sikkim, NE. India, Burma, Vietnam, SW. China to Hongkong and Fukien. 4 species.

Ecology. Epiphytes in hill forest up to montane forest or lithophytes in open exposed places; altitude (100–)500–2000 m.

KEY TO THE SPECIES OF SECTION CHINENSES

- 1a. Petals about equally wide as or only slightly narrower than the median sepal .2
- b. Petals less than half as wide as the median sepal (but see note 5 under *P. chinensis*)
 3
- 2a. Floral bracts persistent during anthesis. Pseudobulbs very slender, fusiform.
 Petals more than 7.5 mm long19. *P. roseans* Schltr.
- b. Floral bracts caducous at anthesis. Pseudobulbs swollen, ovoid. Petals less than
 5.5 mm long.....18. *P. leveilleana* Schltr.
- 3a. Back of the hypochilium with one low keel. Median sepal 4.3–5.5 mm long
 20. *P. rubra* Lindley
- b. Back of the hypochilium with 3 low keels. Median sepal (6–)7.5–11 mm long...
 17. *P. chinensis* Lindley

17. *Pholidota chinensis* Lindley – Fig. 18, Plate 4c, d.

- Pholidota chinensis* Lindley, J. Hort. Soc. Lond. 2, Misc. 16 (1847) 308; Rchb. f., Bonpl. 3 (1855) 250; Ben-
 tham, Fl. Honkong. (1861) 354; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 150, f. 50 H; Dunn & Thut-
 cher, Bull. Misc. Inf. Kew, Add. Ser. 10 (1912) 264; Schltr., Fedde, Rep. Beih. 4 (1919) 188; Herklots,
 Hong Kong Nat. 1 (1930) 63, f. 3, pl. 5–6; Gagnep., Fl. Gen. I.-C. 6 (1933) 327; Icon. Corm. Sinic. 5
 (1976) 690, f. 8210; F. Hainan. 4 (1977) 218, f. 1103; Hu, Gen. Orch. Hong Kong (1977) 82, f. 44.–
Coelogyne chinensis (Lindley) Rchb. f., Walpers Ann. 6 (1861) 237.– Type: Fortune s.n. (holo K).
Coelogyne pholas Rchb. f., Walpers Ann. 6 (1861) 237.– *Pholidota chinensis* auct. non Lindley: Rchb. f.,
 Bonpl. 3 (1855) 250.– Syntypes: Seeman s.n. (lecto W, here chosen), Hance s.n. (W).
Pholidota corniculata (Rchb. f.) Hooker f., Fl. Brit. India 5 (1890) 843; Pfitzer & Kraenzlin, Pfl. R. Heft
 32 (1907) 159.– *Coelogyne corniculata* Rchb. f., Gard. Chron. (1865) 746.– Type: Day s.n., (2-VI-1864)
 (holo W).
Pholidota laucheana Kraenzlin, Xenia Orch. 3 (1892) 106, t. 259 II.6-13; Pfitzer & Kraenzlin, Pfl. R. Heft
 32 (1907) 145.– Type: Eisgrub, cult. Hort. (holo probably lost; neo W, here chosen, see note 3).
Pholidota annamensis Gagnep, Bull. Mus. Hist. Nat. Paris 2, 3 (1931) 145; Fl. Gen. I.-C. 6 (1935) 325, f.
 28 7-14; Hô & Du'o'ng, Fl. Vietnam (1960) 608, 609, fig. (Vietnamese); Hô, Ill. Fl. Vietnam ed. 2, 2
 (1972) 1015, f. 5017 (Vietnamese); Seidenf., Contr. Rev. Orch. Fl. Camb., Laos, Vietn. (1975) 94. –
 Type: Poilane 4350 (holo P).
Pholidota pyrranthela Gagnep., Bull. Mus. Hist. Nat. Paris 2, 22 (1950) 507. –Syntypes: Poilane 28828
 (lecto P, here chosen; L), Poilane 31380 (P, not seen; K).
Pholidota chinensis Lindley var. *cylindracea* Tang & Wang, Acta Phytotax. Sin. 1 (1951) 38, 77.– Type:
 R.C. Ching 5790 (holo PE, not seen; iso NY).

Plant (6.5–)10–30(–40) cm high. Roots to more than 30 cm long, 1–2.5(–3) mm
 diam. Scales of the young shoot 4–6; shortest one 0.8–1.5 cm long, longest one
 2–4.5(–7) cm long; top obtuse to acute; membranous to herbaceous, sometimes sub-
 coriaceous, wrinkled when dried, soon eroding; nerves usually inconspicuous.
Pseudobulbs 1–2.5 cm apart, more or less bulging in the lower half, tapering to base
 and top, (1–)2.5–8(–11) cm long; when dried more or less finely longitudinally wrinkl-
 ed. *Leaves* 2 per pseudobulb. Petiole 1–5.5 cm by 1.5–4 mm. *Blade* (ovate to)
 (ob)ovate-oblong to linear-lanceolate, (4–)8–20(–26) by 1.5–5(–6.5) cm; top acute to

acuminate; herbaceous; main nerves 3–5(–9), above and below rather prominent, small nerves 30–45(–70), hardly prominent. *Raceme* almost proteranthous to synanthous with the just emerging to sometimes up to halfway developed young leaves, (6–)10–20(–33)-flowered. Scape 0.5–2.5 cm extending from the scales, wiry, in fruit elongated to (2.5–)7.5–10(–16) cm. Rhachis more or less pendulous, more or less zigzag, 5.5–15(–30) cm long; internodes 4–8(–14) mm long. Sterile bracts absent, rarely one present, like the floral bracts. *Floral bracts* during anthesis persistent, usually more or less rolled inwards, sometimes not and then boat-shaped, more or less patent to reflexed, transversely elliptic to ovate-oblong, (7–)10–15(–22) by (5.5–)7–12(–20) mm; top truncate to acuminate; membranous to herbaceous; nerves 9–15(–29); inside usually with many scattered (groups of) minute hairs. *Flowers* opening rather wide, not resupinate; lip directed downwards. Pedicel angular by the ribs, 1–5 by 0.3–1.5 mm. Ovary in section star-shaped by the distinct ribs, 1.5–3.5(–5) mm long. *Median sepal* ovate to more or less elliptic, (6–)7.5–10(–11) by (4–)4.5–7(–8) mm; top (retuse to) obtuse to acute; nerves 5–7(–9), midrib prominent. *Lateral sepals* ovate to ovate-oblong, (6.5)7–10(–11) by (3.5–)4–6(–6.5) mm; top (obtuse to) acute to acuminate, often minutely apiculate; nerves 4–6, midrib a more or less swollen, rounded to flattened keel. *Petals* ovate-lanceolate to linear-lanceolate, (6–)6.5–9(–10) by 1–2.5(–3) mm (but see note 5); top acute to acuminate; nerves 1–3, midrib sometimes swollen. *Lip* rather broadly inserted, when flattened 5.5–8(–9) mm long. *Hypochilium* (3.5–)4–5.2 mm long, (2.3–)3–4 mm wide, 2–5 mm high; lateral lobes erect, in front broadly rounded and abruptly lowering; nerves 7–9, the central 3 at the back swollen into low rounded keels (but in '*P. corniculata*' slightly different, see note 6); inside at the back usually with scattered, minute, simple hairs. *Epichilium* recurved to reflexed, entire, more or less cordate or semi-orbicular to transversely elliptic in outline when flattened, (2–)2.5–4(–4.3) by (3–)3.7–5.5(–6.5) mm; top (retuse to) rounded to acute (to acuminate), when retuse lateral lobes semi-transversely elliptic, to c. 2 by 3–4.5 mm; without ornamentation but sometimes the nerves swollen; sometimes minutely papillose. *Column* in outline more or less spatulate, 4–5(–6.5) mm long; top either 3-lobed to irregularly undulating, more or less obtuse; hood in the upper part widened, margins decurrent along the column body. *Anther* inserted near or on the top margin of the hood, more or less broadly cordate (to transversely elliptic), 1–2 by 1.5–2(–2.5) mm; top (truncate to) acute. Pollinia 0.9–1.5 by 0.5–0.8(–1) mm. *Stigma* more or less orbicular to elliptic in outline, 1–2.5 by 1.2–2.5(–3) mm; rostellum semi-orbicular to more or less triangular, 1–1.5(–2.2) by 1.2–2.5 mm. *Fruit* (ob-)ovoid, usually the perianth or at least (part of) the column persistent; body (12–)17–25(–30) by 10–13 mm; jugae with a strong longitudinal keel. Seeds shortly fusiform, to 0.4–0.5 mm long; embryo ellipsoid, to c. 0.3 mm long.

Distribution. Burma (Kachin State). 4 collections (K, E). China (Yunnan, Guizhou = Kweichow = Kouy-tschou, Guangxi = Kwangsi, Hainan, Guangdong = Kwangtung, Fukien). 47 collections (AMES, BM, BO, E, G, HK, K, KYO, L, NY, S, TI). Hongkong. 21 collections (AMES, BM, G, HK, K, KYO, NY, P, SING, W). Vietnam (Hoang Lien Son, ?Ha Nam Ninh, Binh Tri Thien, Quang Nam-Da Nang, Gia Lai-Cong Tum, Phu Khanh, Lam Dong). 12 collections (AMES, K, L, P). Cultivated, origin not known. 31 collections (AMES, HK, K, L, TI, W).

Ecology. Lithophytes or epiphytes, habitat occasionally indicated as moist to wet,

growing in the shade or in the open; altitude (100–)500–1700 m. Fl. April–May, June once recorded; well developed fruits Oct.– April.

Collector's notes. Flowers uniformly greenish white or whitish or white and at the base outside yellowish green or very pale buff with creamy-white lip, anther pale yellow-buff, column very pale buff tinged with pink. Less detailed notes include pale yellow, white, whitish yellow, and white and red. Fragrant or without scent. Bracts after opening of the flower soon brown. '*P. corniculata*' has yellow-green to honey-coloured flowers, lip deeper yellow, margins of the lateral lobes brownish.

Notes. 1. Plants in Vietnam and Hainan tend to be sturdier, and usually have longer inflorescences with more flowers. '*P. pyrranthela*' occurs in Hainan and in Vietnam southwards to 15 degrees North. The name applies to plants with long pendulous inflorescences with (15–)20–33 flowers. '*P. annamensis*' occurs in Vietnam between 15 degrees and 11 degrees North. The name applies to plants with relatively large flowers and conspicuous, large bracts of which the margins are to a lesser degree rolled inwards compared with other specimens of *P. chinensis*. Both reduced to synonymy because these differences are so slight and no real discriminating characters were found.

2. Specimens assigned to *Coelogyne pholas*, *Pholidota laucheana* and *P. chinensis* var. *cylindracea* fit within the normal variability of *P. chinensis*.

3. Three specimens in herbarium Reichenbach bear labels with the name *Pholidota laucheana*, with the annotation: Cult. in Eisgrub, com. Lauche. Two of these are dated, resp. 1893 and 1896. The name *P. laucheana* was published in 1892. The third collection is not dated, but the measurements of the flower parts are larger than those in the description. Most probably the holotype was lost in B. The specimen collected in 1893, which best fits the description, is selected as the neotype; possibly this was collected from the same plant.

4. One syntype of *Pholidota pholas*, Seeman s.n., is clearly annotated as such. Another sheet annotated *Pholidota pholas* from Hongkong shows a letter H between brackets. The tails of the g's in the word Hongkong on the label are decorated. The handwriting was compared with a sample of Hance's handwriting present in the Rijks-herbarium, which has a similar decoration of letters; consequently this specimen must be collected by Hance and is thus the other syntype.

5. One specimen from Hainan, Lau 28054, has unusually broad petals 4 mm wide; in all other aspects it fits in the description of *P. chinensis*.

6. '*P. corniculata*' is only known from the type. The name refers to the lateral lobes of the hood ('corniculum' = small horn). The name applies to a plant which is sturdier than average *P. chinensis*, but similar lobes are also present in several 'typical' specimens. The scales of the young shoot are c. 10 cm long instead of maximal 7 cm, the rhachis is up to 30 cm instead of 23 cm. A more conspicuous difference is in the backside of the lip: outside a wide groove is present which is on section V-shaped and projects inside at the back of the hypochilium as a broad high keel, laterally of this on either side a low, swollen keel is present. Since in all other aspects the plant does not differ from *P. chinensis* it is considered to be an aberrant specimen. The measurements are included in the description above.

7. The type material of *P. corniculata* in W consists of two parts of inflorescences mounted on the sheet, a number of pencil sketches of flower parts, one convolute containing inflorescence parts with relatively small flowers, and two other convolutes, one

with a partial inflorescence with flowers like the ones of the mounted inflorescences, and a second with similar flowers of which one is dissected. On this last convolute is written: *Coelogyne corniculata*. The mounted material as well as the flowers in the last-mentioned convolutes belong to '*P. corniculata*'. The flowers fit the short diagnosis by Reichenbach: '... labello medio angulato saccato ...' and '... very curious in the angular centre of the lip ...'. The illustrated flower analyses on the sheet show lips of which the hypchilium is devoid of the wide groove; instead three about equal keels are present. These sketches depict the relatively small flowers on the sheet which belong to 'typical' *P. chinensis*.

18. *Pholidota leveilleana* Schltr. – Fig. 19.

Pholidota leveilleana Schltr., Fedde Rep. 12 (1913) 107; Ibid., Beih. 4 (1919) 189. – Type: Esquirol 2088 (holo E.).

Pholidota subcalceata Gagnep., Bull. Mus. Hist. Nat. Paris 2, 22 (1950) 508. – Type: Poilane 32.058 (holo P.).

Plant 16–40 cm high. Roots to more than 25 cm long, 0.5–2 mm diam. Rhizome scales 3; smallest one 12–15 mm long, longest one 2–4 cm long; top acute; more or less papyraceous, soon dry, rather long persistent, then desintegrating into thin fibres; nerves not very conspicuous, 21–27. Pseudobulb scales 2, (narrowly) triangular, 3–6 by 1.5–3.5 cm; top acute; papyraceous; many-nerved, like the rhizome scales. *Pseudobulbs* close together, somewhat ascending, swollen, ovoid, 2–3.4 cm long, when fresh more or less quadrangular in section, when dried smooth with coarse irregular folds. *Leaves* one or two per pseudobulb. Petiole 2–8 by 1–2.5 mm. *Blade* linear-lanceolate, 8–29 by 1–3 cm; top acute; herbaceous, sometimes rather stiff; main nerves 3–5, somewhat to very prominent, small nerves 22–40, rather inconspicuous. *Raceme* proteranthous to synanthous with the just developing very young leaves, (8–)20–40-flowered. Scape 8–30 mm beyond the scales, in fruit elongating to more than 9.5 cm. Rhachis pendulous, almost straight to slightly zig-zag, (5.5–)13–17 cm long; internodes 3.5–6 mm long, lowest ones sometimes up to 15 mm long. Sterile bracts absent. *Floral bracts* caducous at anthesis, more or less hastate, folded along the midrib, 9.5–11 by 6–9 mm; top obtuse to acute; papyraceous; nerves 9–11, each above the base splitting into several about parallel branches. *Flowers* remaining rather closed, not resupinate. Pedicel rather angular by the ribs, 1.5–2.5 by 0.4–1.2 mm. Ovary angular by the ribs, c. 2 by 1–1.8 mm. *Median sepal* more or less ovate, 4.2–6 by 2.3–5 mm; top acute, slightly acuminate, tip more or less rounded; nerves 5–7, the midrib somewhat prominent, lateral ones branched or not. *Lateral sepals* ovate, 4.5–6 by 2.5–3.5 mm; top acute; nerves 3–4, midrib a somewhat prominent rounded keel, additional nerves branched or not. *Petals* more or less ovate, 3.7–5 by 2.2–3.5 mm; top acute to somewhat acuminate; nerves 3–4, branched. *Lip* rather broadly inserted, 4.5–6 mm long. *Hypochilium* 2–3 mm long, 1.8–3 mm wide, 1.5–2 mm high; hypochilium margins not lobe-like, in front laterally recurved, gradually passing into the margins of the epichilium; nerves 5–7, all or only the central 5 over the entire length or only towards the base swollen into rounded keels; lateral nerves branched into the lobes. *Epichilium* recurved, either or not two-lobed, 2–2.7 by 3.8–4 mm when spread; top

either or not retuse; lateral lobes when present in front more or less folded, when spread semi-orbicular. *Column* more or less spatulate to club-shaped in outline, 2.6–3.3 mm long; hood more or less widened at the top; top margin more or less rounded to irregularly 3-lobed, either or not overtopping the anther; lateral margins of the hood more or less distinctly continuing downwards along the column body. *Anther* broadly elliptic in outline, c. 1–1.2 by 1.2–1.7 mm; top truncate to retuse. Pollinia c. 0.5 by 0.4 mm. *Stigma* c. 0.7 by 1.2 mm; rostellum a semi-orbicular to broadly triangular rim. *Fruit* not seen.

Distribution. Vietnam (Gia Lai-Cong Tum, Lam Dong). 3 collections: Greenway 17 (AMES), A.D. Kerr 3294 (C, L), Poilane 32058 (P.). China (Guizhou = Kweichow = Kouy-tchou). 1 collection Esquirol 2088 (E).

Ecology. Terrestrial (once recorded), at 900–1500 m. Fl. March, May, June.

Collector's notes. Flower white with pale orange or carmine red on lip, anther brilliant red-orange, pollinia pale yellow.

Note. The type specimen of *P. leveilleana* is a weakly developed plant with one-leaved pseudobulbs and a few-flowered raceme. The two other specimens of which vegetative parts were studied were strongly developed; they have two-leaved pseudobulbs and much longer, many-flowered racemes. The flowers in all three specimens are morphologically identical. For these reason these plants are considered to belong to the same species. More material is needed to analyse the variability.

19. *Pholidota roseans* Schltr. – Fig. 20.

Pholidota roseans Schltr., Fedde Rep. 12 (1913); Fedde Rep. Beih. 4 (1919) 189. – Type: Esquirol 2047 (holo E).

Plant 18–21 cm high. Roots c. 1 mm diam. Pseudobulb scales ?4, at anthesis the longest one c. 2.5 cm long, after anthesis elongating to 6 cm, soon caducous; top acute; membranous; nerves c. 10. *Pseudobulbs* close together, very slender, 5.5–9 cm long, when dried finely irregularly longitudinally wrinkled. *Leaves* 2 per pseudobulb. Petiole 1.2–2 cm by 1.5–2 mm. *Blade* linear-lanceolate, 8.5–10.5 by 1.6–2 cm; top acute; rather stiff herbaceous; main nerves 5–7, rather tiny, slightly prominent above and below, small nerves c. 22, less prominent. *Raceme* proteranthous, 7–9-flowered. Scape 1–2.5 cm extending from the scales, wiry. Rhachis probably pendulous, straight, c. 4 cm long; internodes 4–9 mm long. Sterile bracts absent. Flora bracts during anthesis persistent, patent to reflexed, gradually decreasing in length towards the top of the inflorescence, ovate, c. 5.7–8 by 4.7–6 mm; top acute; on both sides with scattered minute simple hairs; nerves 5–7. *Flowers* opening rather wide, not resupinate. Pedicel more or less angular by the ribs, 6–10 by 0.5–1 mm. Ovary tapering to the base, angular by the ribs of which 3 are more or less thin and wing-like, 6–9.5 by c. 1.8 mm. *Median sepal* ovate, 8–11 by 4.3–5.8 mm; top acute; nerves 5, the midrib somewhat more prominent. *Lateral sepals* ovate, 8.5–11 by 4.5–5.8 mm; top acute, slightly apiculate; nerves 5, midrib a low, thin, wing-like keel. *Petals* ovate, 8–10 by 3.5–5.5 mm; top acute; margin finely papillose; nerves 5, or 3 and then the lateral ones either or not giving off one main branch. *Lip* rather narrowly inserted, 9–9.3 mm long when flattened. *Hypochilium* at the back rather angular in lateral outline, c. 4.5–5.5 mm long, 2 mm

wide, at the back 2–3.8 mm high, in front 2 mm high; lateral margins either or not lobe-like, in the first case with rounded front margin, at the back rather abruptly lowering; 5-nerved, without keels. *Epichilium* reflexed, ligulate to more or less orbicular, c. 4–4.8 by 3–4 mm; top more or less obtuse to truncate; nerves 5, the central 3 slightly swollen. *Column* in outline shortly spatulate, when flattened 3–4.5 by c. 3.5 mm; hood decurrent along the column body, at the top distinctly widened; top margin broadly retuse to truncate, in the centre either or not slightly apiculate. *Anther* inserted about halfway the top margin of the hood and the stigma, more or less broadly cordate, c. 1.2 by 1.5 mm; top shortly acuminate, recurved, the tip obtuse. Pollinia flattened, c. 0.8 by 0.5 mm. *Stigma* more or less semi-orbicular in outline, c. 1.3 by 2 mm; rostellum broadly seam-like to broadly triangular, truncate or acute, 0.6 by 2 mm when spread. *Fruit* not seen.

Distribution. CHINA (Yunnan, Guizhou = Kweichow = Kouy-tschou). 2 collections: Esquirol 2047 (E), K.M. Feng 13589 (AMES).

Ecology. Lithophytes in mixed forest (once recorded); altitude 1250–2000 m.

Collector's notes. Fl. pinkish white to white.

Note. Two collections were available for this study. They are very similar in habit, texture, consistency of the scales, and general appearance of the flowers. Slight differences are present in the lip. In Esquirol 2047 the lateral margins of the lip are rather high and lobe-like, with rounded front margins; the epichilium is more or less orbicular in the one lip that is present (the tip is broken off). In Feng 13589 the lateral margins are not elevated into lobes; the epichilium is ligulate and reflexed. More material is necessary to decide whether these differences are part of the variability in this species; tentatively these plants are considered conspecific.

20. *Pholidota rubra* Lindley – Fig. 21.

Pholidota rubra Lindley, Gen. & Sp. Orch. (1830) 37; Wall., Pl. As. Rar. 3 (1832) 21, pl. 239; Beer, Beitr. Morph. Biol. Orch. (1863) t. 4, f. 1; Hooker f., Ic. Plant. 3, 9 (1889) pl. 1879; Fl. Brit. India 5 (1890) 846; Grant, Orch. Burma (1895) 162; King & Pantl., Ann. R. Bot. Gard. Calc. 8, 1 (1898) 145; Ibid. 8, 3 (1898) pl. 202; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 146; Mitra, Fl. Pl. East India 1 (1958) 305; Hô & Du'o'ng, Fl. Vietnam (1960) 608, 609, fig. (Vietnamese); Hô, Ill. Fl. S. Vietnam ed. 2, 2 (1972) 1016, f. 5019 (Vietnamese); Pradhan, Ind. Orch.: Guide 2 (1979) 293. – *Coelogyne rubra* (Lindley) Rchb. f., Walpers Ann. 6 (1861) 238. – Type: Wallich s.n. (K).

Pholidota undulata Lindley, Bot. Reg. 14 (1829) 1213 (nom. nud.); Gen. & Sp. Orch. (1830) 37; Bot. Reg. 27, Misc. 19 (1841) 6. – *Coelogyne undulata* (Lindley) Rchb. f., Walpers Ann. 6 (1861) 238. – Type Wallich 141 (K).

Plant 18–25(–40) cm high. Roots to more than 25 cm long, 1–2 mm diam., partly villous by root hairs. Rhizome scales 4; smallest one 5–7 mm long, longest one 20–35 mm long; top obtuse to acute; herbaceous, soon dry turning papyraceous, quite soon disintegrating into caducous thin fibres; nerves usually not clear, surface when dry irregularly finely wrinkled. Pseudobulb scales 2; longest one 4–5 cm long; like the rhizome scales. *Pseudobulbs* 0.5–1.7 cm apart, bulging below the centre, tapering to base and top, 3–7.5(–9) cm long; when dry rather coarsely wrinkled. *Leaves* 2 per pseudobulb. Petiole 2–2.5(–3.5) cm by 1.5–2.5 mm. *Blade* linear-lanceolate, c. 12–22(–27) by 1.8–3.5(–4) cm; top acuminate; herbaceous; main nerves (3–)5, some-

what prominent, especially below, small nerves 35–65, hardly prominent. *Raceme* proteranthous to synanthous with the just emerging young leaves, 30–55(–62)-flowered. Scape wiry, 0.3–3 cm extending from the scales, in fruit elongating to 7–15(–21) cm. Rhachis pendulous, more or less straight, 11–22 cm long; internodes 3–7 mm long, in fruit swelling. Sterile bracts absent. *Floral bracts* during anthesis persistent, dropped during fruit setting, inrolled, reflexed, ovate to elliptic, 7–11 by 4–5.2 mm top acute; papyraceous; nerves 11–15; inside at the base with few minute hairs. *Flowers* opening wide, not resupinate. Pedicel more or less angular by the ribs, 2–3 by 0.4–0.5 mm. Ovary angular by the ribs, 1.5–2.7 by 0.7–1 mm. *Median sepal* more or less ovate, 4.3–5.5 by 2–3.6 mm; top acute to acuminate, the tip retuse to apiculate; nerves (3–)5, the midrib somewhat prominent. *Lateral sepals* recurved to reflexed, more or less ovate to obliquely elliptic, 4.5–6 by 2.5–3.2 mm; top acute to acuminate, minutely apiculate; midrib a more or less swollen rounded keel, additional nerves 3–4. Petals linear-lanceolate to linear, 4.3–5.2 by 0.4–0.8 mm; top obtuse, rounded to acute; nerve 1. *Lip* rather broadly inserted on the column, 4–5.5 mm long. *Hypochilium* 2.3–3.5 mm long, 1.5–2.3 mm wide, 1.8–2.6 mm high; lateral lobes erect, rather abruptly lowering in front, tips rounded; 7-nerved, the central 5 somewhat swollen at the base, the midrib at the back more or less distinctly swollen into a low rounded keel, nerves on the lateral lobes branched. *Epichilium* reflexed to recurved, semi-orbicular to ovate, 1.7–2.3 by 1.5–2.3 mm; top acute to apiculate; 3-nerved; smooth without calli. *Column* rather slender, without column foot, 3–4 mm long. Hood rather long, hardly widened at the top, slightly decurrent along the column body, distinctly overtopping the stigma and anther; top entire to somewhat incised, sometimes retuse. *Anther* inserted about halfway the hood, more or less transversely elliptic, 0.7–1.1 by 0.6–1 mm; top recurved, acuminate, the tip more or less rounded. Pollinia pear-shaped, c. 0.3–0.4 by 0.2–0.3 mm. *Stigma* 0.8–1 by c. 1 mm; rostellum narrow, wide, more or less rounded. *Fruit* ellipsoid, on top the column persistent; body 11–14 by 6–7 mm; jugae flat, sometimes with a low longitudinal ridge. Seeds shortly fusiform to 0.3–0.4 mm long, embryo to 0.25 mm long.

Distribution. Sikkim: 2 collections (AMES, BR, C, FI, G, L, OXF, W). INDIA (E. Bengal, Assam, Nagaland). 13 collections (AMES, BM, BR, C, E, G, K, L, MEL, NY, OXF, S, SING, W). BURMA (Kachin State). 5 collections (BM, E). Vietnam (Lam Dong = Lang Biang = Tuyen Duc). 2 collections (P). According to Averyanov also in Ha Nam Ninh and Gia Lai-Cong Tum.

Ecology. Epiphytes; altitude 850–2000 m. Fl. Oct.–Feb.

Collector's notes. Sepals greenish, pale green, pale golden to dull yellow, or pale brownish yellow. Lip lighter greenish, yellow, faintly flesh-coloured, pinkish or white. Without smell (one record).

Note. The plants are probably autogamous, a very high percentage of the flowers set fruit.

SECTION CRINONIA (Blume) Butzin

Pholidota sect. *Crinonia* (Blume) Butzin, Willdenowia 7 (1974) 258, in Schltr, Orch. 1 ed. 3 (1986) 956.–*Crinonia* Blume, Bijdr. 7 (1825) 338; Steudel, Nomencl. bot. (1941) 324; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 134; Ridley, Fl. Malay Pen. 4 (1924) 136.–*Coelogyne* sect. *Crinonia* (Blume) Rchb. f., Walp. Ann. 6 (1861) 236.– Type species: not designated (lecto: *Pholidota carnea*, here chosen).

Pendulous or exceptionally creeping epiphytes, occasionally lithophytes, entirely glabrous except for root hairs. Roots which attach the plant to the substratum only present on the basal portion of the rhizome, usually sparsely branched; aerial roots in the upper part of the rhizome absent or present, usually not branched, either or not appressed to the rhizome. Rhizome pendulous, rather short to rather long, sometimes branched, the parts between the pseudobulbs short to rather long. Scales enclosing the rhizome 4-7, in the older rhizome parts appressed to the rhizome, long persistent, somewhat different and smaller than the 2 long persistent, later desintegrating upper scales which more or less enclose the pseudobulb. *Pseudobulbs* rather close together to distinctly spaced, more or less spirally arranged along the rhizome, long persistent, rather swollen to slender. *Leaves* two per pseudobulb, small to rather large. *Blade* ovate-oblong to linear, herbaceous to coriaceous, many-nerved, main nerves 3-7. *Raceme* proteranthous to synanthous with the almost entirely developed young leaves, or heteranthous, few- to many-flowered; flowers opening more or less simultaneously. Scape short to long, wiry, usually enlarging after anthesis. Rhachis more or less pendulous, short to long, about straight to more or less zig-zag. Sterile bracts rarely present. *Floral bracts* persistent or caducous, either or not folded along the midrib, reniform to ovate-oblong, pergamentaceous or herbaceous. *Flowers* neatly distichous, rather closed to opening wide, not resupinate but lip more or less turned downwards. Pedicel about straight, terete to angular. Ovary more or less angular due to the ribs. *Median sepal* concave, ovate to ovate-oblong, with a pronounced midrib, not keeled. *Lateral sepals* rather shallowly to deeply concave, midrib with a pronounced rounded keel which is sometimes towards the tip wing-like. *Petals* usually slightly asymmetric, ovate, obovate to ovate-oblong, sometimes with erose margin. *Lip* rather narrowly inserted on the short column foot, faintly sigmoid to about straight. *Hypochilium* boat-shaped, especially in the back rather shallowly concave; lateral margins more or less erect, often lobe-like, rarely at the back with 3 faint keels. *Epichilium* more or less recurved, entire, margins more or less turned upwards, towards the base with 2 distinct calli, in one species without calli. *Column* with a more or less distinct small column foot, short, in one case relatively long; hood rather reduced to rather pronounced, either consisting of a more or less band-like median lobe and two more or less triangular lateral lobes (rarely the lateral lobes are absent), or in one species spatulate in outline with decurrent margins. *Anther* inserted on top of the band-like central part of the column, in one species about halfway the top margin of the hood and the stigma, irregularly cordate, orbicular, transversely elliptic to reniform in outline. Pollinia about pear-shaped, sometimes more or less flattened. *Stigma* more or less obliquely cup-shaped; rostellum broad, band-like. *Fruit* (only of *P. carnea* and *P. protracta* seen) obovoid to ellipsoid, in section more or less 3-angular, on top the perianth or at least the column persistent; ribs 6, the 3 jugae flat, band-like, the 3 valvae each with a longitudinal low keel. Seeds shortly fusiform, embryo ellipsoid.

Distribution. South-east Asia: Nepal, Sikkim, NE. India, SW China, Burma, Thailand. Malesia: Malay Peninsula, Sumatra, Java, Lesser Sunda Islands, Borneo, Philippines, Celebes, New Guinea. 3 species.

Ecology. Epiphytes in more or less dense primary lower montane to montane forest or in more open kerangas, sometimes lithophytic on boulders; altitude 700-2350 m.

KEY TO THE SPECIES OF SECTION CRINONIA

- 1a. Inflorescences in general hysteranthous: each borne on a shoot which does not develop into a pseudobulb with leaves after anthesis (rarely few infructescences on a plant do not show this condition, and are borne on top of a pseudobulb with leaves!).....**23. *P. protracta* Hooker f.**
- b. Inflorescences proteranthous or synanthous with the young leaves: each shoot which bears an inflorescence develops later into a pseudobulb with leaves, with on top the infructescence.....**2**
- 2a. Bracts persistent during anthesis. Scape of the inflorescence at anthesis longer than the rhachis**21. *P. aidiolepis* Seidenf. & de Vogel**
- b. Bracts at anthesis caducous. Scape of the inflorescence at anthesis (usually much) shorter than the rhachis**22. *P. carnea* (Blume) Lindley**

21. *Pholidota aidiolepis* Seidenf. & de Vogel – Fig. 22.

Pholidota aidiolepis Seidenf. & de Vogel in Seidenf., Opera Botanica 89 (1986) 106, f. 40.– *Pholidota globosa* auct. non (Blume) Lindley: Seidenf., Bot. Tidsskr. 65 (1969) 121, f. 14.– Type: GT 6338 (holo C; iso L).

Plant over 18 cm long including the inflorescences, probably pendulous (see note). Roots not seen probably only in the basal portion of the rhizome. Rhizome probably pendulous, the portion between two pseudobulbs less than 1 cm long. Rhizome scales and pseudobulb scales long persistent, longest one to over 2.5 cm long. *Pseudobulbs* rather swollen, to c. 1.7 cm long. Petiole to c. 1 cm long. *Leaf blade* linear, c. 8 cm long. *Raceme* synanthous with the almost entirely developed young leaves, 10–18-flowered. Scape elongated, c. 7.5 cm long. Rhachis curved, ?straight to zig-zag, c. 3.8–6.8 cm long; internodes c. 4 mm long. *Floral bracts* persistent during anthesis, ovate, c. 8 by 4.5 mm; top acute; membranous to pergamentaceous; nerves 7–9. *Flowers* partly enclosed by the bracts. Pedicel c. 0.3 by 0.6 mm. Ovary c. 2 by 1 mm. *Median sepal* more or less ovate, c. 3.3 by 1.8 mm; top acute. *Lateral sepals* ovate-oblong, c. 3.7 by 1.6 mm; top acute. *Petals* more or less ovate-oblong, c. 2.9 by 1.3 mm; top irregularly retuse; margin erose. *Lip* c. 3.5 mm long. *Hypochilium* c. 2 mm long, 1.5 mm wide, 0.5 mm high; lateral margins lobe-like, in front rather abruptly lowering; nerves 3. *Epichilium* somewhat recurved, more or less ovate, c. 1.5 by 1.1 mm; top acute. *Column* c. 1.5 mm long; column foot c. 0.2 mm long; hood much reduced, lateral lobes narrowly triangular c. 0.3 mm long, central lobe rather thick, more or less fused with the column body. *Anther* more or less irregularly orbicular in outline, c. 0.6 by 0.6 mm; top truncate. Pollinia c. 0.4 by 0.3 mm. *Stigma* c. 0.4 by 1 mm. *Fruit* not seen.

Distribution. Thailand (VII, Peninsular). Only known from the type (C).

Ecology. Not known; altitude 1350 m.

Collector's notes. Flowers white, column light purple.

Note. The only plant known was cultivated in the Copenhagen Botanic Garden. Before it died the habit was drawn and an inflorescence with flowers was put on

alcohol. The present description of the vegetative parts is based on this drawing. The latter shows two inflorescences: one sprouts from the scales of a young shoot of which the pseudobulb is not (yet) developed, and the other is seemingly borne on top of a fully developed pseudobulb which bears three leaves. The draughtsman probably made a mistake there. So far only one plant with a pseudobulb bearing three leaves was observed in *Pholidota*, but in that case the third leaf was a modified inflorescence. Probably the inflorescence sprouts from a young shoot which was hidden behind the pseudobulb, not showing the bracts enclosing its base, and from the young shoot one young leaf was lost or undeveloped.

22. *Pholidota carnea* (Blume) Lindley – Fig. 23–24, Plate 5a–c.

For literature, see under the varieties.

Plant 15–45 cm long (specimens from Thailand shorter and creeping). Roots to more than 40 cm by 1.5–2 mm. Rhizome portion between two pseudobulbs 0.5–5 cm. Rhizome scales 4–5(–7), shortest one 5–9 mm long, longest one 2–5 cm long, (stiff) herbaceous, margins membranous, nerves 20–35(–42). Pseudobulb scales 2, narrowly triangular, 2–5.5 cm long; soon dry but long persistent and clasping the rhizome scales, the pseudobulbs and the new shoot; herbaceous, margins membranous, nerves 20–45. *Pseudobulbs* ascending to more or less parallel to the rhizome, sometimes patent, usually very slender, 1.5–6 cm long, when dry with longitudinal coarse folds and usually fine cross-wrinkles. Petiole 5–15(–20) by 1–2.5 mm. *Leaf blade* ovate to linear, (3–)5–30 by 0.6–2(–2.5) cm; top acute to acuminate; herbaceous to stiff coriaceous; main nerves 3–7, somewhat prominent below, small nerves (14–)25–55(–64), rather inconspicuous. *Raceme* proteranthous, to synanthous with the just emerged to sometimes almost entirely developed young leaves, 17–40-flowered. Scape short, 0.5–4(–5.5) cm beyond the scales, in fruit elongating to 3–9(–13) cm. Rhachis flexible, curved, sometimes more or less zig-zag, (3–)4–15 cm long; internodes (1.5–)2–5 mm long. Sterile bracts rarely present, at most one, either like the floral bracts or with the consistency of a leaf. *Floral bracts* ovate to ovate-oblong, caducous at anthesis, 5–10 by 3.5–5.5 mm; top acute to obtuse; pergamentaceous to membranous, inside at the base sometimes with some scattered, minute hairs; nerves 7–9. Pedicel 0.5–1.5(–2.3) by c. 0.3–0.6 mm. Ovary 1–6 by 0.5–1.3 mm. *Median sepal* more or less elliptic, ovate, to ovate-oblong, 1.8–4.2 by 1.2–2.5 mm; top retuse to acuminate. *Lateral sepals* ovate to ovate-oblong, 2.2–4.5 by 1.2–2.5 mm; top retuse to acuminate; midrib usually somewhat wing-like to the top. *Petals* more or less elliptic, obovate to ovate (to ovate-oblong), rarely almost orbicular, 1.3–3.7 by 0.8–2 mm; top retuse to acuminate; nerves (1–)3. *Lip* 2.2–4 mm long. *Hypochilium* 0.7–2.2 mm long, 0.5–1.8(–2) mm wide, 0.3–0.7 mm high; lateral lobes (broadly) triangular, 0.4–0.8 by 0.4–1(–1.5) mm, with a rounded top, on the junction with the epichilium gradually to rather abruptly lowering; nerves 3–5, rarely slightly swollen into faint keels. *Epichilium* more or less recurved, irregularly semi-orbicular to rhomboid when flattened, 0.7–2(–2.3) by 1–2.2 mm; top obtuse to acute. *Column* 0.4–2.3 mm long; column foot 0.2–0.8 mm long; hood short, its top margin entire or irregularly serrate, its central part more or less shortly

band-like and much shorter than the anther; lateral lobes either absent (see note 1 under var. *carnea*) or narrowly triangular to triangular with more or less acute top, 0.3–0.7 by 0.2–0.6 mm. *Anther* in outline about irregularly orbicular to cordate, 0.5–1.3 by 0.5–1.3 mm; top truncate. Pollinia 0.3–0.6 by 0.2–0.3 mm. *Stigma* 0.5–1.2 by 0.5–1 mm. *Fruit* body ellipsoid, 4.5–7.5 by 2.5–4 mm.

Distribution and Ecology: see under the varieties.

KEY TO THE VARIETIES OF PHOLIDOTA CARNEA

- 1a. Leaves stiff coriaceous, blade 2.5–4 cm long22c. var. *pumila* (Ridley) de Vogel
- b. Leaves herbaceous, blade of (almost) all leaves distinctly longer than 4 cm.....2
- 2a. Leaves ovate to ovate-lanceolate, rarely linear-lanceolate. Pedicel and ovary rather patent from the rhachis of the inflorescence. Perianth of the open flower about as high as long, in side view rather globose.....22b. var. *parviflora* (Hooker f.) de Vogel
- b. Leaves linear to linear-lanceolate. Pedicel and ovary more or less appressed to the rhachis of the inflorescence or making an acute angle with it. Perianth of the open flower in side view much higher than long, quite angular because the median sepal spreads far from the lateral sepals.....22a. var. *carnea*

22a. var. *carnea* – Fig. 23, Plate 5a.

Pholidota carnea (Blume) Lindley, Gen. & Sp. Orch. (1830) 37; Rchb. f., Bonpl. 5 (1857) 42; Miq., Fl. Ind. Bat. 3 (1859) 669; J.J. Smith, Orch. Java (1905) 158; Ibid., Fig.-Atlas (1909) f. 143; Koord., Exk. Fl. Java 1 (1911) 366; Fl. Tjib. 1, 2 (1922) 46; Ames, Sched. Orch. 6 (1923) 20; J.J. Smith, Fedde, Rep. 32 (1933) 172; Backer, Bekn. Fl. Java (em. ed.) 12, 1 (1952) 139; Holttum, Orch. Malaya (1953) 235; Backer & Bakh. f., Fl. Java 3 (1968) 286; J.B. Comber, Orch. Digest (1983) 76, fig., phot.; Seidenf. & de Vogel, Opera Bot. 89 (1986) 105, f. 59, pl. 8d.– *Crinonia carnea* Blume, Bijdr. (1825) 339; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 135, f. 46A-B; Ridley, Fl. Malay Pen. 4 (1924) 137.– *Coelogyne carnea* (Blume) Rchb. f., Walpers Ann. 6 (1861) 237.– Syntypes: Blume 271 (lecto L, specimen H.L.B. 903, 16- 2435, here proposed; iso BO, L), Blume s.n., specimens H.L.B. 903, 16-2434 and -2436 (L), Blume s.n. (P, 2 specimens).

Pholidota celebica Schltr., Fedde Rep. 10 (1911) 19.– Type: Schlechter 20472 (lost).

Pholidota bismarckiensis Schltr., Fedde Rep. Beih. 1 (1911) 107; Ibid., Beih. 21 (1925) t. 41, no. 142.– Type: Schlechter 18611 (holo lost; lecto BO, here proposed).

Pholidota torricellensis Schltr., Fedde Rep. Beih. 1 (1911) 107; Ibid., Beih. 21 (1925) t. 42, no. 143.– Type: Schlechter 20133 (holo lost; lecto G, here proposed; iso BO, L).

Pholidota elisabethiana Ridley, J. Fed. Malay St. Mus. 6 (1915) 181.– *Crinonia elisabethiana* (Ridley) Ridley, Fl. Malay Pen. 4 (1924) 137.– Syntypes: Ridley 16280 (lecto SING, here proposed; iso BM, K), Ridley ?s.n. from G. Ulu Riang (not seen, lost?).

Crinonia elmeri Ames, Orch. 5 (1915) 67 (nom. nud.); Sched. Orch. 6 (1923) 20 (in syn. *P. carnea*).– Based on Elmer 13834 (AMES).

Plant 15–50 cm long. Rhizome portion between two pseudobulbs 0.5–3 cm long. Rhizome scales (4–)5, shortest one 6–8(–15) mm long, longest one 15–25(–30) mm long.

Pseudobulbs rather swollen to sometimes rather slender, (0.8-)2-4(-5.5) cm long, usually ascending. *Leaf blade* linear to linear-lanceolate, (3-)9-25(-30) by 0.6-1.6(-2.3) cm. *Raceme* proteranthous to synanthous with the just emerging very young leaves, 20-40-flowered. *Scape* (0-)0.5-2.5 cm beyond the scales. *Rhachis* 6.5-16.5 cm long, distance between 10 flowers (17-)23-50(-63) mm. *Flowers* rather to much appressed against the rhachis or the ovary forming an acute angle with this axis, in side view rather angular in outline, perianth much shorter than high. *Ovary* (1-)2-4(-6) by 0.6-1.3 mm. *Median sepal* ovate, (1.8-)2.2-3(-3.5) by (1.2-)1.5-2(-2.5) mm; top acute to acuminate, sometimes truncate and acuminate. *Lateral sepals* (2.2-)2.7-3.3(-4) by 1.2-2.3 mm. *Petals* (1.3-)1.7-2.5(-2.8) by (0.8-)1.3-2(-2.3) mm. *Hypochilium* (0.7-)1.2-2.5 mm long; nerves 3(-5); without keels. *Epichilium* (0.7-)1-1.7 by (0.7-)1-2.2 mm. *Column* (0.6-)1-3 mm long; lateral lobes of the hood either well developed, c. 0.4-0.8 by (0.3-)0.4-0.8 mm, or much reduced to entirely wanting (see note 1). *Fruit* body ellipsoid, 5-7.5 by 2.5-4 mm.

Distribution. Thailand (Peninsula). 3 collections (C, K). Malay Peninsula (Perak, Pahang). 16 collections (AMES, BM, BO, K, SING). Sumatra (Sumatera Utara, Sumatera Barat, Jambi, Bengkulu). 19 collections (AMES, BM, BO, G, L, SING). Java (Jawa Barat, Jawa Tengah, Jawa Timur). 51 collections (AMES, BO, G, K, L, P, S, SING, U). Lesser Sunda Islands (Bali, Lombok, Flores). 7 collections (BO, L). Borneo: Sarawak (1st Division). Sabah (West Coast Residency, Interior Residency). 23 collections (AMES, BM, E, G, K, L, NY, SING). Philippines (Mindanao). 3 collections (AMES, K). Celebes (Sulawesi Utara, Sulawesi Selatan). 3 collections (BM, BO). New Guinea: Irian Jaya (Manokwari, Pini). Papua New Guinea (W. Sepik Prov., Western, Eastern and Southern Highlands, North, Central and Milne Bay Prov.). 21 collections (AMES, BM, BO, BRI, C, E, G, K, L, LAE, NY, P, S, SING, W).

Ecology. Epiphytes, rarely terrestrial in loam in rock crevices along newly opened roads; altitude 700-2200 m. Fl. probably all year round, most records from Jan.-March and July-Nov.

Collector's notes. Flowers usually salmon-coloured to pinkish, sometimes tinged brownish, less frequently greenish, white or cream-coloured. Lip sometimes differently coloured, sometimes with yellow or orange spots.

Notes. 1. *Pholidota carnea* var. *carnea* is rather homogeneous in all parts except in the shape of the column hood. Most plants from W. Malesia have a hood which is on either side drawn out into a triangular lobe which projects along the stigma. Three plants from Java, however, and all plants from the Philippines do not possess these lateral lobes; the hood consists only of the central, band-like projection. In Zollinger 2260 from Java two flowers have a similarly reduced hood; in a third, however, one of the lateral lobes is present, the other is absent.

In E. Malesian plants the lateral lobes are in most cases absent ('*Pholidota torricellensis*'). In several plants, however, different flowers present a range from well developed lateral column lobes to much reduced ones (e.g. Brass 31194 from New Guinea; Sarip 423 from Bali), or flowers of different plants from the same collection have either distinct column lobes, or the lobes are entirely wanting (Anonymus s.n., from Flores, Mt. Ilimandiri). In a collection cultivated in Edinburgh (C 4690, P. Woods, from P.N.G.) three flowers showed different degrees of abortion of the lateral lobes: one had distinctly developed lobes, a second had one lobe aborted, and in a third

all two lobes were absent. Reduction and abortion of the lateral lobes of the column thus occurs in part of the distribution area, but not in all populations; even different flowers of one inflorescence may show different degrees in reduction of the column lobes. This pattern is considered part of the variability of *Pholidota carnea* var. *carnea*, which for this reason is not further split up.

2. Two specimens from Thailand are deviating from all others in the smaller dimensions of all parts and the short rhizome which is not pendulous but attached to the substratum by roots; the pseudobulbs are secund. Notwithstanding these differences they unmistakably belong to this variety.

3. The plants are probably autogamous, a very high percentage of the flowers set fruit.

4. Vern. Saging Saging (Bukidnon lang., Philip.).

22b. var. *parviflora* (Hooker f.) De Vogel, *stat. nov.* – Fig. 24a, Plate 5b.

Pholidota parviflora Hooker f., Icon. Pl. III, 9 (1889) t. 1891; Hooker f., Fl. Brit. India 6 (1890) 195; Ridley, Mat. Fl. Malay Pen. 1 (1907) 135; Holttum, Orch. Malaya ed. 3 (1964) 238; Seidenf., Nord. J. Bot. 6 (1986) 165, f. 9. – *Crinonia parviflora* Pfitzer, in Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 136; Ridley, Fl. Malay Pen. 4 (1924) 137. – *Pholidota micrantha* Hooker f., Fl. Brit. India 5 (1890) 847; Ridley, J. Linn. Soc. Bot. 32 (1896) 328. – Type: Wray s.n., G. Batu Pateh, Perak, 6000' (holo K).

Plant 15–50 cm long. Rhizome portion between two pseudobulbs (2–)2.5–5(–6.5) cm. Rhizome scales 4–5(–7), shortest one 5–9 mm long, longest one 20–50 mm long. *Pseudobulbs* usually very slender, sometimes more swollen, more or less parallel to the rhizome, sometimes patent, 2.5–6 cm long. *Leaf blade* ovate to lanceolate (to linear-lanceolate), (3–)5–11 by 0.9–2(–2.5) cm. *Raceme* rarely proteranthous, usually synanthous with the just emerging to almost entirely developed young leaves, 17–31-flowered. Scape (0.5–)2–4(–5.5) cm beyond the scales. Rhachis (3–)4–8.5 cm long, distance between 10 flowers (17–)20–25(–31) mm. *Flowers* patent from the rhachis, perianth in side view rather globose, about as high as long. Ovary 1–2 by 0.5–1 mm. *Median sepal* about elliptic, ovate to ovate-oblong, (3–)3.5–4.2 by 1.7–3.2 mm, top retuse to obtuse. *Lateral sepals* 3.5–4.5 by 1.6–2.5 mm. *Petals* 3–3.8 by 1.5–2 mm. *Hypochilium* (1–)1.2–2.2 mm long; nerves (3–)5, the central 3 in the back more or less clearly raised into faint keels. *Epichilium* (1.4–)1.8–2(–2.3) by (1–)1.5–2.2 mm. *Column* 1.3–2.3 mm long; hood always with distinct lateral lobes 0.3–0.5 by 0.2–0.5 mm. *Fruit* body 4.5–7 by 3–4 mm.

Distribution. Malay Peninsula (Pahang, Selangor). 19 collections (BO, E, K, KLU, SING).

Ecology. Epiphytes in montane and elfin forest, altitude 1500–2400 m. Fl. April (2 records), June–Aug. (8 records), Nov. (3 records).

Collector's notes. Flowers white, sometimes tinged pink, anther brick-red to purple; column pale mauve, hypochilium pale green (each one record).

22c. var. *pumila* (Ridley) de Vogel, *stat. nov.* – Fig. 24b–g, Plate 5c.

Pholidota parviflora Hooker f. var. *pumila* Ridley, J. Linn. Soc. Bot. 38 (1908) 329. – *Crinonia parviflora* (Hooker f.) Ridley var. *pumila* Ridley, Fl. Malay Pen. 4 (1924) 137. – Type: Wray & Robinson 5530 (holo SING).

Plant over 15–37 cm long. Rhizome portion between two pseudobulbs 5–15(–20) mm. Rhizome scales 4–5, shortest one 4–6 mm long, longest one 10–13 mm long. *Pseudobulbs* more or less slender, 1.5–3 cm long, when dried with a few coarse folds, further irregularly wrinkled. *Leaf blade* ovate-oblong to ovate-lanceolate, 2.5–4 by 0.7–1.3 cm; top acute; coriaceous. *Raceme* proteranthous, rarely synanthous with the to about halfway emerged young leaves, 16–20-flowered. Scape 0.3–2.5 cm beyond the scales, in fruit elongating to 2.5 cm. Rhachis flexible, curved, sometimes zig-zag, 4.5–9 cm long; internodes about terete, 2–5 mm long. *Flowers* patent from the rhachis. Ovary with rather prominent ribs, 1.5–2.5 by 0.4–1 mm. *Median sepal* about ovate, 2.8–4 by 1.7–2.2 mm; top obtuse to acute, sometimes the top margins incurved. *Lateral sepals* 3.2–4.3 by 1.7–2.3 mm. *Petals* more or less narrowed at the base, 2.3–3.5 by 1.5–2 mm. *Hypochilium* 1.7–2.5 mm long, 1–1.5 mm wide, c. 0.7 mm high; nerves 5. *Epichilium* 1–2 by 1–2 mm. *Column* 1–1.7 mm long; with a short hood of which the lateral lobes just overtop the stigma, with an irregularly serrate top margin of which the median part is elongated; lateral lobes well developed, 0.4–0.6 by 0.3–0.5 mm. *Fruit* and seeds not seen.

Distribution. Malay Peninsula (Kedah, Perak, Pahang). 4 collections (BO, K, L, SING).

Ecology. Epiphytes on tree trunks; altitude 2000–2350 m. Fl. June–Aug.

Collector's notes. Leaves reddish or green. Flowers white with pinkish ovary and reddish column, or salmon pink.

23. *Pholidota protracta* Hooker f. – Fig. 25.

Pholidota protracta Hooker f., Ic. Pl. 19 (1889) t. 1877; Fl. Brit. India 5 (1890) 845; King & Pantl., Ann. R. Bot. Gard. Calc. 8, 1 (1898) 146; Ibid. 8, 3 (1898) pl. 203; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 155, f. 53A–F; Mitra, Fl. Pl. East. India 1 (1958) 308; Hundley & Chit, List Trees Burma ed. 3 (1961) 265 ('protractor'); Tuyama in Hara, Fl. E. Himal. (1966) 448; Suwal (ed.?), Bull. Dep. Med. Pl. 2 (1969) 134; Banerji & Thapa, J. Bombay Nat. Hist. Soc. 68 (1972) 665; Hara, Stern & Will., En. Fl. Pl. Nepal 1 (1978) 53; Pradhan, Ind. Orch.: Guide 2 (1979) 29, 627, fig. – Syntypes: Clarke 25229 (lecto K, here proposed), Griffith (Kew Dist. no. 5042, K), Prain 27 (K).

Plant over 17–90 cm long. Roots to more than 18 by 0.3–1 mm. Rhizome portion between two pseudobulbs (0.5–)2.5(–6.5) cm. Rhizome scales 3–6; shortest one 4–8 mm long, longest one 15–25 mm long; papyraceous; nerves more or less distinct. Pseudobulb scales 2, longest one 2.5–5(–6) cm long, nerves c. 14–28; papyraceous, soon dry but long persistent. *Pseudobulbs* slender, sometimes more or less swollen, often rather curved, 2–6(–9) cm long. Petiole 2–10 by 1–2.5 mm. *Leaf blade* lanceolate to linear, 3.5–10(–14) by (0.5–)1–2.3 cm; top more or less acuminate; herbaceous; main nerves 3(–5), above and below slightly prominent, small nerves 16–34, rather inconspicuous. *Raceme* heteranthous, long persistent, one to several on each rhizome

part between two pseudobulbs, projecting from between the rhizome scales (rarely some inflorescences produce after anthesis at their base a developed pseudobulb with leaves), 4–10-flowered. Scape short, extending 0–7(–13) mm beyond the scales, in fruit somewhat enlarging. Rhachis about straight to slightly zig-zag, (0.7–)1.5–3 cm long; internodes 1–3(–5) mm long. *Floral bracts* persistent till long after anthesis, about reniform to broadly ovate, 2.5–4 by 3–4.2(–5) mm; top obtuse to acute; herbaceous; nerves 7–10. Pedicel slender, 5–22 by c. 0.3 mm. Ovary 1.3–3.3(–6) by 0.6–1.1 mm. *Median sepal* more or less ovate, 3.8–4.2 by 2–2.3 cm; top obtuse, sometimes retuse and apiculate. *Lateral sepals* ovate to ovate-oblong, 5–5.8 by 2.5–3 mm; top acute; nerves 3–4. *Petals* ovate to about obovate, 3.3–4 by 1.5–2.1 mm; top acute to obtuse; nerves (1–)3. *Lip* 4.2–5.5 mm long. *Hypochilium* relatively rather shallow, 2.5–3.7 mm long, 1.7–2.5 mm wide, 0.5–0.8 mm high; lateral margins lobe-like, in front more or less abruptly lowering; 5-nerved. *Epichilium* when flattened more or less ovate, semi-orbicular to irregularly rectangular with more or less rounded corners, 1.1–2 by 1.8–2.3 mm; top broadly retuse, truncate to more or less acute; 5-nerved, the lateral nerves often branching towards the margin; without warts. *Column* spatulate in outline, 3–4 mm long; column foot 0.2–0.4 mm long; hood distinctly developed, wing-like, gradually narrowing to the base; top margin rather irregular. *Anther* inserted almost halfway between the top margin of the hood and the stigma, in outline about kidney-shaped, c. 0.7 by 1.2–1.3 mm; top more or less acute to about retuse, recurved. Pollinia more or less flattened, rather wide, 0.2–0.3 by 0.2–0.3 mm. Stigma 0.7–1 by c. 1 mm. *Fruit* obovoid to ellipsoid, in section 3-angular, perianth or at least the column on top persistent; body 8–11 by 4–6 mm. Seeds c. 0.3 mm long.

Distribution. Nepal (East). 1 collection (KYO, L). Sikkim. 3 collections (G, K, KYO, L, W). India (Bengal, Assam). 3 collections (K, KYO). Burma (Kachin State). 1 collection (AMES, BM). China (Yunnan). 2 collections (E, NY, W).

Ecology. Epiphytes and lithophytes on boulders; altitude 1500–2350 m. Fl. & Fr. April–June, Aug., Oct., Dec.

Collector's notes. Flowers cream-coloured (once recorded).

SECTION PHOLIDOTA

Pholidota sect. *Pholidota* Butzin, Willdenowia 7 (1974) 258 (in key); in Schltr., Orch. 1 ed. 3 (1986) 956.–

Pholidota sect. *Eupholidota* Benthams, in Benthams & Hooker, Gen. Pl. 3 (1883) 520.– Pfitzer in E. & P., Pfl. Fam. II, 6 (1888) 128.– Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 143.– *Coelogyne* sect. *Imbricatae* Rchb. f., Walp. Ann. 6 (1861) 238.– Type species: *Pholidota imbricata* W.J. Hooker.

Creeping epiphytes, sometimes lithophytes, entirely glabrous except for root hairs and minute hairs on the floral bracts. Roots which attach the plant to the substratum present along the entire rhizome, long, thin, usually branched. Rhizome creeping, the parts between the pseudobulbs short. Scales of the young shoot later all surround more or less clasping the pseudobulb, persistent till after flowering, then soon disintegrating, stiff herbaceous to subcoriaceous, nerves many, inconspicuous. *Pseudobulbs* close together, all turned to one side of the rhizome. *Leaf* one per pseudobulb (but see note 11). *Blade* oblong to linear-lanceolate, rather small to large, either or not plicate, herbaceous or thick coriaceous, many-nerved, main nerves 3–5. *Raceme* synanthous with

the almost entirely developed young leaf, rarely with the just emerging young leaf, (rather few- to) many-flowered; flowers opening more or less simultaneously. Scape short to long, terete, in fruit more or less distinctly elongating. Rhachis pendulous, (rather short to) long, almost straight to more or less zig-zag. Sterile bracts (0-)1-17. *Floral bracts* persistent till after fruiting, not folded along the midrib, very broadly sagittate to ovate, nerves rather few to very many, rather coarse to very fine. *Flowers* neatly distichous or a number more or less turned to one side, opening rather wide, not resupinate but lip turned more or less downwards. Pedicel more or less straight, more or less angular. Ovary tapering to the base, more or less distinctly angular in section due to the ribs. *Median sepal* concave, forming a hood with the petals, semi-elliptic to ovate; midrib more or less prominent or with a low rounded keel. *Lateral sepals* either or not connate at the base, rather deeply concave, ovate to ovate-oblong; midrib a more or less high, thin, wing-like keel. *Petals* asymmetric, more or less distinctly falcate. Lip broadly inserted, sigmoid. *Hypochilium* boat-shaped to saccate, with distinct, rather high to high lateral lobes, inside at the back with 3 short, rather high, at the margin somewhat swollen keels. *Epichilium* recurved to reflexed, two-lobed, without keels or warts. *Column* without column foot, short; hood distinct, more or less pronounced, distinctly widened and enlarged above the stigma. *Anther* inserted about halfway the margin of the hood and the stigma, more or less transversely elliptic to cordate in outline. Pollinia more or less pear-shaped. *Stigma* more or less (semi-)orbicular to sickle-shaped in outline, either or not with the lateral margins drawn out laterally; rostellum an entire, more or less narrow seam-like rim, either or not with swollen lateral margins. *Fruit* ellipsoid, on top the perianth or at least (part of) the column persistent; ribs 6, the 3 jugae band-like, either or not with a more or less pronounced longitudinal keel, the 3 valvae smooth, median with a longitudinal keel. Seeds minute, shortly fusiform; embryo ellipsoid.

Distribution. South-east Asia: Ceylon, India, Nepal, Sikkim, E. Pakistan, Burma, W. China, Thailand, Laos, Vietnam, Andaman Islands, Nicobar Islands. Malesia: Malay Peninsula, Sumatra, Java, Lesser Sunda Islands, Borneo, Philippines, Celebes, Moluccas, New Guinea. NE. Australia. Pacific: Solomon Islands, New Hebrides, Loyalty Islands, New Caledonia, Fiji, Tonga or Tahiti. 2 species.

Ecology. Epiphytes or occasionally lithophytes in lowland forest up to montane forest, in various kinds of habitats; altitude 0-2300 m.

KEY TO THE SPECIES OF SECTION PHOLIDOTA

- 1a. Adult leaves thick coriaceous. Floral bracts with very many dense fine nerves. Lateral sepals at the base free24. *P. imbricata* W.J. Hooker
- b. Adult leaves thin, herbaceous. Floral bracts with less than 25 relatively coarse nerves. Lateral sepals at the base connate25. *P. pallida* Lindley

24. *Pholidota imbricata* W.J. Hooker - Fig. 26, Plate 6a.

N.B. For literature references marked with * it is not clear whether *P. imbricata* or *P. pallida* is described or a mixture of the two. See also under *P. pallida*.

- Pholidota imbricata* W.J. Hooker, Exotic Fl. 2 (1825) t. 138; Sprengl (ed.), Linn., Syst. Veg. ed. 16, 3 (1826) 727; Lindley, Bot. Reg. 14 (1829) 1213 pro descr.; * Gen. & Sp. Orch. (1830) 36; Lodd., Bot. Cab. 20 (1833) 1934, pl.; Lindley, Bot. Reg. 21 (1935) 1777, pro specimen; Mem. Soc. Mus. Hist. Nat. Strasbourg 3 (1840) t. 1 f. 1; * Wight, Ic. 3, 2 (1844-45) 9, pl. 907; Thwaites, Enum. Pl. Zeyl. (1861) 300; Dalz. & Gibs., Bombay Fl. (1861) 238; F. v. M., Fragm. 4 (1864) 163; * Drury, Handb. Ind. Fl. 3 (1869) 340; Bentham, Fl. Austr. 6 (1873) 290; Fitzg., Austr. Orch. 2 (1875-95) t. 39 (not seen); Fernandez-Villar in Blanco, Fl. Philipp. 4 (ed. 3), Nov. App. (1880) 237; Pfitzer in E. & P., Pfl. Fam. II, 6 (1888) 128; Hooker f. in Trimen, Fl. Ceylon 4 (1898) 162; Bailey, Queensl. Fl. 5 (1902) 1544; * Zoernig, Engler Bot. Jahrb. 33 (1904) 712, f. 53; J.J. Smith, Orch. Java (1905) 151; Ridley, Mat. Fl. Malay Pen. 1 (1907) 135; Cooke, Fl. Pres. Bombay 2 (1907) 688; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 154; Ames, Orch. 2 (1908) 75; J.J. Smith, Nova Guinea 8 (1909) 21; Orch. Java, Fig. Atlas (1909) f. 112; Koord., Exk. Fl. Java (1911) 365; * Constantin, Atlas Orch. Cult. (1913) pl. 25, f. 18; Ames, Orch. 5 (1915) 66; * Schltr., Fedde Rep. Beih. 4 (1919) 188; Ridley, Fl. Malay Pen. 4 (1924) 139; Ames in Merr., En. Philip. 1 (1924) 300; A. Bouman-Houtman, Trop. Nat. 15 (1926) 96, f. 4; Fischer in Gamble, Fl. Pres. Madras III, 8 (1928) 1431; Ames, J. Arn. Arb. 13 (1932) 130; J.J. Smith, Fedde Rep. 32 (1933) 174; Gagnep., Fl. Gen. I.-C. 6 (1933) 324; Backer, Bekn. Fl. Java (em. ed.) 12, 1 (1952) 136; Holttum, Orch. Malaya (1953) 234; * Mitra, Fl. Pl. East. India 1 (1958) 308; Santapau & Kapadia, J. Bombay Nat. Hist. Soc. 59 (1962) 166; Orch. Bombay (1966) 174; Backer & Bakh. f., Fl. Java 3 (1968) 285; Dockrill, Austr. Indig. Orch. 1 (1969) 302; Suwal, Bull. Dep. Med. Pl. 2 (1969) 134; Hø, Ill. Fl. S. Vietnam ed. 2, 2 (1972) 1015, f. 5016; * Banerji & Thapa, J. Bombay Nat. Hist. Soc. 68 (1972) 664; T. & M. Sheenan, Amer. Orchid Soc. Bull. 45 (1976) 797, fig.; Hara, Stern & Will., En. Fl. Pl. Nepal 1 (1978) 53; Sarkar & Argarwal, Bull. Bot. Survey India 20 (1978) 182; F. Sing, Amer. Orch. Soc. Bull. 48 (1979) 345; Pradhan, Ind. Orch.: Guide 2 (1979) 209, 626, fig.; J.B. Comber, Orchid Digest (1983) 73, fig., phot.; Seidenf. & de Vogel, Opera Bot. 89 (1986) 98, fig. 56, pl. 8a.- Type: Wallich s.n., Kew, cult. Hort. (1824) (not seen, probably not preserved, lecto: the drawing and description in Exotic Fl. 1825: 138, chosen by Seidenf., Opera Botanica 89, 1986: 102).
- Wellia, Thecka mararava* Rheede, Hortus Malab. 12 (1703) 147, t. 24.- Type: not designated.
- Cymbidium imbricatum* Roxb., Hortus Beng. (1814) 63 (nom. nud.); Carey (editor), Fl. Ind., ed. 2, 3 (1832) 460.- Based on: Mr. J. R., from Chittagong (probably James Roxburgh, son of W. Roxburgh, not seen).
- Ornithidium imbricatum* Wall. (nomen nudum). See note 2.
- Ptilocnema bracteatum* D. Don, Prodr. Fl. Nep. (1825) 33.- *Pholidota bracteata* (D. Don) Seidenf., Opera Botanica 89 (1986) 100 (basinonym only).- Syntypes: Hamilton s.n. (not seen), Wallich s.n. (not seen). See note 1 (p. 62) and 3.
- Pholidota pallida* auct. non Lindley: Holttum, Orch. Malaya ed. 3 (1964) 237; Carr, Gard. Bull. S.S. 8 (1935) 220; Seidenf. & Smitinand, Orch. Thail. 2 (1959) 137; Santapau & Kapadia, J. Bombay Nat. Hist. Soc. 59 (1962) 168; Dockrill, Austr. Indig. Orch. 1 (1969) 302; Nicholls, Orch. Austr. (1969) 98, pl. 356; * Seidenf., Bull. Mus. Hist. Nat. Paris 3, 71, Bot. (1972) 141; Hallé, Fl. Nouv. Caléd. 8 (1977) 254, pl. 108, carte 68; Pradh., Ind. Orch.: Guide 2 (1979) 706; Bechtel, Cribb & Launert, Orch. Atl. (1980) 400; Joseph, Rec. Bot. Surv. India 22 (1982) 90, fig. 72a-b.
- Pholidota conchoidea* Lindley, Bot. Reg. 26, Misc. 198 (1840) 84; Loudon, Hort. Brit. Suppl. 3 (1850) 607 (notes in symbols); Teuscher, Amer. Orchid Soc. Bull. 41 (1972) 215, phot.- *Coelogyne conchoidea* (Lindley) Rchb. f., Walpers Ann. 6 (1861) 237.- Type: Cuming s.n. (holo K; iso W).
- Pholidota crotalina* Rchb. f. in Otto & Dietr., Allg. Gartenz. 24 (1856) 218; Rchb. f., Bonplandia 4 (1856) 329; Miq., Fl. Ind. Bat. 3 (1859) 270; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 151, f. 50j, 52A,B.- *Coelogyne crotalina* Rchb. f., Walpers Ann. 6 (1861) 238.- Type: Schiller, cult. Stange (W). See note 4.
- Pholidota loricata* Rchb. f., Bonplandia 5 (1857) 43; Zoernig, Engl. Bot. Jahrb. 33 (1904) 714, f. 54; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 153.- *Coelogyne loricata* (Rchb. f.) Rchb. f., Walpers Ann. 6 (1861) 238.- Syntypes: Zollinger 982 (W, not seen; iso K), Zollinger 1206 (K).
- Pholidota triotos* (Rchb. f.) Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 154.- *Coelogyne triotos* Rchb. f., Walpers Ann. 6 (1861) 238; Hamb. Gartenz. 18 (1962) 34.- Type: Schiller (cult. Stange, not seen). See note 5.
- Pholidota imbricata* W.J. Hooker var. *coriacea* Hooker f., Fl. Brit. India 5 (1890) 846; Ridley, Mat. Fl. Malay Pen. 1 (1907) 135; Hundley & Chit, List Trees etc. Burma ed. 3 (1961) 265.- Syntypes: King's Collector 7218 (lecto K, here chosen; iso AMES), Scortechini s.n., Perak (not seen).
- Pholidota assamica* Regel, Gartenfl. (1890) 607.- Type: Hort. Sander (not seen). See note 6.

- Pholidota henryi* Kraenzlin, Vierteljahrschr. Nat. Ges. Zuerich 60 (1915) 427. – *Pholidota imbricata* W.J. Hooker var. *henryi* (Kraenzlin) Tang & Wang, Acta Phytotax. Sin. 1 (1951) 40, 79; Hu, Shiu Ying, Quart. J. Taiwan Mus. 28 (1975) 127. – Type: Henry 13488 (K).
- Pholidota imbricata* W.J. Hooker var. *longifolia* Schltr., Fedde Rep. Beih. 1 (1911) 109. – Type: Schlechter 17535 (holo B, lost; lecto L '177535'; iso BO, E, G, K, L '177535').
- Pholidota imbricata* W.J. Hooker var. *montana* Schltr., Fedde Rep. Beih. 1 (1911) 109; Fedde Rep. Beih. 21 (1925) t. 42, nr 146. – Type: Schlechter 17367 (holo B, lost; lecto E, here chosen).
- ?*Pholidota imbricata* W.J. Hooker var. *platyphylla* Schltr., Fedde Rep. 10 (1911) 19; Fedde Rep 21 (1925) 134. – Type: Schlechter 20442 (holo B, lost). See note 7.
- Pholidota beccarii* Schltr., Notizbl. Berl.-Dahl. 8 (1921) 17; J.J. Smith, Fedde Rep. 32 (1933) 171. – Type: Beccari s.n. (1878) (FI, not seen; drawing of the type seen in K). See note 8.
- Pholidota imbricata* W.J. Hooker var. *papuana* J.J. Smith, Nova Guinea 14 (1929) 349. – Syntypes: Feuilletau de Bruyn 8, Bogor, cult. Hort. no. 51 (lecto BO, here chosen), Feuilletau de Bruyn, Bogor, cult. Hort. 43 (not seen); Heyermans s.n., Bogor, cult. Hort. 7, XII B, IX, 62 (BO). See note 9.
- ?*Pholidota grandis* auct. non Ridley: Kraenzlin, Bull. Soc. Bot. France 67 (1929) 301. – *Pholidota spectabilis* Kraenzlin ex Guill. (nom. nov.), Ann. Mus. Col. Marseille, ser. 6, v-vi (1948) 15. – Type: Levat s.n. (not seen). See note 10.

Plant 10–66 cm high. Roots to more than 25 cm by 0.5–2 mm. Pseudobulb scales 3–6; longest one 3.5–13 cm long; top acute; herbaceous; nerves many, (rather) conspicuous. *Pseudobulbs* close together, usually sturdy and rather swollen, in section rather angular with rounded corners, 2–11 cm long, when dried longitudinally wrinkled. Petiole 0.5–9 by 1.5–6 mm. *Leaf blade* oblong or obovate-oblong to linear-lanceolate, usually widest above the middle, 17–52 by 1.6–9 cm; top acute (to acuminate); adult ones more or less thick coriaceous; main nerves 3–5, above somewhat prominent, below much more so, small nerves many, in the fresh leaf inconspicuous. *Raceme* synanthous with the usually almost entirely developed young (and still thin) leaf, rarely the leaf just emerging, 14–126-flowered. Scape wiry, terete, beyond the scales 2–46 cm long, 0.5–3 mm diam., in fruit more or less distinctly elongating. Rhachis 5–41 cm long; internodes 2–5 mm long. Sterile bracts (2)–3–9(–17), appressed, like the floral bracts, usually narrower. *Floral bracts* patent, when flattened ovate to broadly ovate, (4)–5.5–12(–15) by (5)–6–10(–13) mm; top acute, sometimes obtuse, tip sometimes acute; membranous to papyraceous to pergamentaceous; inside and outside partly to entirely covered with scattered (groups of) minute hairs which are often covered with dried mucilage, giving the impression of brown scales or spots; nerves many, fine, parallel, close together, hardly prominent. *Flowers* not resupinate, distichous but often more or less pointing sideways. Pedicel terete to more or less angular by 3 ribs, 2–5 by 0.3–1 mm. Ovary more or less distinctly angular on section, (1.5)–2–3(–3.5) by (0.5)–1–1.8 mm. *Median sepal* forming a hood with the petals, ovate, (3.6)–5–6(–7) by (2.2)–3–4(–5) mm; top obtuse to acute, tip rarely retuse or acuminate; nerves (3)–5(–7), sometimes the lateral ones branched, midrib more or less prominent to a low rounded keel. *Lateral sepals* (ovate to) ovate-oblong, (4)–5–7(–8) by (2)–2.5–3.5(–4) mm; top acute; nerves (3)–4–5(–6), lateral ones sometimes branched, midrib a distinct wing-like keel 0.5–1(–1.3) mm high. *Petals* more or less distinctly falcate, (4)–4.5–6(–7) by (0.9)–1.3–2.2(–2.8) mm; top acute, its tip rarely truncate or rounded; nerves 1(–3), midrib somewhat prominent. *Lip* broadly inserted. *Hypochilium* more or less deeply concave, 2–4.5 mm long, 1.8–4(–5) mm high including the lateral lobes, 2–4(–4.5) mm wide; lateral lobes erect, triangular to almost semi-orbicular, (1)–1.5–2.5(–3) by (1)–1.5–2.5(–3) mm, the top broadly rounded;

nerves 5–7, the central 3 in the back elevated into short, rather high and wing-like keels with swollen margins of which the lateral ones are higher and longer than the central one which rarely is almost absent, lateral nerves almost always branched. *Epichilium* two-lobed, deeply and widely retuse in front, (2–)3–4(–5) by (3–)4–6(–7) mm when flattened; lateral lobes in outline semi-elliptic to semi-orbicular, (1–)2–2.5(–3) by (1–)2–3.5(–4) mm when flattened; top rounded, sometimes acute. *Column* short, in front view irregularly orbicular to ovate, more or less clearly constricted in the upper half, (2.2–)2.5–3.5(–4) by (2–)2.5–3.5(–4) mm. *Anther* irregularly orbicular to transversely elliptic in outline, 1–1.3 by 1–2.3 mm; top and base truncate to slightly retuse. Pollinia 0.6–1 by (0.3–)0.5–0.7 mm. *Stigma* semi-orbicular in outline, shallow, 1–1.5 by (1.3–)1.5–2(–2.5) mm; rostellum a more or less swollen, undulating to more or less straight rim. *Fruit* ellipsoid, on top the perianth or at least the column persistent; body 9–16(–19) by 6–9 mm. Seeds fusiform, to 0.5 mm long; embryo ellipsoid, to 0.3 mm long.

Distribution. (*N.B. No separate provinces or islands indicated in case the species occurs over the entire area*). Ceylon. 12 collections. (AMES, B, BR, CGE, K, L, W). India. 51 collections (AMES, BM, BO, BR, BRSL, C, CGE, E, G, K, L, MEL, NY, OXF, U, W). Nepal. 7 collections (AMES, BM, BR, E, NY). Sikkim. 5 collections (AMES, BM, BR, C, CGE, G, NY, OXF, W). E. Pakistan. 2 collections (E, SING). Burma. 1 collection (BM). China (Yunnan). 9 collections (AMES, E, K, OXF, NY). Thailand. 12 collections (BKF, C, K, KYO, L, P). Laos. 3 collections (BO, L, P). Vietnam. 9 collections (AMES, B, BO, HBG, K, L, NY, P, S, SING). Andaman Islands. 6 collections (BM, BO, E, G, L, SING). Nicobar Islands. 4 collections (C, L). Malay Peninsula. 22 collections (AMES, BM, BO, CGE, K, KLU, L, NY, SING). Sumatra. 9 collections (BO, K, L). Java. 42 collections (BO, BRSL, K, L, P, SING, U, W). Lesser Sunda Islands (Bali, Sumbawa, Flores). 8 collections (BO, K, L). Borneo (Sabah, Sarawak, Kalimantan). 25 collections (AMES, B, BM, BO, E, G, K, L, NY, SING, W). Philippines (Leyte, Luzon, Mindanao, Negros, Palawan, Panay, Polillo, Samar, Sulu Archipel). 43 collections (AMES, BM, BO, BR, E, G, K, L, NY, P, PNH, S, SING, W). Celebes. 11 collections (BO, K, L). Moluccas (Tenimbar Isl., Buru, Ambon, Ceram, Key Isl.). 9 collections (BO, L, W). New Guinea. 42 collections (AMES, BM, BO, BR, BRI, C, E, G, K, L, LAE, NY, SING). Australia (Queensland) 11 collections (BM, BRI, K, SING, W). Solomon Islands. 1 collection (K). Santa Cruz Islands. 2 collections (BRI, L). New Hebrides. 5 collections (AMES, BRI, G, K, L). Loyalty Islands. 3 collections by Hallé, 2 seen (K). New Caledonia. 13 collections by Hallé, 1 seen (G). Fiji. 1 collection (K). Tonga or Tahiti (see note 12). 1 collection (P). Cultivated or country not known. 18 collections (BO, BM, C, G, K, L, MEL, W).

Ecology. Epiphytes on branches and trunks of trees up to high in the canopy, trees especially mentioned are *Ficus*, *Heritiera littoralis* (2 records) and *Tectona grandis* (2 records); sometimes terrestrial on bare rock, especially on limestone, sometimes on lava flows, then usually exposed, sometimes shaded. Occurring in mangrove forest, beach forest, marsh forest, lowland and hill evergreen rainforest, dry deciduous forest to lower montane forest, few records from montane forest; altitude 0–1350(–1900) m. Fl. all year round, but locally one or two more or less pronounced flowering periods of several months may be recognizable.

Collector's notes. Pseudobulbs medium green to dull greygreen. Leaves above

medium green to more or less dark, dull or sometimes glossy green, below usually lighter green to sometimes reddish. Floral bracts yellow green, light brown to brown, often with brown to blackish spots. Flower white to cream-coloured, often tinged yellowish, greenish to pinkish, to dirty flesh-coloured. Petals and lip sometimes lighter than the sepals. Lip usually with one or two small to rather large yellow to orange-yellow spots at the junction of epichilium and hypochilium; keels orange to yellow. Rostellum and sometimes the entire margin of the stigma yellow, ochrish to brownish. Anther yellow and orange, pinkish, orange-red, redbrown to brownish. Pollinia cream-coloured.

Uses. In the New Hebrides the seeds of *P. imbricata* were used in 1928 as a substitute for face powder.

In China, Canton, the pseudobulbs were for sale in a local druggist's shop. According to the Chinese book 'Ling Nan Ts'ai Yo Lu' (Notes on collecting medicinal plants in Southern China) the pseudobulbs can be used 'to cure internal haemorrhage, asthma, cough, heart- and lung troubles, rheumatism, dysentery, toothache, etc.' (Fl. Hainan 4, p. 219).

In India, Chotanagpur region, the pseudobulbs were in 1978 for sale on the market. They were finely macerated in mustard oil and applied to the joints to relieve rheumatic pains, and watery extracts of crushed pseudobulbs were credited with curative properties if taken internally.

Vernacular names. Leke-solo (Ngadha lang., Flores).

Notes. 1. *Pholidota imbricata* W.J. Hooker (1825) and *P. pallida* Lindley (1835) have been confused throughout history. Even in the publication in which the name *Pholidota pallida* was published Lindley mixed up the two species. Subsequent authors disregarded almost entirely this latter name, until in 1964 Holttum (Orch. Malaya, 3rd ed.) again stressed that *P. imbricata* as then understood consisted of two different species. By choosing the name *P. pallida* for the widespread species he added much to the confusion.

Because no types could be detected, the clue to the unravelling of the nature of these two species lies in scrutinizing the early descriptions for the three diagnostic characters known at that time, these being the colour of the flower, leaf texture and growth characteristics under cultivation. The plates published for each species do not show these characters. They are listed below, together with additional characters and data on the distribution.

Species 1.

Characters listed in the earliest literature.

Flower distinctly coloured: dingy yellow brown or tawny colour (very pale, to almost pure white flowers were recorded later).

Adult leaves firm, relatively thick and coriaceous. Plant grows well under hothouse conditions in temperate regions.

Additional characters found during this study:

Bracts with numerous very fine nerves.

Lateral sepals free at the base.

Distribution: From the Himalaya to SE. China, throughout mainland Southeast Asia, Malesia up to Tahiti in the Pacific.

Species 2.

Characters listed in the earliest literature.

Flower always very pale, white, at most tinged pinkish.

Adult leaves never coriaceous but herbaceous, thin. Plant difficult to grow under hothouse conditions in temperate regions.

Additional characters found during this study:

Bracts with fewer (up to 25), coarser nerves.

Lateral sepals connate at the base.

Distribution: Mainland Southeast Asia, from the Himalaya to SE. China southwards to Thailand and Laos.

In January 1825 W.J. Hooker published *Pholidota imbricata* in Exotic Flora, complete with description and a plate. The only useful diagnostic character mentioned in the description is the flower colour: 'dingy yellow brown or tawny colour'. Such distinctly coloured flowers are only present in plants of species 1, and consequently that species must be named *P. imbricata*. No type specimen is extant and probably no herbarium was made by Hooker.

The history and typification of *P. pallida* is more confusing. In 1829 Lindley published a description and a plate of a *Pholidota* species which he named *P. imbricata* (The Botanical Register 14 fol. 1213). In the description it is explicitly stated that the leaves are coriaceous, thick and rather stiff, and that the plant is easy to cultivate. This identifies it as species 1, the same species described by Hooker in 1825. Seidenfaden, in Opera Botanica 89 (1986) 101, correctly pointed to the fact that the description accompanying fol. 1213 does not apply to the plant figured but is a copy from a manuscript by Wallich. However, Lindley himself studied the flowering plant illustrated in The Botanical Register and did not object to the frequently used statement by Wallich that the leaves were thick and leathery. In addition, Lindley stated that the plant is '... by no means difficult to cultivate', so it can be concluded that the illustrated plant belongs to *P. imbricata* as well. No herbarium material is extant and probably none was made.

In his article in The Botanical Register 17 (1835) 1777, Lindley stated that 'It appears that two different species are confounded under the name *Pholidota imbricata*, namely this one and that which is figured at fol. 1213 of this work.'. He gave adequate descriptions of these: '*P. pallida* has very round blunt bracts, white flowers, smaller leaves, and grows very weakly and unwillingly under ordinary circumstances. *P. imbricata* has pointed bracts, yellowish flowers with a dash of violet, very long strong leaves, and grows and flowers most freely'. He made, however, the unfortunate mistake to state that the plant described and illustrated in The Botanical Register, fol. 1213, 1829, belongs to *P. pallida*. This is, however, *P. imbricata* as argued above. He admitted that he could scarcely point out satisfactory characters to distinguish the two, because 6 years had elapsed since he saw that plant in flower. Evidently, he too did not have the type of *P. imbricata* and the specimen described in 1829 at his disposal when he wrote the 1835 article. Lindley refers to specimens communicated to him by Richard Harrisson in May 1834, of which no herbarium is extant. One sheet in the Lindley herbarium which once belonged to the Lambert herbarium, a Wallich collection without number from Gossain Than collected in 1819, is annotated with 'Ph. pallida, Bot. Reg. 1777 in nota', and does indeed belong to this species. But in that article no mention is made of this specimen, and can not be regarded as a type.

Pholidota pallida is thus based on elements belonging to two different species: the description of 1835 and the description and the plate figured in 1829 which are wrongly assigned to it. Since no holotype is extant, the Code (Sidney 1981, Art. 7.4) requires that a lectotype or neotype is chosen, in accordance with Art. 7.12, T.4 and T.4d. Considering the intention of Lindley when he distinguished *P. pallida*, it is evident that he meant to describe species 2. Therefore the elements published in 1829 should be excluded. A possible choice would be to designate the description of *P. pallida* as the lectotype. However, a neotype has already been selected by Hallé (1977) see below.

Up to 1964 the name *P. pallida* was by most authors disregarded or considered a synonym of *P. imbricata*. Then Holttum, in *Orch. Malaya*, 3rd ed. again realised that two different species were present under the latter name. He evidently was confused by Lindley's treatment of the two, and wrongly interpreted that *P. pallida* would be the widespread species, and *P. imbricata* the Himalayan one with limited distribution. He was followed by most later authors, including Hallé (1977), in *Flore de la Nouvelle Calédonie et Dépendances*, who cited the specimen Wallich s.n. (1819) from Gossain Than (K) as the type of *P. pallida*, thus selecting a neotype, without indicating it as such. He based this on the annotation on the sheet stating: '*P. pallida*, Bot. Reg. 1777 in nota', but as stated above this specimen is not cited there. Hallé's choice was not made in the context of a revision of the two taxa, which is clearly demonstrated by the fact that the Gossain Than specimen does not belong to species 1, *P. imbricata*, which is native in New Caledonia but to species 2, *P. pallida*, which only occurs on mainland Asia. In order not to enlarge the confusion again by choosing the description of *P. pallida* as the lectotype, here Hallé's choice is nevertheless followed.

Seidenfaden, in *Opera Botanica* 89 (1986) 100, used the name *Pholidota bracteata* for species 2, a new combination based on *Ptilocnema bracteata* D. Don (February 1825), and placed *P. pallida* in its synonymy. However, since Don described the leaves of the specimens as 'coriaceous' this can only be species 1, *P. imbricata*. So far no specimens annotated by Don have turned up, and no proof is present for the assumption by Seidenfaden that the Wallich specimen from Gossain Than in Nepal is an (iso?)type of *Ptilocnema bracteatum* D. Don. For these reasons I refrain from following Seidenfaden in the use of the name *Pholidota bracteata*.

2. A plate of *Ornithidium imbricatum* by the illustrator Gornchand and the scribe Kasinaut which is similar to some of the plates in Wallich's article in *Asiatick Researches* 13 (1820) 369-415 is present in Copenhagen. This plate was probably never effectively published; I searched for it in vain in literature and could not even find a reference in *Index Londinensis*. I regard Wallich's name to be a *nomen nudum*.

3. I have not seen material labelled *Ptilocnema bracteata*, consequently I cannot designate a lectotype. A number of Wallich collections possibly were seen by Don. I have seen only one Hamilton collection, no. 1965 from Gualpara, collected in 1808, which is labelled *Mararava disticha*.

4. The type of *P. crotalina* is a Schiller collection without number, cultivated by Stange. In herbarium Reichenbach 8 sheets, two envelopes and two plates with drawings with this name are present. These all belong to *P. imbricata*, except one envelope without locality and one drawing annotated 'Java Lobb' which all belong to *P. camelostalix* var. *camelostalix*. Two sheets are annotated 'Cult. Hort. Schiller', three others 'Batavia 1855'; all specimens were cultivated. Although no indication is present that the plants were cultivated by Stange I am convinced that these latter sheets all belong to the type material of *P. crotalina*.

5. I have not seen the type of *Pholidota triotos*, this is probably lost. According to Reichenbach f. it is related to *P. imbricata*. It is placed in the synonymy of this latter species on the authority of Ames in Merrill, *Enum. Philip.* 1 (1924) 301.

6. I have not seen the type of *Pholidota assamica*, this is probably lost. The very short description states that it is very closely related to *P. imbricata*, and that it differs only in the almost globose pseudobulbs. The pseudobulbs of *P. imbricata* are very

variable; I have seen globose pseudobulbs in several specimens and am convinced that *P. assamica* is a synonym of that species.

7. I have not seen the type of *Pholidota imbricata* var. *platyphylla*, this is probably lost. *P. imbricata* is a variable species which according to this study can not be split up into varieties. Schlechter knew this species very well. He tended, however, to distinguishing too many varieties and even species in this taxon. The differences in which this variety is supposed to deviate from *P. imbricata* are: leaves subsessile, generally broad, to 8 cm wide; bracts very broad; flowers larger; front lobes of the lip large, angular-suborbicular. Since all these differences are not diagnostic and/or vague, and fall within the variability of *P. imbricata* as understood here, I am quite sure that it belongs to this species.

8. I have not seen the type of *Pholidota beccarii*. The drawing of this species by Carr in Kew, made after a flower of the holotype, resembles *P. imbricata* rather well. I have no doubt that it belongs to that species.

9. *P. imbricata* var. *papuana* applies to very sturdy plants. In Bogor four specimens are labelled *P. imbricata* var. *papuana* in J.J. Smith's handwriting. They are probably all syntypes. This is evident for the specimens Feuilletau de Bruyn 8 and Heyermans s.n. where the text on the labels corresponds with that in Nova Guinea. A third specimen is annotated Cult. Hort. Bogor n. 49, and a fourth is from (camp) Mamberamo II. Both latter plants were also collected by Feuilletau de Bruyn, and it is likely that they are also types.

10. I have not seen the type collection of *P. grandis* Ridley. If the specimen collected by Levat belongs to *Pholidota* (which is according to the description probably the case) it must belong to *P. imbricata*. This is the only species of *Pholidota* which occurs so far eastwards.

11. The collection Docters van Leeuwen 288 from Java consists of several specimens deviating only from normal *P. imbricata* because most pseudobulbs bear 2 leaves.

12. During the voyage of the *Astrolabe* and the *Zélée* in 1838–1840 M. le Guillou collected *P. imbricata* in Tahiti–Archipel des Amis. The latter are the Friendship Islands, to which belongs Tonga. Although it is more likely that this species occurs in Tonga its occurrence there can not be ascertained on these data.

25. *Pholidota pallida* Lindley – Fig. 27, Plate 6b & c.

N.B. In literature marked with * it is not clear whether *P. imbricata* or *P. pallida* is described, or a mixture of the two. See also under *P. imbricata*.

Pholidota pallida Lindley, Bot. Reg. 21 (1835) 1777, pro description; Zoernig, Engl. Bot. Jahrb. 33 (1904) 707, f. 52; * Seidenf. & Smit., Orch. Thail. (1959) 137; * Seidenf., Bull. Mus. Hist. Nat. Paris ser. 3, 71, Bot. 5 (1972) 141. – Type: Wallich s.n., cult. Horticultural Society (not seen, probably no herbarium made, neo Wallich s.n., Gossain Kan, 1819, chosen by Hallé, see note 1 under *P. imbricata*).

Pholidota calceata Rchb. f., Bonplandia 4 (1856) 329; Lindley, J. Proc. Linn. Soc. (Bot.) 1 (1857) 173; Hooker f., Icon. Pl. 3, 9 (1889) pl. 1876; Hooker f., Fl. Brit. India 5 (1890) 846; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 145, fig 50A,B, 52E; Mitra, Fl. Pl. East. India 1 (1958) 308; Pradhan, Ind. Orch.: Guide 2(1979) 292, 626, fig. – *Coelogyne calceata* (Rchb. f.) Rchb. f., Walp. Ann. 6 (1861) 238. – Type: Hooker f. & Thomson s.n. (Lindley ill. nr. 52) from Khasiya, India (holo K; iso C, G, K, L, OXF, NY, S, W).

- Pholidota imbricata* auct. non W.J. Hooker: Hook f., Fl. Brit. India 5 (1890) 845; King & Pantl., Ann. R. Bot. Gard. Calc. 8, 1 (1898) 144; Ibid. 8, 3 (1898) pl. 201; Duthie, Ann. R. Bot. Gard. Calc. 9, 2 (1906) 115; Banerji & Thapa, J. Bombay Nat. Hist. Soc. 68 (1972) 664. (N.B. for other literature probably treating a mixture of *P. imbricata* and *P. pallida* see under *P. imbricata*, all references marked with *).
- Pholidota imbricata* W.J. Hooker var. *sessile* Hooker f., Fl. Brit. India 5 (1890) 846; Balakrishnan & Chowdhury, Bull. Bot. Survey India 9 (1967) 92, f. 45-56.- Type: Prain s.n., Naga Hills, Kohima 1000-1500 m (CAL, not seen).
- Pholidota yunnanensis* auct. non Rolfe (1903): Schltr., Fedde Rep. 19 (1924) 378.- *Pholidota yunpeensis* Hu (nom. nov.), Rhodora 27 (1925) 107.- *Pholidota schlechteri* Gagnep. (nom. nov.), Bull. Mus. Hist. Nat. Paris 2, 3 (1931) 147.- Type: Herb. S. Ten 35, probably collected by Tschang near Yunpé (Holo B, lost, lecto E, here chosen).
- Pholidota tixieri* Guill., Bull. Mus. Hist. Nat. Paris 2, 28 (1957) 548; Seidenf., Bull. Mus. Hist. Nat. Paris 3, 71 (1973) 142.- Type: Tixier XIX (Holo P).
- Pholidota* sp. GT 2828 Seidenf. & Smitinand, Orch. Thail. (1959) 139.- Specimen: GT 2828 (C).
- Pholidota bracteata* auct. non Seidenf.: Seidenf. in Seidenf. & de Vogel, Opera Bot. 89 (1986) 100, fig. 57, pl. 8b (excluding the basonym, see note 1 under *P. imbricata*, p. 62).

Plant (7-)10-40 cm high. Roots to more than 15 cm by 0.5-1.5 mm, usually partly villous with root hairs. Pseudobulb scales 5, longest one (2-)3-8 cm long; top obtuse to acute; herbaceous to papyraceous; nerves (15-)20-40(-60), rather inconspicuous. *Pseudobulbs* close together, slender to rather swollen, (1.5-)2.5-6(-8) cm long, when dried longitudinally wrinkled. Petiole (0.5-)1-4 cm by 1-4(-6) mm. *Leaf blade* oblong to linear-lanceolate, (3.5-)6-30(-37) by (0.6-)1.5-6(-8.5) cm; top acute (to acuminate); herbaceous; main nerves 3(-5), above somewhat prominent, below much more so, small nerves (12-)20-80(-95), slightly prominent. *Raceme* usually synanthous with the almost entirely developed leaf, rarely with the just emerging young leaf, (10-)15-50(-8.5)-flowered. Scape wiry, terete, beyond the scales (2.5-)5-18(-26) cm long, 0.3-1 mm diam., sometimes almost wanting, in fruit elongating to 7-28 cm. Rhachis (3-)5-11 cm long; internodes 1.5-2.5 mm long. Sterile bracts appressed to the base of the rhachis (0-)1-3(-5), like the floral bracts, sometimes larger or narrower; occasionally 1 or 2 additional scales are present much lower on the scape. *Floral bracts* patent, when flattened broadly ovate to sagittate to very broadly sagittate, (4.5-)5-7(-8) by (5.5-)6-9(-11) mm; top acute to obtuse; herbaceous; in and outside with few scattered (groups of) hairs, usually mainly along the margin; nerves 8-19(-23), rather prominent, branched. *Flowers* rather membranous. Pedicel more or less terete to angular, 0.5-3(-3.7) by 0.2-0.5 mm. Ovary angular by the ribs, tapering to the base, 1-2.7 by 0.3-1 mm. *Median sepal* forming a hood with the petals, semi-elliptic to about ovate, (2.5-)3-4.5 (-5) by 2-3.5(-4.5) mm; top obtuse (to retuse); nerves 3-5(-7), the median one rather prominent. *Lateral sepals* for c. 1/4 to c. 1/3 of their length connate, in the basal part rarely connate over a much shorter stretch, ovate to ovate-oblong, (3.5-)4-6(-6.5) by 1.7-2.5(-3.5) mm; top acute, slightly apiculate; nerves 3-4, midrib a high, thin, wing-like keel. *Petals* more or less slightly falcate, (2.7-)3-5(-5.3) by 0.7-2(-2.3) mm; top obtuse to acute; midrib somewhat prominent, sometimes 2 additional nerves present. *Lip* 3.7-5.5 mm long when flattened. *Hypochilium* 2.3-3.5 mm long, 1-3 mm wide, 1.5-3 mm high; lateral lobes erect, projecting in front, with more or less broadly rounded top; nerves 5-7, the central 3 in the back of the hypochilium elevated into short, rather high and wing-like keels, central one often less developed. *Epichilium* two-lobed, 1-2.5(-3) by 2-4.5 mm (-6) mm

when flattened; lobes in outline more or less irregularly quadrangular to semi-orbicular when flattened, 0.7–1.5 by 0.7–2(–2.7) mm. *Column* short, wide, wing-like, broadly spathulate to irregularly orbicular in outline, sometimes the top margin irregularly dentate, (1.7–)2–3.5(–4) by 1.8–4 mm. *Anther* inserted near the top margin of the hood, about transversely elliptic to broadly cordate, 0.6–1(–1.5)(by 1–2(–2.5) mm; top truncate to deeply retuse. Pollinia 0.3–0.7 by 0.2–0.5 mm. *Stigma* in outline semi-orbicular to sickle-shaped, the lateral margins drawn out laterally, 1.5–2.2(–2.5) mm wide; rostellum narrow, band-like, lateral margins swollen. *Fruit* ellipsoid, on top the perianth or at least the column persistent; body 10–15 by 5–8 mm. Seeds fusiform, up to 5 mm long; embryo ellipsoid, to c. 3 mm long.

Distribution. Nepal. 20 collections (AMES, BM, C, E, G, K, KYO, SING, W). Sikkim. 5 collections (AMES, BR, C, E, G, K, KYO, L, W). Bhutan. 3 collections (BM, E). China (Yunnan). 23 collections (AMES, BO, E, K, P). India (Kumaon, Bengal, Assam, Nagaland, Manipur). 35 collections (BM, BR, C, CGE, E, G, K, L, MEL, NY, OXF, S, SING, U, W). Burma (Kachin State, Shan States). 3 collections (AMES, KYO). Thailand (Northeast, North and Southwest). 14 collections (BKF, C, G, K, L). Laos (Xieng Khouang). 2 collections (P). Cultivated or country not known. 15 collections (AMES, BR, CGE, E, G, K, S, W).

Ecology. Epiphytes or lithophytes; altitude (800–)1000–2000(–2300) m. Fl. May–Aug., well developed fruits Oct.–Dec.

Collector's notes. Bracts (greenish) white to pinkish, when dry pale brown. Fl. entirely white, creamy-white or tinged pink, once recorded with tips of the petals tinged pale orange. Fragrance once recorded.

Note. 1. For a discussion concerning the confusion between *P. pallida* and *P. imbricata*, the history of the use of these names, and the lectotypification of the two species, see note 1 under *P. imbricata*.

2. *P. pallida* is very variable in size, shape of the bracts, and the number of flowers in an inflorescence. In the Himalaya all plants are large. In Assam, India, two species were recognised up till now: large, sturdy plants with very broad, more or less hastate bracts and many flowers as *P. pallida*, and small, slender plants with rather ovate bracts and fewer flowers as *P. calceata*. In Assam only few specimens are intermediate between the two forms, all except a few can be classified without doubt in one of these two categories. However, in Yunnan, China, the largest plants do not reach the large size of those in India and the Himalaya, and the smallest plants fall within the size variation of *P. calceata*. Both share the characters which distinguish them from *P. imbricata*. Since during this study no morphological characters were detected on which *P. pallida* and *P. calceata* can be separated, the two are here considered merely as different forms of the same species, without taxonomic status. Similar variation in size is present in *P. imbricata*.

SECTION REPENTES de Vogel, *sect. nov.*

Rhizoma longe repens, partes inter pseudobulbos (paulo) longae. Hypochilium sine lobis lateralibus, distaliter cum sineve 3 carinis brevis. Epichilium sine carinis verrucisve minimum vel grande latumque. – Typus: *Pholidota yunnanensis* Rolfe.

Lithophytes or epiphytes, entirely glabrous except for root hairs and sometimes minute hairs on the inside of the floral bracts. Roots which attach the plant to the substratum present along the entire rhizome, one or several on each rhizome part between two pseudobulbs, long, usually branched. Rhizome sturdy to slender, creeping, sometimes branched, the parts between the pseudobulbs rather long. Scales enclosing the rhizome distinct, 3–8, long persistent, tubular, short, broadly clasping the rhizome; scales enclosing the pseudobulb 2–4, more or less covering or clasping the developed pseudobulb, desintegrating after the development of 1–4 new bulbs, more or less narrowly triangular, nerves inconspicuous to distinct. *Pseudobulbs* rather to distinctly spaced, all turned to one side of the rhizome, more or less distinctly ascending, small to rather large, slender to rather swollen. *Leaves* two per pseudobulb, small to rather large. *Blade* ovate-oblong to linear, small to rather large, rather few- to many-nerved, main nerves 3–9. *Raceme* proteranthous to synanthous with the just emerging to sometimes to halfway developed young leaves, rather few- to many-flowered; flowers opening more or less simultaneously. Scape short, wiry, at anthesis entirely hidden by the scales of the young shoot or somewhat extending, after anthesis distinctly elongating. Rhachis flexible or stiff, erect or more or less pendulous, zig-zag or not. Sterile bracts absent. *Floral bracts* caducous at anthesis but sometimes several remain clasping the flowers, ovate to sometimes ovate-oblong, sometimes slightly hairy above. *Flowers* neatly distichous or more or less turned to one side, either or not resupinate but lip turned more or less downwards, rather closed, in one species widely opened. Pedicel curved or straight, usually angular. Ovary more or less angular due to the ribs. *Median sepal* concave, ovate to ovate-oblong, midrib pronounced. *Lateral sepals* concave, ovate to ovate-oblong, midrib with a more or less pronounced keel which may be towards the tip wing-like. *Petals* almost symmetric, ovate, top sometimes recurved. *Lip* rather broadly inserted, without lateral lobes, only in one species distinctly curved and there the distinction between hypo- and epichilium is clear. *Hypochilium* either wide and shallowly concave, saccate, or (deeply) boat-shaped with rounded margins: in the first case either without or inside at the base with 3 short keels, in the second case laterally near the base on each side with a depression, inside either or not with a clear transverse fold, or with 3 distinct, short keels; margins not lobe-like. *Epichilium* either small or distinctly developed, without keels or warts; in the first case either triangular and convex, not recurved, or consisting of two small semi-elliptic lobes which are bent to cover the front opening of the hypochium; in the second case recurved or not, broad, (transversely) elliptic to panduriform when flattened, the lateral margins usually turned upwards, either or not emarginate. *Column* without column foot, short, towards the top either with a short, abruptly obtuse hood which just overtops the stigma and is on each side drawn out in a lobe, or with a broadly rounded large hood. *Anther* either inserted on the top margin of the hood or about halfway between the top margin and the stigma, transversely elliptic to elliptic. Pollinia obliquely pear-shaped. *Stigma* more or less obliquely cup-shaped; rostellum a narrow seam along the top margin, sometimes more triangular. *Fruit* ellipsoid, the entire perianth or sometimes only the column persistent; ribs 6, the 3 jugae flat, band-like, the 3 valvae smooth, median with a longitudinal low keel. Seeds shortly fusiform, embryo ellipsoid.

Distribution. South-east Asia: India, Bhutan, Burma, Thailand, Vietnam, China, Taiwan, Hong Kong. W. Malesia: Sumatra, Java. 4 species.

Ecology. Lithophytes, sometimes in moss or on lava beds, or epiphytes; altitude 200–2200m.

KEY TO THE SPECIES OF SECTION REPENTES

- 1a. Lip almost entirely saccate, laterally at the base on each side with a small depression; epichilium very small2
- b. Lip consisting of a broad saccate hypochilium without lateral depressions and a broad epichilium which is semi-orbicular to semi-elliptic in outline when flattened3
- 2a. Plants sturdy, flowers widely open. Keels 3, in the back of the hypochilium, fused at the base. Hood relatively large, with rounded top; anther inserted about halfway between stigma and hood margin. Epichilium consisting of 2 small lobes which are bent to cover the front opening of the hypochilium, rarely the lobes reduced or absent.....27. *P. convallariae* (Rchb. f.) Hooker f.
- b. Plants rather small, flowers rather closed. Keels absent. Hood abruptly truncate; anther inserted on the top margin. Epichilium consisting of a triangular to narrowly triangular concave point26. *P. cantonensis* Rolfe
- 3a. Roots rather sturdy, woody, stiff, 1.5–2 mm thick. Lip distinctly sigmoid because the epichilium is abruptly recurved, without keels; epichilium 2.8–4 mm long29. *P. yunnanensis* Rolfe
- b. Roots rather thin and flexuous, herbaceous, 0.5–1 mm thick. Lip not distinctly curved, in the back of the hypochilium with 3 short keels; epichilium 1–2 mm long28. *P. missionariorum* Gagnep.

26. *Pholidota cantonensis* Rolfe – Fig. 28, Plate 5d.

Pholidota cantonensis Rolfe, Kew Bull. 119 (1896); J. Linn. Soc. Bot. 36 (1903) 23; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 149; Dunn & Thutcher, Kew Bull., add. ser. 10 (1912) 264; Schltr., Fedde Rep. Beih. 4 (1919) 188; Icon. Corm. Sinic. 5 (1976) 691, f. 8212; Hu, Gen. Orch. Hong Kong (1977) 82. –Type: Ford 130 (holo K; iso HK).

Pholidota uraiensis Hayata, Icon. Pl. Formos. 4 (1914) 64, f. 29; Schltr., Fedde Rep. Beih. 4 (1919) 189; C. Cheng, Formosan Orchids (no date) '80', phot.; Liu & Su, Fl. Taiwan 5 (1979) 1086, pl. 1633. –Type: Sasaki s.n. (I-1913) (not seen).

Plant long creeping, 6–13 cm high. Roots several from each rhizome part between two pseudobulbs, up to 15 cm long, c. 1(–2) mm diam., branched. Rhizome parts between two pseudobulbs 1–2.5(–3.5) cm long. Rhizome scales (6–)7–8, shortest one 4–5 mm long, longest one 8–13 mm long, herbaceous to subcoriaceous. Pseudobulb scales 2–4, soon dry but rather long persistent, covering the last 1–3 pseudobulbs but leaving the rhizome scales free, longest one 1.5–2.5 mm long; top acute to acuminate; papyraceous; nerves 1(–2). *Pseudobulbs* rather swollen (1–)1.5–2.5 cm long, when dried more or less shining and rather coarsely wrinkled, long persistent. Petiole 5–12 by c. 1 mm. *Leaf blade* linear-lanceolate, (3–)4.5–13 by 0.5–1 cm; top acute to

acuminate; herbaceous to subcoriaceous; main nerves 3, above and below slightly prominent, small nerves 10–18, rather inconspicuous. *Raceme* proteranthous, 10–20-flowered. Scape entirely hidden top up to 6 mm projecting from the scales, 0.3–0.5 mm thick, in fruit enlarging to (2–)2.5–4.5 cm. Rhachis curved, sometimes slightly zig-zag, (2–)3.5–5 cm long; internodes about terete to angular, 2–4 mm long. *Floral bracts* ovate, 6–6.5 by 4–5 mm; top acute; papyraceous; nerves 4–8, sometimes some giving off one or two parallel branches. Pedicel 1–2 by 0.3–0.5 mm. Ovary about terete in section, 0.8–1.2 by 0.4–0.8 mm. *Median sepal* more or less ovate, 3.8–4.2 by c. 2 mm; top (acute,) obtuse to truncate; midrib prominent. *Lateral sepals* ovate-oblong, 4–4.3 by 1.8–2 mm; top acute; midrib a rounded keel, towards the top low wing-like with acute tip. *Petals* ovate, 3.2–3.8 by 2–2.5 mm; top acute to acuminate, its top more or less obtuse to acute; nerves 3–5, midrib somewhat prominent. *Lip* rather narrowly inserted, 3–4 mm long. *Hypochilium* boat-shaped, deeply concave, 2.9–3.5 mm long, 1.5–2.5 mm wide, 1.7–2.7 mm high; lateral margins broadly rounded; near the base laterally on both sides with a depression, and inside with a more or less clear transverse fold; nerves 5, not thickened into keels, lateral ones with a few branched towards the margin. *Epichilium* entire, concave, small, not clearly separated from the hypochilium, triangular to narrowly triangular, 0.3–0.5 by 0.3–0.7 mm; top acute to rounded; without ornamentation or keels. *Column* short, 1.3–2 mm long; towards the top with a short, truncate hood which just overtops the stigma, with an irregularly dentate top margin and laterally on each side with a small, about rounded lobe. *Anther* inserted on the top margin of the hood, in outline about elliptic, 0.6–0.7 by 0.5–0.8 mm; top truncate. Pollinia 0.3–0.4 by c. 0.2 mm. *Stigma* c. 0.4–0.5 by c. 0.4 mm; rostellum more or less obtuse to rounded. *Fruit* ellipsoid, on top the perianth is usually persistent but soon erodes off; body 6–10 by 4–5 mm. Seeds fusiform, c. 0.5 mm long; embryo c. 0.3 mm long.

Distribution. China (Guangdong = Kwangtung, Jiangxi = Kiangsi, Zhejiang = Chekiang. 14 collections (AMES, C, K, NY); according to Icon. Corm. Sinic. 5 (1976) 691 also present in Guangxi = Kwangsi and Fukian = Fukien). Hong Kong. 3 collections (HK, K). Taiwan (all over the island). 13 collections (K, KYO, L, TI).

Ecology. Epiphytes or lithophytes; altitude 200–1500 m, once recorded from 2500 m. Fl. & fr. probably all year round, no records for Dec.

Collector's notes. Sepals and petals whitish to cream-coloured, lip ochrish yellow, anther pinkish.

27. *Pholidota convallariae* (Rchb. f.) Hooker f. – Fig. 29, Plate 6d.

For literature, see under the varieties.

Plants 11–33 cm high including the infructescences. Roots several from each rhizome part between two pseudobulbs, up to 26 cm long, 1–2.5 mm diam., usually sparsely branched. Rhizome sturdy, the parts between the pseudobulbs 1.2–3.5 cm long. Rhizome scales 3–4, shortest one c. 0.5–0.8 cm long, longest one up to c. 2–2.5 cm long. Pseudobulb scales 3–4, shortest one 1.5–3 cm, longest one 4–6.5(–8) cm long; top acute to rounded; herbaceous with a more or less membranaceous margin, finely

longitudinally wrinkled when dried; nerves c. 30, inconspicuous except towards the top; after development of the pseudobulb soon desintegrating into soft, quickly desintegrating fibres. *Pseudobulbs* close together to rather wide apart, slender to rather swollen, 1.5–7 cm long, when dried finely irregularly wrinkled. Petiole 0.8–6 cm by 1.5–4 mm. *Leaf blade* linear-lanceolate, 3.7–21 by 0.5–2.3 cm; top acute; herbaceous; main nerves (5–)7–9, midrib prominent below, other main nerves less so, small nerves 26–44, slightly prominent below, all nerves above slightly prominent. *Raceme* proteranthous to synanthous with the just emerging very young to halfway developed leaves, 3–28-flowered. Scape short, entirely hidden to c. 1.5 cm emerging from the scales, in fruit elongating to 7–21 cm, more or less flattened. Rhachis more or less erect, stiff, distinctly zig-zag, 1.5–10 cm long; internodes rather angular, 3–6 mm long, nodes with a small rim. *Floral bracts* ovate to ovate-oblong, rarely persistent, usually caducous at anthesis but often several remaining, each clasped around a flower, then convolute and pointing to various directions, 7–20 by 5–7.5 mm; top obtuse to acute; stiff herbaceous, often inside with few scattered minute hairs; nerves pronounced, 9–21, all about equal, some branched. *Flowers* widely opening, all turned to one side, more or less resupinate, lip downwards directed. Pedicel more or less terete to rather angular, more or less straight to curved, 1.5–4 by 0.3–1 mm. Ovary distinctly curved, more or less terete, 1.5–4 by 0.8–1.5 mm. *Median sepal* ovate to ovate-oblong, 4–8 by 1.8–3.7 mm; top acute, sometimes the tip rounded; midrib rather pronounced. *Lateral sepals* ovate to ovate-oblong, 4–8, by 2.2–4 mm; top acute to apiculate; midrib somewhat to rather prominently keel-like. *Petals* ovate, 4–6.7 by 2–5 mm; top (abruptly) obtuse, sometimes acute; midrib somewhat to rather prominent, additional nerves sometimes short, sometimes branched. *Lip* rather narrowly inserted, 3.5–6.2 mm long. *Hypochilium* boat-shaped, deeply concave, 3.5–6.2 mm long, 1.8–2.8 mm wide, 2–3.7 mm high; lateral margins rounded, not drawn out in lateral lobes; laterally near the base on each side with a shallow depression; inside at the back with 3 or 5 short, prominent keels which are fused at the back. *Epichilium* consisting of two small semi-elliptic lobes which are bent to cover the front opening of the hypochilium, overlapping each other; lobes c. 0.5 by 1–1.5 mm, sometimes hardly or not developed. *Column* rather short, 1.7–3.8 mm long, near the top widening into a distinct large hood which covers the anther and overtops the rostellum by 0.8–1.5 mm; top acuminate to truncate, tip obtuse to rarely acute; laterally on each side with a hardly pronounced, rounded lateral lobe which is turned to the front. *Anther* inserted about halfway in the hood, in outline irregularly orbicular, 0.7–1 by 0.7 by 1 mm; top truncate, more or less recurved. Pollinia slender, somewhat curved, 0.5–0.7 by 0.2–0.3 mm. *Stigma* distinctly overtopped by the hood, transversely elliptic, 0.5–0.8 by 0.8–1.2 mm; rostellum broad, more or less narrow, its margin about straight to rounded. *Fruit* ellipsoid; body 9–13 by 5–6 mm, hard coriaceous; beak consisting of the swollen, persistent column 2–3 by 2 mm.

KEY TO THE VARIETIES OF PHOLIDOTA CONVALLARIAE

- 1a. Inflorescence (14–)18–28-flowered. Floral bracts 10–12(–20) by 5–6.5(–7.5) mm.
Lip with 3 keels in the back27a. var. *convallariae*
- b. Inflorescence up to 7-flowered. Floral bracts c. 7 by 7 mm. Lip with 5 keels ...
.....27b. var. *breviscapa* Deori & Joseph

27a. var. *convallariae* – Fig. 29, Plate 6d.

Pholidota convallariae (Rchb. f.) Hooker f., Ic. Pl. 3 (1889) 161; Pfitzer & Kraenzlin, Pfl. R, Heft 32 (1907) 146, fig. 50E, 52C,D; J.J. Smith, Bull. J. Bot. Btzg II, 9 (1913) 23; Ibid. III, 5 (1922) pl. 30 f. II; Fedde, Rep. 32 (1933) 172; Gagnep., Fl. Gen. I.-C. 6 (1933) 324; Backer, Bekn. Fl. Java (em. ed.) 12, 1 (1925) 138; Mitra, Fl. Pl. East. India 1 (1958) 305; Seidenf. & Smit., Orch. Thail. 2, 1 (1959) 137; Hô & Du'o'ng, Fl. Vietnam (1960) 608, 609; Hundley & Chit, List trees Burma ed. 3 (1961) 264; Seidenf. & Smit., Orch. Thail. 4, 2 (1964) 759; Backer & Bakh. f., Fl. Java 3 (1968) 286; Hô, Ill. Fl. S. Vietnam ed. 2 (1972) 1015, f. 5018; Deori & Joseph, Bull. Bot. Survey India 20 (1978) 159, f. 5; Pradhan, Ind. Orch.: Guide 2 (1979) 291; Bechtel, Cribb & Launert, Orch. Atlas (1980) 400; J.B. Comber, Orchid Dig. (1983) 73, fig., phot.; Seidenf. & de Vogel, Opera Bot. 89 (1986) 104, fig. 58, pl. 8c. – *Coelogyne convallariae* Rchb. f., Flora 55 (1872) 277. – Type: Oliver s.n. (holo K; fragm. and drawing W).

Pholidota fragrans Ridley, J. Fed. Malay St. Mus. 8 (1917) 106. Syntypes: Robinson & Kloss s.n. (IV-1914, 4500') (lecto BM, here chosen; iso K, SING); id. 4500' (BM, not seen); id. 4700' (BM, not seen).

Pseudobulbs (2.2–)3–5.5(–7) cm long. *Leaves* (8–)10–18.5(–21) by 1.5–2.3 cm. Inflorescence 8–11.5 cm long beyond the scales of the young shoot, (14–)18–28-flowered. *Floral bracts* ovate to ovate-oblong when flattened, 10–12(–20) by 5–6.5(–7.5) mm. *Median sepal* (4–)4.5–5.5(–8) by 1.8–3(–3.7) mm. *Lateral sepals* (4–)4.7–6(–8) by 2.2–3(–3.7) mm. *Petals* (4–)4.3–5.5(–6.7) by 2–3.5(–3.8) mm. *Lip* (3.5–)4–4.5(–6.2) mm long, with 3 keels at the back.

Distribution. India (Assam). 8 collections (AMES, BR, E, G, L, SING, U, W). Burma (Chin). 4 collections (AMES, K, W). China (Yunnan). 5 collections (AMES, BR, E, G, L, SING, W). Vietnam (Gia Lai-Cong Tum = Kontum = Pleiku, Lam Dong = Tuyen Duc = Lang Biang, Thuan Hai = Ninh Thuan = Bin Thuan = Bin Tiy). 3 collections (NY, W). Thailand (North, Central). 16 collections (BKF, BM, K, L, S). Sumatra (Aceh, Sumatera Barat). 3 collections (BO, L, SING). Java (Jawa Barat). 7 collections (BO, L, U).

Ecology. Epiphytes or lithophytes, sometimes lithophytic on lava beds; altitude (?600–)1000–1750 m. Possibly two flowering periods: February to May (14 records) and September to December (4 records).

Collector's notes. Flowers white or creamy-white, sometimes with a pale green centre, sometimes yellowish; fragrant.

Note. Cumberlege 1311 from Thailand has unusually large flowers. Only flowers preserved on alcohol are present, herbarium material is not extant. The epichilium is not developed; the hypochilium ends into a point like in *P. cantonensis*. Further the flower is identical to that of *P. convallariae*, it is considered to belong to that species. The measurements are included in the above description.

27b. var. *breviscapa* Deori & Joseph.

Pholidota convallariae (Rchb. f.) Hooker f. var. *breviscapa* Deori & Joseph., Bull. Bot. Survey India 20 (1978) 159. – Type: A.S. Rao 50902A (holo CAL; iso 50902 B–G ASSAM, not seen).

Pseudobulbs 1.5–2.5 cm long. *Leaves* 4–8.5 by 0.5–0.6 cm. Inflorescence extending c. 4 cm long beyond the scales of the young shoot, 3–7-flowered. *Floral bracts* more or less rhomboid when flattened, c. 7 by 7 mm. *Median sepal* c. 5 by 3 mm. *Lateral*

sepals c. 5 by 4 mm. *Petals* 4–5 by c. 3.5 mm. *Lip* c. 4 mm long, with 5 keels at the back.

Distribution. India (Pradesh). Only known from the type.

Ecology. Epiphytes; altitude c. 1660 m. Fl. & fr. Nov. to Dec.

Collector's notes. Flowers white, column pink. Pedicel pink, ovary green.

Note. A request to borrow the holotype of this variety for study was refused. The details above were copied from the type description.

28. *Pholidota missionariorum* Gagnep. – Fig. 30.

Pholidota missionariorum Gagnep., Bull. Mus. Hist. Nat. Paris II, 3 (1931) 146. – Syntypes: Martin 2576 (lecto P, here chosen; iso E), Cavalerie 3987 (P, not seen).

Pholidota rupestris Hand.-Mazz., Symb. Sin 7 (1936) 1349, f. 42, 4–5. – Type: Handel-Mazzetti 8801 (holo W; iso E).

Plants long creeping, (5.5–)8–10 cm high. Roots (two to) several together at the base of each rhizome part, thin, flexuous, up to 20 cm by 0.5–1 mm, branched from about halfway towards the tip. Rhizome slender, the parts between the pseudobulbs (0.5–)1–1.8 cm long. Rhizome scales long persistent, 3–4, shortest one 4–5 mm long, longest one 8–12 mm long, herbaceous. Young shoot slender, ascending, more or less tapering to the top; pseudobulb scales 3, soon dry but rather long persistent, covering the last 3–4 pseudobulbs and usually obscuring the view on the rhizome scales of the young shoot, longest one 1.5–2.5 cm long, top acute to apiculate, papyraceous, nerves c. 12–17. *Pseudobulbs* rather swollen, 0.6–2.5 cm long, shining, when dried rather irregularly coarsely wrinkled and long persistent. Petiole 2–11 by c. 1 mm. *Leaf blade* ovate-oblong to linear-lanceolate, (1.1–)2–6.5(–8.5) by 0.4–1 cm; top acute to acuminate; (sub)coriaceous; main nerves 3, midrib more or less sunken above, prominent below, other main nerves above and below prominent, one running rather near each margin, small nerves, 9–16, rather inconspicuous. *Raceme* proteranthous to synanthous with the just emerging very young leaves, 7–13-flowered. Scape entirely hidden to c. 5 mm projecting from the scales, 0.3–0.5 mm thick, in fruit enlarging to 1.5–2.5 cm. Rhachis sometimes faintly zig-zag, 2–4 cm long; internodes more or less terete, 3–6 mm long. *Floral bracts* ovate, c. 6–7 by 5–6 mm; top acuminate; papyraceous; nerves c. 9, just above the base branching in several about equal parallel branches. Pedicel 0.7–2 by 0.3–0.5 mm. Ovary about terete in section, 1.5–4 by 0.7–1.5 mm. *Median sepal* more or less ovate, 3.3–4.3 by 2–2.8 mm; top obtuse to rounded, often curved backwards; midrib pronounced. *Lateral sepals* ovate to ovate-oblong, 3.8–4.7 by 1.8–2.2 mm; top acute to acuminate; midrib a rounded keel. *Petals* ovate, 3–3.5 by 1.7–2.5 mm; top obtuse (to acute), often curved backwards; midrib somewhat prominent. *Lip* rather broadly inserted, more or less straight to somewhat curved, 3.5–4 mm long. *Hypochilium* boat-shaped, rather shallowly concave, 2–3 mm long, 1.7–2.5 mm wide, 0.5–1 mm high; nerves 5, the 3 central ones at the base thickened into short low keels. *Epichilium* not clearly separated from the hypochilium, wider than long when flattened, 1–2 by 2.5–3.4 mm; top broadly rounded, (entirely to) more or less retuse; lateral margins usually turned erect, 0.7–1 by 0.5–2 mm, broadly rounded; without ornamentation or keels. *Column* short, 1.5–2 mm long, towards the top

with a short, abruptly obtuse hood which just overtops the stigma, with an irregularly dentate to almost entire top margin and laterally on each side usually with a small, rounded to triangular lobe. *Anther* inserted on the top margin of the hood, hardly extending from it, in outline irregularly cordate to broadly elliptic; c. 0.5–0.7 by 0.7–0.8 mm; top truncate to somewhat retuse. Pollinia c. 0.3 by 0.2 mm. *Stigma* 0.6–1 by c. 0.8; rostellum broad, rounded to triangular, sometimes somewhat acute. *Fruit* ellipsoid; body 8–10 by c. 5 mm. Seeds to c. 0.5 mm long, with 0.2 mm long embryo.

Distribution. Bhutan. 1 collection (TI). China (E. Tibet, N. Yunnan, Guizhou = Kweichow = Kouy-tschou). 16 collections (AMES, E, K, L, P, W). Burma (Kachin State). 1 collection (K).

Ecology. Lithophytes, sometimes epiphytes, once recorded near a stream; altitude 1700–2200 m. Fl. & fr. Sept. to April.

Collector's notes. Flowers white, greenish white, to cream-coloured; fragrant (once recorded).

29. *Pholidota yunnanensis* Rolfe – Fig. 31.

Pholidota yunnanensis Rolfe, J. Linn. Soc. Bot. 36 (1903) 24; Pfitzer & Kraenzlin, Pfl. R. Heft 32 (1907) 149; Schltr. in Fedde, Rep. Beih. 4 (1919) 189; Icon. Corm. Sinic. 5 (1976) 691, f. 8211. – Syntypes: Henry 11.144 (lecto K, here chosen; iso NY), Hancock 585 (K).

Pholidota kouytcheensis Gagnep., Bull. Mus. Hist. Nat. Paris II, 3 (1931) 145. – Syntypes: Cavalerie & Fortunat 2338 (lecto P, here chosen); Ducloux 5473 (P); Vial s.n. (II-1890) (P); Laborde 2524 (E); Perny (not seen).

Plant long creeping, (6.5–)8–19 cm high. Roots relatively sturdy, stiff one to two (rarely three) together at the base of each rhizome part, up to 45 cm long by 1.5–2 mm, branched from about halfway onwards. Rhizome slender, the parts between the pseudobulbs 1.5–4.5 mm long. Rhizome scales (5–)6–7, shortest one 3–6 mm long, longest one 15–25 mm long; papyraceous. Young shoot slender, ascending, more or less tapering to the top; pseudobulb, scales 2, still persistent along the last developed 1–2(–3) pseudobulbs, leaving the rhizome scales more or less free; longest one 18–30 mm long, top acute to acuminate, papyraceous, nerves 15–40. *Pseudobulbs* usually very slender, (1.5–)2–4.5(–6) cm long, shining, when dried rather coarsely longitudinally wrinkled and long persistent. Petiole (2–)3–7 by 1–2.5 mm. *Leaf blade* linear-lanceolate, (2.5–)5–13 by (0.3–)0.5–1.5 cm; top acute; stiff herbaceous to subcoriaceous; main nerves 3(–5), above and below somewhat prominent, small nerves 18–36, rather inconspicuous. *Raceme* proteranthous to rarely synanthous with the just emerging very young leaves. 10–20-flowered. Scape entirely hidden to c. 5(–10) mm projecting from the scales, 0.5–1 mm thick, in fruit enlarging to 3.5–7 cm. Rhachis sometimes more or less zig-zag, 3–7 cm long; internodes more or less terete, 2–4(–7) mm long. *Floral bracts* caducous but often clasping the ovary during anthesis, ovate, 6–8(–9.5) by 4.5–5.7(–7) mm; top acute to acuminate; papyraceous; nerves 9–11, just above the base branching into several about equal, parallel branches; above sometimes with few scattered minute hairs. *Pecicel* 1–2(–6) by 0.3–0.5 mm. Ovary more or less triangular, 1.5–4(–7) by 0.5–1 mm. *Median sepal* ovate, 3–4.5 by 2–4 mm; top acute to apiculate, somewhat recurved or not; midrib somewhat prominent. *Lateral sepals*

ovate, 3.3–5 by 2–2.8 mm; top acute; midrib a distinct rounded keel which is often towards the top more or less wing-like. *Petals* ovate, 3–3.8 by (2–)2.4–3 mm; top acute to acuminate, recurved to reflexed, its tip rounded to acute; nerves 3, lateral nerves sometimes branched. *Lip* rather broadly inserted, distinctly sigmoid, 4–6 mm long when flattened. *Hypochilium* saccate, 0.8–2 mm long, 1.5–1.7 mm wide, 1.3–1.8 mm high; nerves 5, not thickened into keels. *Epichilium* separated from the hypochilium by a distinct bent, more or less irregularly elliptic to broadly spatulate when flattened, 2.8–4 by 2.2–3.5(–4) mm; top rounded to emarginate; lateral margins usually turned erect; without ornamentation or keels. *Column* hardly widening to the top, 2–3 mm long, towards the top with a short, abruptly truncate hood which just overtops the stigma, with an entire to irregularly dentate top margin and usually laterally on each side with a small, triangular to rounded lobe. *Anther* inserted on the top margin of the hood, hardly extending from it, in outline irregularly broadly elliptic, 0.5–0.7 by c. 0.8 mm; top broadly truncate. Pollinia c. 0.3 by 0.2 mm. *Stigma* 0.4–0.8 by 0.5–0.8 mm; rostellum more or less triangular, 0.3–0.5 by 0.5–0.8 mm. *Fruit* (narrowly?) ellipsoid, tapering to the base, on top the entire perianth or at least the lignified column is persistent; body 10–10.5 by 3.5–6 mm. Seeds rather thickly fusiform, c. 0.3 mm long; embryo ellipsoid, c. 0.2 mm long.

Distribution. China (Yunnan, Guizhou = Kweichow = Kouy-tschou, Guangxi = Kwangsi, Hubei = Hupeh; according to Icon. Corm. Sinic. 5 (1976) 691 also present in Sichan = Szechwan and Hunan). 18 collections (AMES, E, K, L, NY, P, W).

Ecology. Lithophytes, sometimes recorded forming dense mats growing amongst moss; altitude 700–1150 m, twice recorded from c. 2000 m. Fl. & fr. May to Aug. (11 records), also Feb. (2x), Oct. (1x) and Nov. (1x).

Collector's notes. Flowers white, cream-coloured to pinkish.

DUBIOUS SPECIES

***Pholidota aculeata* Bot. Reg. ex Steudel.**

Pholidota aculeata Bot. Reg. ex Steudel, Nomencl. Bot. ed. 2 (1941) 324; Loudon, Hort. Brit. Suppl. 3 (1850) 607.– Type: not designated.

Distribution. India orientalis.

Note. Steudel refers to Botanical Register as source of the name. I have not found it there, nor have I seen specimens annotated with this name. Loudon cited Lindley as the author.

***Pholidota cyclopetala* Kraenzlin.**

Pholidota cyclopetala Kraenzlin, Pfl. R. Heft 32 (1907) 151; J.J. Smith, Fedde, Rep. 32 (1933) 173.– Type: Berlin, cult. Hort., III-1907 (lost).

Distribution. W. Malesia: S. Sumatra.

Note. I agree with J.J. Smith that this species is possibly identical with *P. carnea* var. *carnea*.

***Pholidota gardneriana* Wall. ex Steudel.**

Pholidota gardneriana Wall. ex Steudel, Nomencl. Bot. ed. 2 (1941) 324.– Type: not designated.

Distribution. India orientalis.

Note. This is the only reference with this name I have seen. It is possible that Steudel mistakenly transferred *Coelogyne gardneriana* Lindley in Wallich, Pl. As. Rar. 1 (1830) 33, t. 38 to *Pholidota*.

***Pholidota gracilis* Hort. ex Orch. Rev.**

Pholidota gracilis Hort. ex Orch. Rev. (1910) 115.– Type: Colman s.n., not seen.

Distribution. Not known.

Note. The description of this species consists only of: “*P. gracilis*, bearing a dozen short spikes of white flowers”.

***Pholidota tristis* Lindley ex Loudon.**

Pholidota tristis Lindley, Loudon, Hort. Brit. Suppl. 3 (1850) 607.– Type: not designated.

Distribution. India.

Note. This species is included in Index Kewensis as *Pholidota tristis* Lindl. ex Baxt., nomen. I have not found a description or other references.

***Pholidota wattii* King & Pantl.**

Pholidota wattii King & Pantl., J. As. Soc. Beng. 66, 2 (1898) 590.– Type: Watt s.n., not seen.

Distribution. India, Assam.

Note. In Kew an empty herbarium sheet of *P. wattii* is present stating: Assam, near P. advena; these notes are probably copied from the type description. The description fits best *Pholidota rubra* except that this species has one low rounded keel instead of 3 shallow lamellae in the hypochilium, and stout imbricate unequal bracts on the peduncle are not known in *Pholidota*.

EXCLUDED SECTION AND SPECIES

***Pholidota* sect. *Pseudopholidota* Ames.**

Pholidota sect. *Pseudopholidota* Ames, Leaflet Philip. Bot. 5 (1912) 1557.– Type species: *Pholidota elmeri* Ames (= *Thecostele alata* Par. & Rchb. f.) = *Thecostele* Rchb. f.

Distribution. Philippines, Palawan.

Note. *Pholidota elmeri* was recognised by Ames to be conspecific with *Thecostele alata* in 1915. The consequence is that *Pholidota* sect. *Pseudopholidota* must be placed in the synonymy of *Thecostele*, which Ames never did.

***Pholidota elmeri* Ames.**

Pholidota elmeri Ames, Leaflet. Philip. Bot. 5 (1912) 1557; Orch. 5 (1915) 66, in note; in Merr., Enum Philip. 1 (1924) 301.- Type: Elmer 12971. = *Thecostele alata* Par. & Rchb. f.

Distribution. Philippines, Palawan.

Note. *Pholidota elmeri* was recognised by Ames to be conspecific with *Thecostele alata* in 1915.

***Pholidota gracilis* L.O Williams.**

Pholidota gracilis L.O Williams, Bot. Mus Leaflet. 6 (1938) 59.- Type: SF (Moulton) 6762 (holo AMES, not seen; iso SING). = probably *Dendrochilum*, subgen. *Aphanostelidion*.

Distribution. Borneo. Sarawak (4th Div.).

Note. Although the shortly saccate hypochilium of the lip and the absence of stelidia on the column are characters which are also present in *Pholidota*, this species does not belong to that genus. The habit, the general appearance of the flower, the slender curved column and the relatively long epichilium suggest more *Dendrochilum*.

***Pholidota kinabaluensis* Ames.**

Pholidota kinabaluensis Ames, Orch. 6 (1920) 68; de Vogel, Orch. Mon. 1 (1986) 41.- Type: Clemens 279 (n.v.) = *Entomophobia kinabaluensis* (Ames) de Vogel.

Distribution. Borneo. Sarawak (1st & 4th Div.). Sabah (West Coast Residency). Kalimantan (Kalimantan Timur).

***Pholidota pusilla* (Ridley) Kraenzlin.**

Pholidota pusilla (Ridley) Kraenzlin, Pfl. R. Heft 32 (1907) 158, de Vogel, Orch. Mon. 1 (1986) 38.- Type: Ridley s.n., Malay Peninsula, Perak, Larut Hills 4000' (n.v.) = *Chelonistele sulphurea* (Blume) Pfitzer var. *sulpurea*.

Distribution. Sumatra, Malay Peninsula, Java, Borneo, S Philippines.

***Pholidota membranacea* Teijsman & Binnendijk.**

Pholidota membranacea Teijsman & Binnendijk, Nat. Tijdschr. Ned. Ind. 5 (1853) 488.- Type: not designated (growing on trees in the environments of Buitenzorg, now Bogor). = *Dendrochilum* sp.

Distribution. W. Java.

Note. By J.J. Smith in Orch. Java (1905) 160 from the description identified as a *Dendrochilum* but the description is insufficient to identify the species.

Pholidota rhombophora Rchb. f.

Pholidota rhombophora Rchb. f., Linnaea 41 (1877) 117, in note under *Coelogyne* (*Pholidota*) *rhombophora*.— Type: Wallis s.n. (W). = *Acoridium rhombophorum* (Rchb. f.) Ames.

Distribution. Philippines, Luzon

Note. Ames, in Orch. 3 (1915) 7, transferred this species to *Dendrochilum rhombophorum*, and in Sched. Orch. 5 (1923) to *Acoridium rhombophorum*.

Pholidota sigmatochilus (Rolfe) J.J. Smith.

Pholidota sigmatochilus (Rolfe) J.J. Smith, Blumea 5 (1943) 299; de Vogel, Orch. Mon. 1 (1986) 31.— Type: Gibbs 4260 (BM) = *Chelonistele kinabaluensis* (Rolfe) de Vogel.

Distribution. Borneo. Sabah (West Coast Residency).

Pholidota suaveolens Lindley.

Pholidota suaveolens Lindley, Gard. Chron. (1856) 372.— Type: not designated. = *Coelogyne suaveolens* (Lindley) Hooker f.

Distribution. NE India to Thailand.

Note. Transferred to *Coelogyne* by Hooker f., Ann. Bot. Gard. Calc. 5 (1895) 27, t. 40. Pfitzer & Kraenzlin, Pfl. R. Heft 7 (1905) 55 describe this species as *Coelogyne suaveolens*, and on p. 150 as *Pholidota suaveolens*, stating explicitly in a note under the latter that it is without doubt a *Pholidota* and not a *Coelogyne*.

Pholidota triloba J.J. Smith.

Pholidota triloba J.J. Smith, Brittonia 1 (1931) 105; Orch. Mon. 1 (1986) 45.— Type: Clemens 20398. = *Geesinkorchis phaio스테* (Ridley) de Vogel.

Distribution. Borneo. Sarawak (1st Div.). Kalimantan (Kalimantan Timur).