

REVISIONS IN COELOGYNINAE (ORCHIDACEAE) IV*
COELOGYNE SECTION TOMENTOSAE

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SUMMARY

This article contains a taxonomic revision of *Coelogyne* section *Tomentosae* (24 species). Five species (*C. acutilabium*, *C. bruneiensis*, *C. echinolabium*, *C. latiloba*, *C. velutina*) are newly described; three other species are allotted for the first time to this section (*C. buennemeyeri*, *C. distans*, *C. rupicola*). One species, formerly included in section *Tomentosae*, is excluded (*C. veitchii*). Six species are here reduced to synonymy. A key to the species is provided. Synonymy, description, distribution, habitat notes, colour descriptions and detailed illustrations are given for the section and all its species.

INTRODUCTION

The first species of *Coelogyne* section *Tomentosae*, *C. testacea*, was described by Lindley in 1842. In 1854 Lindley included this, together with *C. tomentosa* in his section *Flaccidae*. Reichenbach f. (1861) followed Lindley, and added several species. In later concepts of the subdivision of *Coelogyne* only *C. flaccida* remained in section *Flaccidae*, Lindley's 5 other species were placed in 3 other sections which are still recognised.

Coelogyne section *Tomentosae* was established in 1907 by Pfitzer, who at the same time erected the section *Venustae* to accommodate *C. venusta*. Section *Tomentosae* is maintained by all later authors, who all included *C. venusta* in section *Tomentosae*; that view is also adopted here. Pfitzer listed a total of 11 species, of which two were later reduced to synonymy. The main character on which he distinguished section *Tomentosae* from other sections, and especially from section *Verrucosae* which was placed next to it, is the presence of short hairs on at least the ovary, and often also on the rhachis. He also included *C. veitchii*, in which he was followed by subsequent authors. This species has, however, an entirely glabrous inflorescence and ovary, and is so deviating in characters of the lip that it seems out of place in this section; hence it is excluded in this treatment. *Coelogyne testacea* seems also somewhat different in the flower characters, but is here tentatively retained.

Although section *Tomentosae* is better circumscribed in this way there remains a problem to be solved. Section *Verrucosae* is by most authors separated from section *Tomentosae* based on the glabrous ovaries and inflorescences, the erect instead of limply pendulous inflorescences, and the presence of verrucose papillae on the lip. However, some of its species, including *C. asperata* and *C. papillosa*, have a more or less sparse indument of

* Part I: *Blumea* 28 (1983) 413–418; Part II: *Orchid Monographs* 1 (1986) 17–86; Part III: *ibid.* 3 (1988) 1–118.

hairs on the ovary. In section *Tomentosae*, on the other hand, some species have papillae on the lip instead of separate keels, and others have more or less erect inflorescences, whereas the flower structure and the indument of the ovary clearly indicates their relationship. Since section *Verrucosae* has not yet been studied in detail it is premature to suggest a different sectional subdivision, or suggest other characters to differentiate the two. Therefore, the concept of section *Tomentosae*, as it was accepted by all authors after Pfitzer, has been maintained until all species involved in the complex have been revised and a better decision can be made on the sectional subdivision of the genus.

NOTES ON MORPHOLOGICAL CHARACTERS AND THEIR TAXONOMIC VALUE

General – It is usually necessary to use a combination of floral and vegetative characters for identification of a specimen.

Habit – The habit varies between plants with crowded pseudobulbs, often forming large clumps, to long creeping plants with the pseudobulbs widely spaced on the rhizome. With experience living as well as a number of herbarium specimens can be recognised from the habit.

Roots – The roots are a few millimetres thick, often quite long, and are unbranched or branch loosely, normally near the end. They supply no reliable characters.

Young shoot – The young shoot which produces an inflorescence either develops at its base a pseudobulb with two leaves, or at the base of this shoot the pseudobulbs and leaves remain reduced, and vegetative shoots are produced separately. See under Inflorescence.

Pseudobulbs – The pseudobulbs are crowded to widely spaced. They vary from shortly ovoid to long cylindrical, are almost smooth to strongly ribbed, sometimes more or less flattened. Although in each species variation exists, in a number of these the pseudobulb shape in combination with other vegetative characters are sufficient to recognise the species when alive; in herbarium specimens the pseudobulb shrinks so much that the shape often becomes unrecognisable.

Leaves – The texture of the leaves ranges from herbaceous to coriaceous; in most but not all species this is quite constant. Although each species has a more or less specific leaf shape the variation in shape and size is often too great to use these as reliable characters.

Inflorescence – An important subdivision of the section is into plants with heteranthous inflorescences or with proteranthous to synanthous inflorescences [for definitions see Orchid Monographs 3 (1988) 3].

In species with heteranthous inflorescences the vegetative growth of the plant is by means of separate vegetative shoots, the inflorescence-bearing shoot does not produce a pseudobulb with leaves at its base, and the inflorescence seems also during fruit setting to be borne lateral on the rhizome.

In species with proteranthous to synanthous inflorescences the inflorescence-bearing shoot produces during its development at the base a pseudobulb with leaves. The leaves from the undeveloped pseudobulb at the base are initially present but not fully grown, either hidden in the scales of the young shoot or already partly emerged. During fruit setting the leaves develop further, and eventually the pseudobulb at the base of the inflorescence starts elongating and swelling. On top of the old pseudobulbs the base of the decayed inflorescence is often still present.

These character states can be observed in living plants in which the development can be followed. In herbarium specimens, however, heteranthous and proteranthous inflorescences look exactly alike. For these reasons the use of this character in the key is restricted. The placing of the inflorescence after fruit setting, either seemingly lateral on the rhizome or on top of a developed pseudobulb with leaves is a selection criterium for possible candidates. In the latter case older pseudobulbs show a trace of its stalk after decaying of the infructescence.

The peduncle is the inflorescence stalk from the base up to the first sterile or floral bract. Most species have a short peduncle which is (almost) entirely covered by the scales of the young shoot. In few species the peduncle is elongated, but varies considerably in length.

The floral bracts are persistent during anthesis except in *C. distans* where they are caducous. Their length in relation to the pedicel plus ovary is more or less constant in some species, in others it varies considerably. At the base of the rhachis a few bracts may be sterile.

The indument on the rhachis is usually sparse, one species is characterised by a dense indument. The length of the internodes varies considerably, in some species even in the same inflorescence.

The number of flowers per inflorescence varies considerably in multiflowered species; in few-flowered species the number is more reliable.

Flowers – The flowers are positioned with the lip turned downwards. The coloration of the flower parts varies somewhat within a species, but many species have a specific combination of colours of the different parts by which they can be recognised.

Pedicel and ovary – The indument on the ovary varies in density, and is usually unreliable for identification.

Sepals – There is some variation in length–width ratio within each species, but the general shape of the sepals does not vary much within the section. The length of the sepals can be used to separate the species into two (artificial) groups. In one species the keels on the sepals are quite pronounced.

Petals – The remarks under the sepals about the measurements apply to the petals as well.

Lip – The most reliable characters to differentiate the species are found in the lip. The presence or absence of a central keel on the hypochilium is very important, even if in rare occasions a central keel is partly developed in species where this is normally absent. Shape and ornamentation of the keels provide reliable characters, although in some species some variation is possible. The number of keels on the epichilium is more variable than that on the hypochilium. Some species are characterised because the keels on the epichilium are dissolved in a mass of papillae or warts. The shape of the epichilium is specific for some species, in other species this is somewhat variable. One species is characterised by the shape of the lip which is not divided into a hypo- and epichilium.

Column – The shape of the column is rather uniform in the section, although the length–width ratio is rather specific for a number of species. Some species have the top of the hood deeply incised, others have a sparse indument on the front of the column stalk.

Anther – The shape of the anther is somewhat variable. In *C. rochussenii* the top consists of a strap-shaped lobe separated from the main body, in *C. bruneiensis* the margins are wing-like widened.

Stigma – The shape of the stigma is rather uniform in the section.

Fruit – Possibly some characters are present in the keels on the valvae and/or jugae on the fruit or in its size, but of most species fruits are not known.

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Living plants of the following species were grown and studied when flowering in the Leiden Hortus Botanicus: *C. bruneiensis*, *C. dayana*, *C. pholidotoides*, *C. rhabdombulbon*, *C. rochussenii*, *C. swaniana*, *C. testacea*, *C. tomentosa*, *C. velutina*, and *C. venusta*. I am much obliged to the prefect 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, Saarbrücken and Singapore who supplied cuttings of specimens in their collections.

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The areas visited for these studies are:

- Borneo: Sarawak (Bahagian Kuching)
- Brunei (Belait and Temburong District)
- Sabah (Bahagian Pantai Barat, Pedalaman)
- Celebes: Sulawesi Utara, Sulawesi Tengah, Sulawesi Selatan
- Java: Jawa Barat
- Sumatra: Sumatera Barat, Sumatera Utara

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COELOGYNE SECTION TOMENTOSAE

Coelogyne section *Tomentosae* Pfitzer in Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 66; Schltr., Orchis 9, 6 (1915) 163; Holttum, Mal. Nature J. 7 (1953) 163; Orch. Malaya ed. 3 (1964) 256; Butzin, Willdenowia 7 (1974) 252; Seidenf., Dansk Bot. Arkiv 29, 4 (1975) 60. – Type species: *Coelogyne tomentosa* Lindley, here chosen.

Coelogyne section *Venustae* Pfitzer in Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 66. – Type species: *Coelogyne venusta* Rolfe.

Short or long creeping, rather small to tall epiphytes or sometimes lithophytes or terrestrials. Roots along the entire rhizome, sturdy. Rhizome short to long creeping, terete, covered with scales which are long persistent or soon disintegrating. Young shoot terete or more or less flattened, with tightly imbricate scales and tapering to the top or with rather loosely imbricate scales. Pseudobulbs 2-leaved. *Leaves* herbaceous to (sub)coriaceous. Petioles short to long, per pseudobulb one almost orbicular in section and narrowly channeled, the other semi-orbicular in section and widely channeled. Leaf blade ovate to linear, rather small to large; base narrowed into the petiole; top acute to acuminate. Inflorescence pendulous, sometimes erect with curved or pendulous rachis, wiry to rather sturdy, few- to multi-flowered, heteranthous or proteranthous to synanthous with hardly emerged to almost entirely developed leaves; subglabrous to densely tomentose. Peduncle more or less terete,

usually short and more or less entirely enclosed by the scales of the young shoot, in few species long and then only at the base covered by those scales. Rhachis more or less terete, more or less zigzag to about straight. Sterile bracts absent or few, at the base of the rhachis and appressed to it, as the floral bracts. Floral bracts in almost all species persistent, folded backward to patent to ascending, attached around the rachis; top acute to obtuse; nerves many, fine. *Flowers* all open about simultaneously, mostly widely open, distichous, rather small to large, rather membranous. Pedicel terete to more or less angular, usually sparsely hairy; ovary usually tapering into the pedicel, 6-ribbed, densely to rather sparsely hairy or almost glabrous. *Median sepal* symmetric, boat-shaped, broadly sessile, (narrowly) ovate to (narrowly) elliptic; top acute to acuminate; nerves in the middle of the blade 5–13, often with (cross) branches, midrib more or less prominent, sometimes a low rounded keel; often with scattered hairs. *Lateral sepals* more or less distinctly asymmetric; nerves 5–13, midrib a low rounded to strong plate-like keel; further as the median sepals. *Petals* about symmetric to more or less falcate, narrowly elliptic to linear, more or less flat; nerves 1–11, midrib prominent or not; further as the median sepal but glabrous. *Lip* immobile, boat-shaped, 3-lobed, when flattened pandurate to elliptic or (ob)ovate in outline. *Hypochilium* rather narrowly to broadly attached, not or slightly ventricose at the base, when flattened in outline orbicular to elliptic or (ob)ovate or cordate. Lateral lobes of the hypochilium erect, in front more or less broadly rounded and either or not recurved, with entire or erose margin; in *C. venusta* about triangular and projecting in front, in *C. acutilabium* in front gradually lowering. Keels on the hypochilium median, 2–5 (the number and absence or presence of the median one not always constant in a species), sometimes the lateral ones only developed in the upper half to upper quarter of the hypochilium, in *C. reflexa* only developed on the junction of hypo- and epichilium, more or less high and plate-like with entire to incised or dentate, simple, swollen or double margin, in some species broader towards the epichilium and with small wart- or papillae-like processions or cross-ridges. *Epichilium* (rather) broadly attached, concave or convex, transversely elliptic to (ob)ovate or spatulate or ligulate, sometimes with a short claw; top acuminate to emarginate or deeply retuse with broadly acute tip; margin strongly recurved to curved upwards, entire to erose; keels in 3 species dissolved into a mass of papillae or warts, in the others 2 to 8 (the number not always constant in a species), more or less high and plate-like with entire to incised or dentate, simple, swollen or double margin, in some species broader and with small wart- or papillae-like processions or cross-ridges or teeth. *Column* more or less curved to the front, when flattened slender to rather broadly spatulate in outline; hood rather wide to narrow, widest at the middle or near the top, gradually narrowing to the base; top margin recurved or not, more or less irregular or dentate, sometimes laterally notched. Anther in outline more or less cordate, semi-elliptic, obovate to bell-shaped; top broadly rounded to truncate, sometimes more or less deeply incised at the tip. Pollinia 4, flattened, (obliquely) elliptic, at the tip connate by a caudicle consisting of a mass of sterile pollen. *Stigma* cup-shaped, semi-elliptic to semi-orbicular, with elevated, more or less recurved margin; rostellum large, semi-orbicular to more or less triangular, with broadly rounded top, laterally sometimes incised. *Fruit* beaked by the persistent, swollen column; body ellipsoid; valvae keeled; jugae band-like, with a vague to pronounced longitudinal ridge.

Distribution – Mainland Southeast Asia: Thailand. W Malesia: Malay Peninsula, Sumatra, Java, Borneo (most species), Philippines, Celebes, W Moluccas.

Habitat & Ecology – Epiphytes, sometimes terrestrial or lithophytic on bare rock, often growing on the base of tree trunks or on big branches, in rather dense shade to very exposed. Altitude: lowland to upper montane forest, mostly in the range of 1000–2000 m.

Cultivation – Some species of section *Tomentosae*, known as necklace orchids, are widely cultivated, and much appreciated for their free flowering with long, pendulous, multiflowered inflorescences. In nature they grow usually on bare bark or rock, the latter occasionally covered with moss. In cultivation they are best grown on fern slabs, larger plants in pots or baskets with a loose mixture of fern root and hardwood bark or charcoal which allows good drainage; some *Sphagnum* can be added. Watering should be regular (the pseudobulbs should not shrivel), and aerial humidity should be rather high; the leaves tend to dry out at the tip when not properly cared for. The leaves possess minute trichomes which may have a function in water absorption; spraying of leaves benefits the plants (Rosinsky, pers. comm.). When developing new shoots they require more water and extra diluted manure. Repotting or division of plants is best done in this growing stage before the new roots develop. The plants are normally grown under moderate shade, in nature some can stand full exposure to the sun but their development is then slower. Large plants flower more easily than small plants; the long inflorescences require the pots or baskets to be hung for proper development because the flowers are easily damaged. The flowers last several days to a week.

A few attempts were made to cross species of section *Tomentosae* with *Coelogyne* of other sections. In 1906 Co. Brymer in Doncaster, England, produced a cross between *C. dayana* and *C. asperata*, known under the name *C. × brymeriana*. *Coelogyne × intermedia* is a hybrid between *C. cristata lemoniana* and *C. tomentosa* produced in 1913 by the firm Cypher & Sons in Cheltenham. Holtum (1964) reported that an attempt in Singapore to cross *C. asperata* with *C. rochussenii* failed. References to crosses between species of section *Tomentosae* were not found in literature.

One collection, Sands 3666 from Sabah, seems to be a natural hybrid between *C. dayana* and *C. radioferens*. It has a 10-flowered, pendulous inflorescence, the flower characters are intermediate between both species. The epichilium has median at the base a mass of distant, coarse low teeth, irregularly scattered, which laterally continues into radiating rows of low elongated warts. The flowers are somewhat smaller than those of *C. radioferens*.

KEY TO THE SPECIES

- 1a. Flowers rather small to small, median sepal less than 18 mm long 2
- b. Flowers rather large, median sepal more than 20 mm long 6
- 2a. Pseudobulbs slender cylindric, more than 11 cm long, if shorter less than 1 cm thick 3
- b. Pseudobulbs rather shortly fusiform or ovoid, less than 9 cm long. 4
- 3a. Scale part of the inflorescence-bearing young shoot flattened, more than 12 cm long. Floral bract very large, 22–33 by 13–25 mm, enclosing the flower (almost) entirely, perianth laterally extending from it. – Sepals and petals (creamy-)white, lip with a white median band and margins, lateral lobes and centre of epichilium including the keels yellowish to brown 12. *C. moultonii* J.J. Smith

- b. Scale part of the inflorescence-bearing young shoot terete, less than 11 cm long. Floral bract not very large, 11–18 by 8–13 mm, enclosing at most the base of the floral parts, perianth free or extending from its top (rarely the bract dropped at anthesis). – Sepals and petals (creamy-)white, sometimes tinged green. Lip (creamy-)white, lateral lobes and epichilium with a yellow to light brown blotch
11. *C. longibulbosa* Ames & C. Schweinf.
- 4a. Epichilium of the lip ligulate, about equally wide over most of its length, its margins not undulate; keels only developed on the junction of hypo- and epichilium. – Flowers cream-coloured to greenish yellow, lip sometimes whitish, with a yellowish blotch
16. *C. reflexa* C.L. Chan & J.J. Wood
- b. Epichilium of the lip more or less widened from a narrower base, its margins undulate, keels extending over almost the entire length of the hypochilium. 5
- 5a. Median sepal 9.5–11.5 mm long. Epichilium of the lip when flattened broadly spatulate, with a broad claw, less than 5 by 5 mm. – Flower (creamy-)white, lateral lobes of the lip in front with a brown spot, epichilium with yellow
14. *C. pholidotoides* J.J. Smith
- b. Median sepal 12–15 mm long. Epichilium of the lip when flattened irregularly obovate to almost rectangular, gradually widening from a broad base, more than 6.5 by 5.5 mm. – Sepals, petals and lip (creamy-)white or tinged pink, lateral lobes and midlobe of lip with a yellow blotch or band, keels on the epichilium sometimes tipped brown
24. *C. venusta* Rolfe
- 6a. Lip not clearly divided in a hypochilium and epichilium; lateral lobes indistinct, sides of the lip low, in front very gradually lowering and passing into the narrowly triangular top of the lip. – Colours not known **1. *C. acutilabium* de Vogel**
- b. Lip clearly 3-lobed, divided in a hypochilium and epichilium; sides of the hypochilium with pronounced lateral lobes which are in front more or less broadly rounded; epichilium transversely elliptic or butterfly shaped to \pm orbicular or (broadly to slender) ovate, sometimes with a short and broad claw 7
- 7a. Pseudobulbs 5–15 cm apart on a long creeping rhizome. Bracts dropped at anthesis. Keels on the hypochilium of the lip 5 (sometimes additional lateral ones only partly developed). – Flowers (creamy-)white; lateral lobes of the lip inside with brownish stripes, outside with yellow to brown front margin; keels with a brown tip
5. *C. distans* J.J. Smith
- b. Pseudobulbs much closer together on the rhizome, rarely to 5 cm apart. Bracts persistent at anthesis, rarely caducous but then often remaining clasped around the pedicel. Keels on the hypochilium of the lip 2, 3 or 4, in the latter case exceptionally with a 5th, partly developed median keel 8
- 8a. Keels on the epichilium of the lip not separate, more or less entirely dissolved into a mass of warts, lobules or papillae 9
- b. Epichilium of the lip with 2–8 distinctly separate keels. 11

- 9a. Keels on the hypochilium of the lip 3. Ornamentation on the epichilium consisting of truncate, interconnected, molar-like warts; sometimes two median keels still separate. – Sepals and petals dull light (greenish) yellow to mauve. Lip (creamy-)white, lateral lobes inside brown with whitish lines, outside in front with a brown band, median of lip and keels sometimes yellowish; epichilium whitish, warts yellowish, between and around papillae brown **22. *C. tomentosa* Lindley**
- b. Keels on the hypochilium of the lip 2. Ornamentation on the epichilium consisting of flattened lobules or rounded papillae 10
- 10a. Pseudobulbs 6–20 cm long, much longer than the 0.5–2 cm long scale part of the inflorescence-bearing shoot. Floral bracts 20–25 mm long. Epichilium orbicular or broadly ovate, 5–8 by 5–10 mm, with rounded to acute top, without radiating rows of papillae or warts from the central mass of slender lobules. – Flower creamy- or dirty white, inside of lateral lobules of the lip with brownish colouring and paler nerves
6. *C. echinolabium* de Vogel
- b. Pseudobulbs 5–10 cm long, shorter than the 9–17 cm long scale part of the inflorescence-bearing shoot. Floral bracts 25–50 mm long. Epichilium butterfly-shaped to transversely elliptic in outline, 8–13 by 10–17 mm, more or less deeply emarginate or retuse, with radiating rows of papillae and/or low elevated warts from the central mass of papillae. – Sepals and petals ochrish yellow. Lip (creamy-)white, inside of lateral lobes brown with white nerves, outside in front with a brown band
15. *C. radioferens* Ames & C. Schweinf.
- 11a. Keels on the hypochilium of the lip to the base with entire or at most with irregularly, more or less deeply incised margin 12
- b. Keels on the hypochilium of the lip to the base with distinct warts, laciniae or teeth 16
- 12a. Inflorescence with a distinctly elongated peduncle extending 5.5–22 cm beyond the scales of the young shoot, emerging from between the almost entirely developed young leaves. Keels on the hypochilium with a distinctly swollen and laterally widened margin. – Flowers white, sometimes suffused pale salmon; lip with a median bright golden yellow band including the keels and the base of the midlobe
19. *C. rupicola* Carr
- b. Inflorescence with a short peduncle which is extending at most 2.5 cm beyond the scales of the young shoot, emerging from the scales only or from between the less than halfway developed young leaves. Keels on the hypochilium at most with slightly swollen but not laterally widened margin 13
- 13a. Inflorescence on a shoot without developed leaves, with less than 5 flowers, rhachis stiff. Keels on the epichilium of the lip rather broad and swollen, consisting of many small elevated cross-ridges. – Flower white, lip median white, inside on the front half orange-brown, lateral lobes inside brown with white nerves and margin
10. *C. latiloba* de Vogel
- b. Inflorescence on a shoot with just emerging to more or less developed young leaves, with 10 or more flowers, rhachis pendulous. Keels on the epichilium of the lip plate-like 14

- 20a. Keels near the attachment of the lip abruptly elevated into high, plate-like, triangular to semi-elliptic, lacerate processions. Pseudobulbs usually 4(-5)-angular with more or less sharp ridges and hollow sides. – Flower white or rarely tinged pink, lateral lobes of the lip outside often suffused ochre or brown or with brownish lines, in front with an ochre to brown band, inside brown with white nerves, epichilium with an ochrish to brown blotch over the keels **20. *C. swaniana*** Rolfe
- b. Keels near the attachment of the lip not elevated into plate-like processions, at most the fimbriae or teeth longer. Pseudobulbs at most shallowly grooved but without sharp ridges or hollow sides 21
- 21a. Epichilium of the lip more or less slender ovate; top (rather) long acuminate to long acute. – Sepals and petals (rather) bright (greenish) yellow to greenish. Lip whitish, lateral lobes outside with brownish stripes, in front with a brown band, inside brown with whitish nerves; epichilium white, base often with a yellow blotch, the ends of the keels brown; sometimes only the ends of the keels yellow or brown
18. *C. rochussenii* de Vriese
- b. Epichilium of the lip broadly spatulate, (broadly) ovate or almost orbicular to transversely elliptic; top retuse to broadly acute 22
- 22a. Rhachis of the inflorescence densely velutinous. Keels on the epichilium 3, 5 or 7. – Sepals and petals white or pinkish. Lip whitish, lateral lobes outside in front with a brown band, inside brown with whitish or pinkish nerves, median whitish, to the front yellow, with longitudinal brown lines, base of epichilium yellow surrounded by brown **23. *C. velutina*** de Vogel
- b. Rhachis of the inflorescence glabrous or sparsely hairy. Keels on the epichilium 2, 4 or 6 23
- 23a. Keels on the epichilium of the lip with irregular to irregularly dentate margin, without median inside with brown lines, lateral lobes outside in front with a brown band, inside brown with whitish nerves; epichilium yellow to the top, with brown margin
13. *C. odoardi* Schltr.
- b. Keels on the epichilium of the lip rather deeply incised into many slender, soft, tooth- or hair-like processions to 1 mm high 24
- 24a. Inflorescence proteranthous or synanthous with the just developing young leaves, after flowering a pseudobulb with leaves develops at its base. Ovary (almost) glabrous to rather sparsely hairy. Column broad, 5–7 mm wide when flattened. Keels on the hypochilium 4, very rarely 2 or 5, the lateral keels rarely absent, usually only developed in the front half to one quarter of the hypochilium, rarely a median keel developed. – Plant green. Flowers dull clay- or flesh coloured or dull (creamy-)ochrish. Lip similar coloured or whitish, lateral lobes of the lip in- and outside (dark) brown except the margin, without lighter coloured nerves; epichilium with some brown
21. *C. testacea* Lindley
- b. Inflorescence heteranthous, after flowering no pseudobulb with leaves develops at its base. Ovary rather densely hairy. Column narrow, to 4.5 mm wide. Keels on the hypochilium 2. – Plant dull glaucous green, often tinged reddish except the upper side of the leaves. Sepals and petals light yellow. Lip white, lateral lobes outside in front with a light brown band, inside brown with whitish nerves; epichilium white, margin brown **2. *C. bruneiensis*** de Vogel

1. *Coelogyne acutilabium* de Vogel, *spec. nov.* – Fig. 1.

Labellum non trilobatum si complanatum anguste ovatum in circumferentia, lobis lateralibus inconspicuis, labelli lateribus humilibus, distaliter gradatim in labelli parte apicali anguste triangulari minuentibus, columna distaliter stelidiis 2 brachiformibus antheram amplectentibus. – Typus: Bogor, cult. Hort. (from Sander & Co, St. Albans) s.n. (holo BO; iso L).

Vegetative parts not seen. *Inflorescence* 12-flowered, way of development of the inflorescence-bearing young shoot not known. Peduncle not seen. Rhachis pendulous, slightly zigzag, c. 24 cm long, densely hairy with velutinous hairs; internodes 17–25 mm long. *Floral bracts* ovate, 14–25 by 10–20 mm; top acute to rounded; the lowest 2 sterile. *Flowers* widely open, the perianth laterally extending from the top of the bract. Pedicel angular, 3–6 by c. 1.5 mm; ovary 3–6 by c. 2 mm, densely hairy with velutinous hairs. *Median sepal* narrowly elliptic, c. 28 by 5.3 mm; margin not recurved; top acute; nerves 9, midrib a low rounded keel. *Lateral sepals* somewhat asymmetric, narrowly ovate, c. 27 by 5 mm; top acute; nerves 9, midrib a low, rounded keel to 0.3 mm high. *Petals* recurved, almost straight, linear, c. 24 by 1.5 mm; top acute; nerves in the middle of the blade 3, midrib prominent. *Lip* not 3-lobed, rather shallowly boat-shaped, not clearly divided into hypochilium and epichilium, narrowly attached, not saccate at the base, when flattened in outline narrowly ovate, c. 18 by 5.5 mm; lateral lobes indistinct, sides of the lip low, in front very gradually lowering, entire; top part recurved, when flattened narrowly triangular, somewhat fleshy, its margin entire to somewhat irregular, more or less curved upwards; keels 3, plate-like, starting c. 3 mm from the base of the lip, there to 0.7 mm high, deeply incised, margin simple, broken into irregular, more or less triangular to quadrangular lamellae, at about one third of the hypochilium rather gradually lowered to 0.2 mm, further to the top with irregular to entire margin, gradually disappearing. *Column* at the top distinctly curved to the front, club-shaped, c. 15 by 1.5 mm; hood narrow, hardly wider to the top, its top margin recurved, rounded, deeply emarginate, laterally deeply incised producing two arm-like, triangular stelidia which clasp the anther. Anther obovate, c. 3.5 by 1.5 mm; the top rounded. Pollinia not seen. *Stigma* semi-elliptic, c. 2 by 1 mm; rostellum semi-elliptic, c. 2.5 by 1.5 mm, top broadly rounded. *Fruit* not seen.

Distribution – Cultivated, now dead, origin not known, only known from the type specimen which consists of one dried inflorescence only.

Habitat & Ecology – Not known.

Collector's notes – Colours not known.

Note – The epithet *acutilabium* refers to the shape of the lip.

2. *Coelogyne bruneiensis* de Vogel, *spec. nov.* – Fig. 2; Plate 1a.

Coelogyne testacea in floris forma paecipue in carinarum decibus similis, sed in inflorescentia heterantha pseudobulbis columnaue gracilioribus ovarii indumento densiore et in florum colore diversissimo ut in par-tibus vegetativis differt. – Typus: Leiden, cult. Hort. (de Vogel) 27697 (holo BRUN, iso K, L).

Roots c. 2 mm diam. Rhizome short, rhizome scales soon eroding. Scale part of the inflorescence-bearing shoot c. 3.5 cm long; scales tightly imbricate, with triangular top. *Pseudobulbs* close together, spindle-shaped, terete to rhomboid in section, 9–14 cm long, alive shallowly grooved. *Leaves* herbaceous, rather stiff. Petiole 3–6 cm long. Blade narrowly elliptic, 26–35 by 2.5–4 cm; top narrowly acute; main nerves 3–5. *Inflores-*

cence heteranthous, c. 12-flowered. Peduncle entirely enclosed in the scales of the young shoot. Rhachis pendulous, somewhat zigzag, c. 19 cm long; internodes 12–15 mm long. *Floral bracts* almost orbicular, 12–17 by 13–17 mm; top obtuse; the lowest 3 sterile. *Flowers* widely open, the perianth extending from the bract. Pedicel 7–10 by c. 1 mm; ovary 4–5 by c. 2 mm, rather densely hairy. *Median sepal* long elliptic, c. 25 by 9 mm; top acute; nerves 7, midrib prominent. *Lateral sepals* somewhat asymmetric, oblong, c. 25 by 9 mm; top acute; nerves 7, midrib a low rounded keel to 0.3 mm high. *Petals* oblanceolate, c. 25 by 4.5 mm; top acute; nerves 5, midrib slightly prominent. *Lip* 3-lobed, when flattened in outline broadly elliptic, c. 25 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline broadly elliptic, c. 19 by 21 mm; lateral lobes large, in front broadly rounded and slightly recurved, almost entire; keels 2, low plate-like, with double margin for most of their length, to 0.7 mm high, their top margin deeply incised into soft tooth-like processions, starting at the base of the lip and there the teeth scattered, continuing in the keels of the epichilium. *Epichilium* convex, transversely elliptic, c. 7 by 11 mm; margin recurved, more or less undulate and irregular; top truncate, tip acute; keels 6, plate-like, to 1 mm high, with many slender, soft, tooth-like processions (additional short keels on other nerves, midrib without keel), ending c. 2 mm from the top margin of the epichilium. *Column* almost straight, narrowly spatulate, c. 17 by 4.5 mm when flattened; hood widest in the middle, gradually narrowing to the base, its top margin and sides above the lateral notch irregularly dentate, retuse, shallowly laterally notched, the middle part not or slightly recurved. Anther broadly bell-shaped in outline, c. 2.7–3 by 2–3 mm; top truncate, notched; margins wing-like widened. Pollinia c. 1.8 by 1.2 mm. *Stigma* semi-orbicular, c. 2 by 2 mm; rostellum semi-elliptic, c. 2 by 3 mm, top broadly rounded. *Fruit* not seen.

Distribution – Borneo: Brunei (Belait District). Only known from the type.

Habitat & Ecology – Epiphytes, 2–5 m high on trunks of trees, in the vicinity of a waterfall, locally common. Altitude 150 m. Fl. Sep.

Collector's notes – Young shoot, rhachis and bracts dull brownish red. Pseudobulbs and leaves dull dark glaucous green, often tinged reddish except the upper side of the leaves. Sepals and petals light yellow. Lip white, lateral lobes outside in front with a light brown band, inside brown with white nerves, hypochilium median white; epichilium white, margin brown, keels in front light brown.

Note – The epithet *bruneiensis* refers to the country where this species was collected.

3. *Coelogyne buennemeyeri* J.J. Smith – Fig. 3.

Coelogyne buennemeyeri J.J. Smith, Bull. Jard. Bot. Buit. III, 5 (1922) 28; *ibid.* III, Suppl. 2¹ (1930) tab. 11, fig. 3. – Syntypes: Bunnemeijer 5500 (lecto BO, here chosen; iso K, L, U), 5225 (BO, L), 5376 (BO).

Roots 2–4 mm diam. Rhizome 7–11 mm thick. Scale part of the inflorescence-bearing young shoot terete, more or less tapering to the top, 5–8 cm long; scales (rather) tightly imbricate, with acute top. *Pseudobulbs* 1–2.5 cm apart, (long) ovoid, 3–7.5 cm long, when dried smooth with coarse sharp longitudinal folds. *Leaves* subcoreaceous. Petiole 2–5(–6.5) cm long. Blade elliptic to ovate, 13.5–26 by 2–4.5 cm; main nerves 3–7. *Inflorescence* almost proteranthous to synanthous with the just emerging very young leaves, 11–23-flowered. Peduncle almost entirely enclosed by the scales of the young shoot. Rhachis pendulous, about straight, 20–40 cm long; internodes 15–25 mm long. *Floral*

bracts elliptic, 14–18 by 12–13 mm; top acute to rounded, tip acute to acuminate; lowest 0–2 sterile. *Flowers* widely open, the perianth extending from the bract. Pedicel 13–22 by c. 1 mm; ovary 5–8 by 1.8–2 mm, rather sparsely hairy. *Median sepal* long elliptic to narrowly ovate, 23–27 by 7–9 mm; top acute; nerves 5, midrib swollen. *Lateral sepals* (narrowly) ovate, 23–27 by 6.5–7 mm; nerves 5, midrib a (rounded? to) high and pronounced keel. *Petals* linear, 23–27 by 2.5–2.8 mm; top acute; nerves 3, midrib more or less prominent. *Lip* 3-lobed, when flattened in outline ovate, 21–25 mm long. *Hypochilium* when flattened in outline almost orbicular to obovate, 14–16 by 12–18 mm; lateral lobes rather high, in front rounded and not or slightly recurved, erose; keels 2, plate-like, 1–1.5 mm high, with irregular to sometimes deeper incised margin, sometimes partly broken up, starting 2–3 mm from the lip base, continuing in the keels of the epichilium. *Epichilium* when flattened about orbicular, 7–9 by 7.5–9 mm; top rounded to truncate; margin erose; keels 2 (in Bünnemeyer 5376 with 2 additional shorter keels), plate-like, 1–1.5 mm high, ending 2.5–3 mm from the top margin of the epichilium, with irregular, more or less deeply incised margin. *Column* curved to the front, when flattened spatulate, 11–12 by 6–7 mm; hood large, widest at the middle, gradually narrowing to the base; top margin recurved, irregular. *Anther* cordate in outline, 2.5–2.8 by 2–2.4 mm; top rounded, more or less deeply incised at the tip. *Pollinia* c. 1.5 by 0.8 mm. *Stigma* semi-elliptic, c. 2 by 1.5 mm; *rostellum* semi-orbicular to broadly triangular, c. 1.5 by 2 mm. *Fruit* not seen.

Distribution – Sumatra (Sumatera Barat). 3 collections, only known from the syntypes (BO, K, L, U).

Habitat & Ecology – Epiphytes in montane forest or shrub vegetation, on trees and on shrubs between boulders. Altitude 2350–2500 m. Fl. Oct.–Nov.

Collector's notes – Flowers light pink, salmon-coloured or greenish salmon, in the latter plant the bracts similar in colour and the lip lighter.

Note – This species is dedicated to H. A. B. Bünnemeijer, a collector in the employ of the Herbarium at Buitenzorg, Java, who made more than 10,000 plant collections in Sumatra.

4. *Coelogyne dayana* Reichb.f. – Fig. 4; Plate 1b.

Coelogyne dayana Reichb.f., Gard. Chron. new ser. 21 (1884) 826; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 70, fig. 22g; Schltr., Orchis 9, 6 (1915) 176, fig. 35; Summerh., Curtis Bot. Mag. 172 (1958) t. 309, fig.; Seidenf., Dansk Bot. Arkiv 29, 4 (1975) 63, fig. 26. – *Pleione dayana* (Reichb.f.) Kuntze, Rev. Gen. Pl. 2 (1891) 680. – Type: Veitch s.n., collector Curtis (holo W, iso K).

Coelogyne pulverula Teijsm. & Binnend., Nat. Tijdschr. Ned. Ind. 24 (1862) 306; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 68, fig. 22f; Schltr., Orchis 9, 6 (1915) 176, fig. 30 (synon. nov.). – Type: Teijsmann & Binnendijk s.n. (L).

Roots 2–5 mm diam. Rhizome short; rhizome scales soon eroding. Scale part of the inflorescence-bearing young shoot 7.5–15 cm long; scales rather appressed imbricate, with acute top. *Pseudobulbs* close together, spindle-shaped to long ovoid, 7–25 cm long, rather shallowly grooved, when dried smooth with sharp longitudinal folds. *Leaves* herbaceous, rather stiff. Petiole 6–15 cm long. Blade oblanceolate to long elliptic, 25–65 by 4.5–11 cm; main nerves 7–9. *Inflorescence* proteranthous to synanthous with the less than halfway developed young leaves, 10–55-flowered. Peduncle almost entirely enclosed in the scales of the young shoot. Rhachis limply pendulous, about straight to somewhat zigzag, 25–110 cm long; internodes 15–45 mm long. *Floral bracts* broadly (ob)ovate or elliptic, 19–36 by

14–28 mm; top broadly triangular to obtuse; the lowest 1–4 sterile. *Flowers* widely open, the perianth usually extending laterally from the top part of the bract. *Pedicel* 8–25 by 1–2 mm; *ovary* 5–10 by 2–3 mm, rather densely hairy. *Median sepal* narrowly elliptic, 23–36 by 5–9.5 mm; margin more or less recurved; top acute; nerves 5–13, midrib prominent. *Lateral sepals* narrowly elliptic, 23–33 by 5.5–9 mm; top acute; nerves 5–9, midrib a low rounded keel to c. 0.5 mm high. *Petals* narrowly elliptic, 23–33 by 2.2–7 mm; top rounded to acute; nerves 5–7, midrib prominent or not. *Lip* 3-lobed, when flattened in outline elliptic to obovate, 20–30 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline obovate, 17–26 by 17–26 mm; lateral lobes large, in front broadly rounded and strongly recurved, more or less distinctly erose; keels 2, low and more or less broad, 0.3–0.6 mm high, at the back up to 1 mm high, in the back one quarter with one to two rows of scattered wart- or tooth-like processions which are sometimes partly fused, in the front three quarters with smaller wart- or papillae-like processions, both starting near or at the base of the lip and continuing in the central keels of the epichilium. *Epichilium* convex, when flattened transversely elliptic to almost orbicular, very rarely ovate, 6–11.5 by 9–15 mm; margin strongly recurved, distinctly erose; top deeply retuse to broadly acute, rarely rather narrowly acute; keels 6–8, separate, in front branched or not, more or less broad and swollen, consisting of many elevated narrow cross-ridges (sometimes broken up into small teeth), 0.5–1 mm high, ending 2–5 mm from the top margin of the epichilium, in front often (partly) dissolved into sharp tooth-like angular processions and sometimes with similar additional lateral processions. *Column* slightly curved to the front, in outline hardly spathulate, 15–20 by 4–5 mm; hood narrow, widest just below the top, very gradually narrowing to the base, its top margin irregularly dentate, sometimes laterally deeply notched, the middle part only somewhat recurved. *Anther* bell-shaped to almost triangular in outline, 3–4.5 by 3.4–4.4 mm; top truncate to very broadly rounded. *Pollinia* 1.8–2.2 by 0.8–1.2 mm. *Stigma* semi-elliptic, 1.5–3 by 2–3 mm; *rostellum* semi-orbicular, 2–3.5 by 2.5–4 mm; top broadly rounded, rarely deeply incised laterally. *Fruit* body ellipsoid, 4–6 by 1.5–2.2 cm; *valvae* keeled, keels rather pronounced, to c. 2 mm high; *jugae* band-like, with a more or less clear longitudinal ridge.

Distribution – Thailand (Peninsula), one doubtful record by Kerr (Seidenfaden, l.c.). Malay Peninsula (Pahang, Selangor, Johore?), 14 collections (K, SING, W). Sumatra (Aceh, Sumatera Utara, Sumatera Barat, Sumatera Selatan, Bengkulu), 36 collections (BO, C, K, L, SING). Borneo: Sarawak (Bahagian Kuching, Miri), Sabah (Bahagian Pantai Barat, Sandakan, Tawau), Kalimantan (Kalimantan Timur), 24 collections (AMES, B, BM, BO, E, G, HBG, K, KLU, L, NY, S, SAR, SING). Cultivated, origin not known, 25 collections (BO, E, G., K, L, W).

Habitat & Ecology – Epiphytes on trunks and major branches of trees in primary forest, sometimes lithophytic on rocks, often near streams. Altitude 275–1500(–1900?) m. Flowering period Feb.–Sep., one record in Oct. and Dec.

Collector's notes – Sepals and petals pale to light yellowish brown to (greenish) ochre. Lip: hypochilium outside white, front of the lateral lobes with a brown band, lobes inside brown to dark brown with white nerves and white margin, median white including the keels; epichilium white, above with a broad brown band near the margin and often a narrow brown cross band over the keels. Column white suffused little to heavily with brown.

Notes – 1. Collected by Curtis and introduced in Europe by Veitch & Sons, flowered for the first time in 1884. Dedicated to the famous orchid grower John Day.

2. The floral parts of Sumatran specimens are in general smaller.

3. Cultivated plants with many inflorescences and simultaneous open flowers are described in literature, the most spectacular one recorded from Java, with 78 inflorescences and together nearly 4000 flowers.

5. *Coelogyne distans* J.J. Smith – Fig. 5.

Coelogyne distans J.J. Smith, Bull. Dép. Agric. Ind. Néerl. 15 (1908) 2; Bull. Jard. Bot. Buit. III, Suppl. 2¹ (1930) tab. 11, fig. 2. – Type: Bogor, cult. Hort. s.n., 1907 (holo BO, not seen; iso L nr. 153, 157 and s.n.).

Roots 1.5–2 mm diam. Rhizome long creeping, 4–6 mm thick; rhizome scales 5–6 between two pseudobulbs, persistent, tubular and inflated with broad triangular top, 10–20 mm long, 15–20 mm apart, not overlapping. Inflorescence-bearing young shoot terminal on a more or less long creeping rhizome part, its scale part cylindrical, 3.4–4 cm long; scales rather loosely imbricate, with broad triangular top. *Pseudobulbs* 5–15 cm apart, more or less ovoid, 6.5–12 cm long, (shallowly?) grooved, when dried smooth with coarse sharp longitudinal folds. *Leaves* herbaceous. Petiole 4–7.5 cm long. Blade obovate to elliptic, 25–32 by 2.8–6 cm; main nerves 5–7. *Inflorescence* proteranthous, 3–4-flowered. Peduncle almost entirely enclosed in the scales of the young shoot. Rhachis erect about straight or somewhat curved, 1.5–2 cm long; internodes 2.5–12 mm long, the basal one 2.5–4 mm long. *Floral bracts* dropped at anthesis, not seen. *Flowers* widely open. Pedicel c. 13 by 1 mm; ovary 6–10 by 1.8–2 mm, rather sparsely hairy. *Median sepal* narrowly elliptic, 30–35 by 5–9 mm; margin sometimes recurved; top acute; more or less fleshy; nerves 9–15, midrib prominent or a low rounded keel. *Lateral sepals* somewhat falcate, narrowly elliptic, 26–32 by 7–8.5 mm; top acute; more or less fleshy; nerves 9–15, midrib prominent or a low rounded keel. *Petals* somewhat falcate, narrowly elliptic to obovate, 28–32 by 4.5–6 mm; top rounded to acute; nerves 7–13, the midrib not prominent. *Lip* 3-lobed, when flattened in general outline elliptic, 24–27 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline obovate, 18–22 by 16–21 mm; lateral lobes large, in front more or less rounded and recurved, erose; keels 5 (sometimes additional short keels on other nerves), plate-like, strongly lacerate, often broken up, to 1 mm high, starting near or at the base of the lip, all except the median one continuing in the keels of the epichilium. *Epichilium* more or less irregularly orbicular or ovate, 8–10.5 by 8–11 mm; sometimes with a short and broad claw; margin more or less undulate; top acute to truncate; keels 6 (sometimes additional short keels on other nerves, midrib without keel), plate-like, lacerate, rarely broken up, to 1.5 mm high, irregular in length, ending 4–5 mm from the top margin of the epichilium. *Column* curved to the front, when flattened spatulate, 20–24 by 7–9 mm; stalk median in front more or less distinctly hairy; hood large, widest in the middle, gradually narrowing to the base, its top margin shallowly laterally notched, irregularly dentate, the middle part recurved. Anther more or less broadly cordate to almost semi-orbicular in outline, 2.8–3.8 by 3–4 mm; top almost truncate to very broadly rounded or acute, tip sometimes projecting. Pollinia c. 2 by 1.4 mm. *Stigma* semi-elliptic, 2–3 by 1–2.5 mm; rostellum semi-orbicular, 2–3 by 3–4 mm, top broadly rounded. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Miri), Sabah (Bahagian Pantai Barat), Kalimantan (Kalimantan Barat), 6 collections: Bogor, cult. Hort. 78 (P), 153, 157 and s.n. (L); Chin See Chung 2643 (AMES, L); SAN (Fidilis & Sumbing) 110864 (K).

Habitat & Ecology – Epiphyte in forest along river. Altitude not known. Fl. March–April.

Collector's notes – Flowers white or cream-coloured; lateral lobes of lip inside with light reddish brown lines, outside with yellowish to brown front margin; keels with a brown tip. Column below the stigma brownish. Fragrant ('egg custard smell'); according to J.J. Smith (1908) the fragrance is produced only by the sepals and petals.

Note – The epithet *distans* refers to the wide spacing of the pseudobulbs.

6. *Coelogyne echinolabium* de Vogel, *spec. nov.* – Fig. 6.

Hypochilium ad basin carinis 2 laminiformibus margine valde dentato ad lacerato, in quarta parte superiore carinis 2 additis, epichilium orbiculare ad ovatum in medio ad basin loborum gracilium complanatorum massa. – Typus: Clemens 21639 (holo L; iso K, NY).

Roots c. 2 mm diam. Rhizome short, rhizome scales soon eroding. Scale part of the inflorescence-bearing shoot short, 1.5–2 cm long, enclosed by the scales covering the pseudobulb; scales rather loosely imbricate, with broad triangular top. *Pseudobulbs* close together, (very) slender cylindrical, 6–20 cm long, when dried with many fine sharp longitudinal folds. *Leaves* thin herbaceous. Petiole 3.5–7 cm long. Blade (narrowly) elliptic, 16–33 by 3–6.5 cm; top acute to acuminate; main nerves 5–7. *Inflorescence* heteranthous, 8–18-flowered. Peduncle almost entirely enclosed in the scales of the young shoot. Rhachis pendulous, about straight to slightly zigzag, 17–25 cm long; internodes 15–23 mm long. *Floral bracts* ovate to elliptic, 16.5–25 by 11–20 mm. *Flowers* rather closed, perianth laterally extending from the bract. Pedicel 4–7.5 by c. 1 mm; ovary 3–5 by c. 1.5 mm, rather densely hairy. *Median sepal* narrowly elliptic, 24–26 by 6–8.5 mm; margin hardly recurved; top acute to acuminate; nerves 7–13, midrib more or less prominent. *Lateral sepals* somewhat asymmetric, narrowly elliptic, 24–26 by 6.2–8 mm; top acute to acuminate; nerves 9–11, midrib a low rounded keel to 0.3 mm high. *Petals* straight or slightly falcate, narrowly elliptic, 23–26 by 4–5 mm; top acute to acuminate; nerves 5–7, midrib somewhat prominent. *Lip* 3-lobed, when flattened in outline elliptic, 20–24 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline elliptic to \pm orbicular, 17.5–20 by 15.5–20 mm; lateral lobes large, in front broadly rounded and not recurved, front half with about entire to finely dentate margin; keels 2 (in the front one quarter of the hypochilium with 2 additional nerves), plate-like, strongly double dentate to lacerate, the lateral ones sometimes less incised, to 0.4 mm high, starting at the base of the lip, all continuing to the mass of lobes on the epichilium. *Epichilium* orbicular or broadly ovate, 5–8 by 5–10 mm; margin curved upwards, finely erose or dentate; top rounded to acuminate; median at the base with a mass of flattened slender lobules to 0.8 mm high which are often deeply incised into more or less slender tooth-like projections, this mass ending 2–3 mm from the front margin of the epichilium. *Column* very slender, hardly curved to the front, when flattened narrowly spatulate, 15–18 by 2.8–4 mm; hood long and narrow, widest in the middle or near the top, gradually narrowing to the base, its top margin irregularly dentate, the middle part not recurved. Anther bell-shaped in outline, 3–3.8 by 2.5–3.8 mm; top broadly rounded to truncate. Pollinia 1.7–2 by 0.8–1 mm.

Stigma semi-elliptic, 2–2.5 by 1.5–2 mm, margin a high rim; rostellum semi-orbicular, 2–2.5 by c. 3 mm, top broadly rounded to truncate. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Kuching, Kapit), 6 collections: Beccari 1342, 1868, 2045; Clemens 21639, 22129; SAN (Amin et al.) 94679 (FI, K, L, NY).

Habitat & Ecology – Epiphytes in forest, no further details. Altitude not known. Fl. records in Jan.–Feb. and June–July.

Collector's notes – Not detailed: Flower creamy- or dirty white, bracts pinkish brown. Herbarium flowers show on the inside of the lateral lobes of the lip a brownish colouring with pale nerves.

Notes – 1. Schlechter probably had a duplicate of Beccari 1868 in Berlin on which he based the description of *C. rhabdombulbon*, describing 6 keels on the epichilium without mentioning a mass of lobes. In Kew a drawing made by Carr is extant, stating 'Beccari 1868, Type', showing 6 distinctly separate (rather shallowly incised) keels, exactly as in Schlechter's description. Apparently Beccari's collection 1868 was a mixture of *C. rhabdombulbon* and *C. echinolabium*. The three Beccari collections in Firenze annotated by Schlechter and cited with the description of *C. rhabdombulbon* all have the keels on the midlobe dissolved into a mass of lobes, and belong to *C. echinolabium*.

2. The epithet *echinolabium* refers to the mass of lobes on the epichilium of the lip which gives a prickly appearance.

7. *Coelogyne hirtella* J.J. Smith – Fig. 7; Plate 1c.

Coelogyne hirtella J.J. Smith, Bull. Jard. Bot. Buit. III, 11 (1931) 105; *ibid.* III, Suppl. 3³ (1949) tab. 159. – Type: Endert 3976 (holo L).

Coelogyne radioferens auct. non Ames & C. Schweinf.: J.J. Smith, Mitt. Inst. allg. Bot. Hamb. 7 (1927) 32, t. 5, fig. 24. – *Coelogyne radiosa* J.J. Smith, Bull. Jard. Bot. Buit. III, 11 (1931) 105. – Syntypes: Winkler 954a (lecto L, here chosen), 954 (L, E, P).

Roots 1–3 mm diam. Rhizome 10–15 mm thick; rhizome scales (rather) soon disintegrating. Scale part of the inflorescence-bearing young shoot cylindrical, 4–15 cm long; scales more or less loosely imbricate, with broad triangular top. *Pseudobulbs* close together, more or less thick ovoid, 2–6 cm long, with some shallow grooves, when dried rather finely wrinkled. *Leaves* herbaceous, more or less stiff. Petiole 3.5–32 cm long. Blade (narrowly) (ob)lanceolate to linear, 14.5–55 by 1.5–7.5 cm; main nerves 5–7. *Inflorescence* proteranthous to synanthous with the just emerged young leaves, 5–10-flowered. Peduncle almost entirely enclosed in the scales of the young shoot or up to 9 cm extending. Rhachis stiff, more or less erect or curved, not to rather zigzag, 7–18 cm long; internodes 13–20 mm long. *Floral bracts* persistent or caducous at anthesis (then often remaining clasped around the pedicel), (broadly) ovate, 15–42 by 10–24 mm; top broadly acute; the lowest 0–1 sterile and sometimes larger. *Flowers* widely open, perianth and sometimes (part of) the ovary emerging from the bract if this is persistent. Pedicel 9–25 by 1–2 mm; ovary 3–11 by 2–3 mm, more or less densely hairy. *Median sepal* narrowly elliptic, 20–37 by 6.5–12 mm; top acute, more or less distinctly acuminate; nerves 7–11, midrib swollen or a low rounded keel. *Lateral sepals* (narrowly) elliptic to lanceolate, 20–36 by 5–11 mm; top acute; nerves 7–11, midrib a plate-like, 0.5–2.5 mm high keel. *Petals* (narrowly) (ob)lanceolate, 20–36 by 5–10 mm; top acute; nerves 7–9, midrib slightly prominent. *Lip* 3-lobed,

when flattened in outline almost orbicular, 18–29 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline almost orbicular to ovate, 15–25 by 10–27 mm; lateral lobes large, in front broadly rounded and somewhat recurved, entire or sometimes erose; keels 2 (rarely an additional median entire keel partly developed), low and rather broad, at the back up to 3 mm high, slowly decreasing in height to 0.4–1 mm high, up to \pm halfway with one or two rows of tooth-like processions which are in the back sometimes branched, in the front half with low cross ridges or rarely with tooth-like processions, very rarely this part of the keels not developed; both starting near or at the base of the lip and continuing in the central keels of the epichilium. *Epichilium* convex, when flattened broadly ovate to transversely elliptic, 5–8 by 5.5–12 mm; margin strongly recurved and more or less curved up again, entire or somewhat erose; top acute or obtuse, rarely retuse; keels 4(–6), rather broad and swollen, consisting of many elevated narrow cross-ridges or solid with many minute tubercles, to 0.4–1 mm high, rarely branched, ending 3–5 mm from the top of the epichilium. *Column* curved to the front, when flattened spathulate, 13.5–19 by 5–8.5 mm, stalk median in front hairy; hood large, widest in the middle, gradually narrowing to the base, its top margin more or less irregularly dentate, the middle part recurved, obtuse. Anther about semi-elliptic to almost bell-shaped in outline, 2.5–5 by 2.5–4.5 mm; top very broadly rounded. Pollinia 1.8–4 by 0.9–1.3 mm. *Stigma* semi-elliptic, 2–3 by 2–3.5 mm, margin a broad rim; rostellum semi-elliptic, 2.5–4 by 3–5 mm, top broadly rounded, rarely deeply incised laterally. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Kapit, Miri, Limbang), Sabah (Bahagian Pedalaman, Pantai Barat, Sandakan), Kalimantan (Kalimantan Barat, Tengah, Timur), 49 collections (AMES, B, BM, E, G, HBG, K, L, NY, P, SING).

Habitat & Ecology – Epiphytes, (low) on tree trunks and on major branches, in dense to open kerangas and moss forest, sometimes terrestrial or lithophytic on sandstone. Altitude 1150–2350 m. Fl. probably all year long, few records Dec.–Feb. and July–Aug.

Collector's notes – Sepals and petals white or cream-coloured, sometimes tinged pale green. Lip white or cream-coloured, lateral lobes outside in front with an ochrish to brownish blotch, inside brown with white nerves and margin; epichilium in the centre more or less deep (ochrish) yellow, sometimes bordered with brown, with white margin, front end of the keels dark brown to almost black. Column white, in front pale yellow to brownish, anther white to pinkish. Sometimes recorded as fragrant.

Notes – 1. SAN (Chan Chew Lun) 85338 deviates in the smaller flowers and in the keels which are not developed in the front part of the hypochilium.

2. The epithet *hirtella* refers to the hairiness of the leaves, the petioles, and the inflorescence.

8. *Coelogyne judithiae* Taylor – Fig. 8; Plate 1d.

Coelogyne judithiae Taylor, Orchid Rev. (1977) 289, fig. 252, 253. – Type: Jackman s.n. (1968) (holo K).

Roots, rhizome and inflorescence-bearing young shoot not seen. *Pseudobulbs* close together, narrowly ovoid to fusiform, 10–20 cm long, with up to 8 shallow grooves. *Leaves* herbaceous, more or less stiff. Petiole 3–7 cm long. Blade narrowly elliptic, 25–42 by 6–10 cm; top acute to acuminate; main nerves 5–7. *Inflorescence* synanthous with the young leaves, 10–15-flowered. Peduncle almost entirely enclosed in the scales of the young shoot.

Rhachis pendulous, rather zigzag, to 15 cm long; internodes 13–15 mm long. *Floral bracts* obovate, 17–30 by 12–15 mm; top broadly rounded; the lowest 0–2 sterile. *Flowers* widely open, the perianth extending from the top of the bract. Pedicel 15–17 by c. 1 mm; ovary 5–6 by c. 3 mm, rather sparsely hairy. *Median sepal* narrowly elliptic, c. 30 by 10 mm; margin not recurved; top acute; nerves 7, midrib prominent. *Lateral sepals* somewhat asymmetric, narrowly elliptic, c. 27 by 10 mm; top acute; nerves 11, midrib a low rounded keel. *Petals* almost straight, linear, c. 29 by 5 mm; top rounded, irregular; nerves 5–7, midrib prominent. *Lip* 3-lobed, when flattened in outline elliptic, 24–25 mm long. *Hypochilium* rather narrowly attached, not saccate at the base, when flattened in outline elliptic, c. 20 by 17 mm; lateral lobes large, in front projecting, rounded and hardly recurved, erose; keels 4, rarely 5 (the lateral ones only developed in the upper half to one quarter of the hypochilium, sometimes broken up; the median one only sometimes developed and then short), plate-like, with irregular, slightly undulating and swollen margin; the lateral keels starting 0.5–1.5 mm from the base of the hypochilium and there c. 0.5 mm high, gradually lowering and all except the median continuing in the keels on the epichilium. *Epichilium* convex, more or less irregularly semi-orbicular to transversely elliptic, 7–8 by 10–10.5 mm; margin distinctly undulate; top retuse to obtuse and apiculate; keels 4, sometimes branched (midrib without keel), plate-like, as those on the hypochilium, to 0.5 mm high, ending 3–4 mm from the top margin of the epichilium. *Column* curved to the front, when flattened spatulate, c. 21 by 6.5 mm; hood large, widest near the top, gradually narrowing to the base, its top margin deeply incised, distinctly 4–6-lobed, the middle part not recurved. Anther more or less cordate to ovate in outline, c. 3 by 3 mm; top broadly rounded. Pollinia 1.5–2 by 0.7–0.8 mm. *Stigma* semi-elliptic, c. 1.5 by 3 mm; rostellum semi-orbicular, 2 by 3 mm, top broadly rounded. *Fruit* not seen.

Distribution – Malay Peninsula, Perak. Only known from the type.

Habitat & Ecology – Not known.

Collector's notes – Young leaves dull greenish liver-coloured. Flowers white, lip median mustard to ochrish yellow on lower and upper side of the hypochilium and on the upper base of the epichilium; keels on the hypochilium cream-coloured, on the epichilium as the colour blotch; anther mustard to buff. Vanilla smell.

Note – This species is dedicated to the collector of the holotype, Mrs. Judith Jackman, a British amateur orchid grower.

9. *Coelogyne kaliana* Cribb – Fig. 9; Plate 2a.

Coelogyne kaliana Cribb, Kew Bull. 36 (1982) 779, fig. 1. – Type: G. Smith BE 79 (K).

Roots 2–3 mm diam. Rhizome short, rhizome scales soon desintegrating in persistent fibres. Scale part of the inflorescence-bearing young shoot cylindrical, 3–7.5 cm long; scales more or less loosely imbricate, with broad triangular top. *Pseudobulbs* close together, more or less ovoid, 1.5–5.5 cm long, often distinctly 3-ridged, when dried rather finely wrinkled. *Leaves* (sub)coriaceous. Petiole 2–8 cm long. Blade (narrowly) elliptic to (ob)lanceolate, 7–23 by 2–5.5 cm; main nerves 7–9. *Inflorescence* heteranthous, 4–12-flowered. Peduncle almost entirely enclosed in the scales of the young shoot. Rhachis curved, pendulous, more or less zigzag, 8–30 cm long; internodes 17–35 mm long. *Floral bracts* ovate,

obtuse to very broadly acute, 15–30 by 11–22 mm; the basal 0–2 sterile, often larger. *Flowers* widely open, perianth, ovary and part of the pedicel emerging from the bract. Pedicel 15–42 by 1.5–2 mm; ovary 8–20 by 2–3.5 mm, rather sparsely hairy. *Median sepal* narrowly elliptic, 32–50 by 8–17 mm; margin not or slightly recurved; top acute; nerves 7–11, midrib a low, rounded or sharp keel. *Lateral sepals* slightly falcate, narrowly elliptic to lanceolate, 32–49 by 8–14 mm; top acute; nerves 5–9, midrib a rounded to low plate-like keel. *Petals* slightly falcate, narrowly elliptic to lanceolate, 32–49 by (4–)9–13 mm; top acute; nerves 5–9, midrib slightly prominent. *Lip* 3-lobed, when flattened in outline ovate, 26–40 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline almost orbicular to elliptic, 20–25 by 20–25 mm; lateral lobes large, in front broadly rounded and recurved, entire; keels 3, plate-like, at the back 0.5–1 mm high, there the central one lacerated or with small teeth and the lateral ones with a double row of teeth, in the middle lower with a simple or double row of small teeth or warts, to the top lower and broader with low undulating cross ridges or a double row of low irregular warts, all starting near or at the base of the lip and continuing in the keels of the epichilium. *Epichilium* convex, when flattened orbicular or ovate, 8.5–13 by 8–13 mm; margin strongly recurved and curved up again, slightly erose; top acuminate; keels 5–7, rather broad and swollen, consisting of many elevated narrow cross-ridges, to 0.5 mm high, ending 6–7 mm from the top of the epichilium, the median one much shorter, sometimes the lateral ones irregularly branched. *Column* curved to the front, when flattened spatulate, 16.5–21 by 7–10 mm; hood large, widest in the middle, gradually narrowing to the base, its top margin irregularly dentate, the middle part recurved, sometimes retuse. Anther unequal rhomboid to almost triangular in outline, 4–5.3 by 3–5 mm; top very broadly rounded, tip sometimes retuse. Pollinia 3–3.5 by 1–1.5 mm. *Stigma* semi-elliptic, 2–3.5 by 2.5–3 mm; rostellum semi-orbicular, 3–5 by 4.5–5 mm, top broadly rounded. *Fruit* not seen.

Distribution – Malay Peninsula: Selangor, Pahang, Perak, 9 collections (E, K, KLU, L, SING).

Habitat & Ecology – Epiphytes on shrubs, tree trunks and big branches in montane forest, sometimes terrestrial in moss. Altitude 1650–2000 m. Fl. April–Aug.

Collector's notes – Flowers white; lateral lobes of lip inside brown with white nerves and margin, outside with a small brown spot on junction of lateral lobes and epichilium, median part of hypochilium deep yellow with 4 longitudinal brown lines, keels white or yellow; epichilium base and centre deep yellow bordered with brown, margin and top white, keels more or less light yellow. Fragrance and unpleasant smell (*Castanea sativa* flowers) each once recorded.

Note – The epithet *kaliana* refers to the type locality Ulu Kali.

10. *Coelogyne latiloba* de Vogel, *spec. nov.* – Fig. 10.

Inflorescentia 2- vel 3-flora, hypochilium epichilio plus quam 3-plo longius, hypochilii carinae 2 (interdum carina tertia brevior gaudens) satis crasse laminiformes irregulariter vadose ad satis profunde incisae edentatae, epichilii carinae 2 (vel 3 vel 4?) satis latae tumidaeque e cristis pluribus elevatis angustis transversis constantes. – Typus: Collette A 38 (BM).

Roots 1–1.5 mm diam. Rhizome short; rhizome scales soon dry but long persistent. Scale part of the inflorescence-bearing shoot c. 3.5 cm long; scales rather loosely imbricate, with

broad triangular top. *Pseudobulbs* close together, ovoid, to 4.5 cm long, shallowly grooved, when dried smooth with coarse sharp longitudinal folds. *Leaves* hard coriaceous. Petiole 1.5–7.5 cm long. Blade lanceolate, 15.5–32 by 2.3–4.2 cm; main nerves 3–5. *Inflorescence* heteranthous, 2–3-flowered. Peduncle sturdy, short, erect, extending c. 2.5 cm beyond the scales of the young shoot. Rhachis suberect, zigzag, 2–6.5 cm long; internodes 6–30 mm long. *Floral bracts* ovate, 17–18 by 10–11 mm; top acute; the lowest 1 sterile. *Flowers* widely open, the perianth laterally extending from the top of the bract. Pedicel c. 4 by 1.5 mm; ovary c. 5 by 2 mm, rather sparsely hairy. *Median sepal* narrowly elliptic, c. 25 by 7 mm; margin not recurved; top acute; nerves 5, midrib a low rounded keel. *Lateral sepals* slightly asymmetric, narrowly elliptic, c. 23 by 7 mm; top acute; nerves 7, midrib a low, thick plate-like keel to 0.8 mm high. *Petals* almost straight, narrowly elliptic, c. 25 by 5 mm; top acute; nerves 5, midrib prominent. *Lip* 3-lobed, when flattened in outline almost orbicular, 17–19 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline about broadly cordate, 15–17 by c. 18 mm; lateral lobes large, high, in front broadly rounded and recurved, entire to somewhat irregular; keels 3, rather thick plate-like, the lateral keels up to 0.5–0.8 mm high but most parts lower, starting near or at the base of the lip but sometimes the basal part not developed, irregularly shallowly to rather deeply incised, often to the epichilium disappearing, median keel only developed in the basal half of the hypochilium, lower than the lateral keels, not or slightly incised. *Epichilium* somewhat convex, transversely elliptic, sometimes with a short broad claw, 4–5 by c. 7 mm; margin more or less undulate, slightly erose; top truncate with broad triangular tip; keels 2 (sometimes a third and possibly a fourth additional keel developed laterally), rather broad and swollen, consisting of many elevated narrow cross-ridges, to 0.3 mm high, ending c. 4 mm from the top margin of the epichilium. *Column* slightly curved to the front, when flattened spatulate, c. 16 by 5.5–6 mm; hood large, widest in the middle, gradually narrowing to the base, its top margin rounded, slightly irregular, the middle part not recurved; stalk median in front hairy. Anther ovate in outline, c. 3 by 2.5 mm; top broadly rounded. Pollinia c. 2.5 by 1.5 mm. *Stigma* semi-orbicular, c. 2 by 3 mm; rostellum semi-orbicular, c. 3 by 4 mm, top broadly rounded. *Fruit* not seen.

Distribution – Borneo: Sabah (Bahagian Pantai Barat). Only known from the type.

Habitat & Ecology – Epiphyte, 1.20 m high on a *Leptospermum* shrub, in light shade. Altitude c. 1700 m. Fl. Sep.

Collector's notes – Flowers pure white, lateral lobes of the lip inside bright brown with white nerves, lip median white, inside the front half rich bright orange-brown except for a narrow white band in front, keels white.

Notes – 1. A few-flowered species, the young infructescence of the type collection had 3 flowers developing in fruits; in cultivation the plant produced 2 flowers. Collenette is probably wrong in her statement about the type specimen that the inflorescence is 5–6-flowered, and that in cultivation the inflorescence was damaged and hence produced only 2 flowers.

2. The epithet *latiloba* refers to the broad lateral lobes of the lip.

11. *Coelogyne longibulbosa* Ames & C. Schweinf. – Fig. 11.

Coelogyne longibulbosa Ames & C. Schweinf., Orch. 6 (1920) 33. – Type: Clemens 79 (holo BM; iso AMES, BO, K).

Roots 1.5–3 mm diam. Rhizome (rather) long creeping, 5–10 mm thick; rhizome scales 4–5 between two pseudobulbs, soon desintegrating. Scale part of the inflorescence-bearing young shoot terete, cylindric or tapering to the top, 4.5–11 cm long; scales tightly imbricate. *Pseudobulbs* 3–7.5 cm apart, very slender cylindric, (5–)11–25 cm long, when dried smooth with coarse sharp longitudinal folds. *Leaves* herbaceous. Petiole 1.3–5.7 cm long. Blade narrowly elliptic, 15.5–35.5 by (1.5–)3–7 cm; top acute; main nerves 3–7. *Inflorescence* synanthous with the just emerging young leaves, rarely proteranthous, 16–25-flowered. Peduncle almost entirely enclosed in the scales of the young shoot, in fruit elongating to 21 cm. Rachis limply pendulous, 10–31 cm long; internodes 9–17 mm long. *Floral bracts* persistent, rarely dropped at anthesis, (ob)ovate, 11–18 by 8–13 mm; top rounded; the lowest 0–2 sterile, often larger. *Flowers* rather widely open, perianth more than half or entirely emerging from the top of the bract. Pedicel 6.5–14 by 0.3–1 mm, ovary 2–5 by 0.7–1.5 mm, rather densely hairy. *Median sepal* narrowly ovate, 12.5–16.5 by 3.5–7.5 mm; top acute, tip acute to rounded; nerves 5–7, midrib prominent or not. *Lateral sepals* narrowly ovate, 12.5–16.5 by 5–7 mm; top acute, tip acute to rounded; nerves 5–7, midrib prominent or a low rounded keel. *Petals* linear-ovate, 11–16.5 by 1.5–3 mm; top narrowly triangular, tip rounded to acute; nerves 3(–4). *Lip* 3-lobed, when flattened in outline (broadly) elliptic, ovate to almost orbicular, 11.5–16 mm long. *Hypochilium* when flattened in outline about cordate, 7–11.5 by 7–15 mm; lateral lobes large, in front projecting, broadly rounded and hardly recurved, entire; keels 2 (sometimes lateral ones on the epichilium descending somewhat on the hypochilium), plate-like, with double, ± entire margin, starting 1–2.5 mm from the base of the lip, there 0.5–1.5 mm high, lowering to the front and continuing in the keels of the epichilium. *Epichilium* ± convex, when flattened about obovate to transversely elliptic, 4.5–10 by 6–10 mm; sessile or with a short claw, base 3–7 mm wide; margin slightly erose or entire, undulate or not; top ± retuse, tip acute or broadly acute; keels 4(–6), simple or double, the central two continued from those on the hypochilium, ending 2–3 mm from the top margin; lateral keels 3–5 mm long, additional keels absent or present, 1–4 mm long. *Column* curved to the front, when flattened broadly spatulate in outline, 9–11 by 4–6 mm; hood widest below the middle, sides distinctly projecting to the front, broadly rounded; top acuminate or quadrangular or truncate, top margin irregular or entire, recurved. Anther cordate in outline, 1.2–2 by 1.2–2 mm; base retuse; top obtuse to acute. Pollinia 0.8–1 by 0.5–0.6 mm. *Stigma* 1.3–2 by 1–1.5 mm; rostellum large, triangular to semi-orbicular, 1.3–1.7 by 1.5–1.7 mm. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Miri, Limbang), Sabah (Bahagian Pedalaman, Pantai Barat), 19 collections (AMES, B, BM, BO, E, G, HBG, K, L, NY, SING).

Habitat & Ecology – Epiphytes on tree trunks (often near the base). Altitude 1000–1900 m. Fl. Sep.–Feb.

Collector's notes – Bracts cream-coloured tinged brownish to dull pinkish. Sepals and petals white to cream-coloured, sometimes tinged green, lip white or cream-coloured with a yellow, ochre to light brown blotch on lateral lobes and epichilium. No smell (one record).

Note – The epithet *longibulbosa* refers to the long slender pseudobulbs.

12. *Coelogyne moultonii* J.J. Smith – Fig. 12; Plate 2b.

Coelogyne moultonii J.J. Smith, Bull. Jard. Bot. Buit. II, 3 (1912) 54; Schltr., Orchis 9, 6 (1915) 177; J.J. Smith, Bull. Jard. Bot. Buit. III, Suppl. 2¹ (1930) tab. 13, fig. 4. – Type: Moulton 17 (not seen).

Roots 2–3 mm diam. Rhizome short, rhizome scales soon eroding. Scale part of the inflorescence-bearing young shoot flattened, broad, 12–17 cm long; scales loosely imbricate. *Pseudobulbs* close together, slender cylindrical, 12.5–28 cm long, when dried with sharp longitudinal folds. *Leaves* herbaceous. Petiole (5–)6–11 cm long. Blade linear to very narrowly elliptic, 34–52 by 5–9.5 cm; main nerves 7–9. *Inflorescence* synanthous with the two just emerged to halfway developed young leaves, 24–52-flowered. Peduncle almost entirely enclosed in the scales of the young shoot. Rachis limply pendulous, straight or very slightly zigzag, 30–55 cm long; internodes 6–15 mm long. *Floral bracts* ovate to broadly ovate, 22–33 by (13–)16–25 mm; top broadly rounded; the lowest 1–4 sterile. *Flowers* not fully opening, enclosed and almost or entirely overtopped by the bract from which the perianth exerts below. Pedicel 4–6 by 1.7 mm; ovary 4–5 by 1–1.5 mm, rather densely hairy. *Median sepal* narrowly ovate, 14.5–18 by 3.5–6.5 mm; top acute; nerves 7, the midrib prominent. *Lateral sepals* narrowly ovate, 14.5–18 by 3.5–6.5 mm; top acute; nerves 7, the midrib prominent or a low rounded keel. *Petals* linear, 13.5–17 by 1.5–3 mm; top acute; nerves 3. *Lip* 3-lobed, when flattened in outline elliptic, 13–16.5 mm long. *Hypochilium* shallowly saccate at the base, when flattened in outline broadly obovate, 8–12 by 6–12 mm; lateral lobes large, in front rather to very broadly rounded and not recurved, often erose and undulate; keels 4 (the lateral ones often near the base of the lip not developed, rarely also a short median one developed), plate-like, double or (entirely or partly) simple, 0.5–1 mm high, with irregular or deeper incised margin, to the epichilium lower, the median ones starting 2–3 mm from the lip base and there 0.5–1 mm high, all continuing in the keels on the epichilium. *Epichilium* more or less convex, broadly attached over 4–8 mm, transversely semi-elliptic to broadly obovate, 4–5.5 by 4–8 mm; the margin irregular; the top truncate to retuse, tip broadly acute; keels 4–6, plate-like, with simple, irregular or more or less deeply incised margin, additional lateral ones absent or short, the central ones to more or less halfway the epichilium, the lateral ones shorter. *Column* more or less curved to the front, when flattened broadly spatulate, 9–13 by 4–8 mm; hood widest below the middle, sides distinctly projecting to the front, below rather abruptly narrowed; top irregular, recurved. Anther cordate in outline, 1.3–2 by 1.2–2.5 mm; base retuse; top obtuse. Pollinia 0.7–1 by 0.5–0.7 mm. *Stigma* semi-elliptic, 1–1.5 by 1–1.5 mm; rostellum large, triangular to semi-orbicular, 1.5–2 by 1.5–2.5 mm. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Limbang), Sabah (Bahagian Pantai Barat), 20 collections (AMES, B, BM, BO, E, G, HBG, K, L, NY).

Habitat & Ecology – Epiphytes, often on trunks of trees, sometimes lithophytic on mossy rocks. Altitude 1100–2350 m. Fl. April–June, Sep.–Dec.

Collector's notes – Bracts creamy-yellow to ochrish, sometimes greenish, turning brownish. Flower white to cream-coloured. Lateral lobes of the lip inside and sometimes also outside pale yellowish, ochrish to light brown with white margins, between the keels sometimes with similar coloured lines, epichilium with a large pale yellowish to light brown spot, also over the front of the keels, and white margins. Column whitish, anther with some brown.

Note – This species is dedicated to J.C. Moulton, Curator of the Sarawak Museum (1905–1915), Director of the Raffles Museum and Library (1919–1923), later Chief Secretary of Government in Sarawak. He made several expeditions in West Borneo.

13. *Coelogyne odoardi* Schltr. – Fig. 13.

Coelogyne odoardi Schltr., Notizbl. Bot. Garten Berlin 8 (1921) 14. – Type: Beccari 1678 (FI).

Roots 2–3 mm diam. Rhizome rather short to more or less long creeping, 4–5 mm thick; rhizome scales rather long persistent. Scale part of the inflorescence-bearing young shoot terete, cylindric, 3–6 cm long; scales rather loosely imbricate. *Pseudobulbs* 1.5–3 cm apart, ovoid, 1.5–4.5 cm long, shallowly grooved, when dried smooth with coarse, vague longitudinal or reticulate folds. *Leaves* herbaceous to rather coriaceous. Petiole 0.8–6.5 cm long. Blade elliptic, 5–23.5 by 1.8–3.7 cm; main nerves 3–5. *Inflorescence* synanthous with the just emerging to less than halfway developed young leaves, 3–13-flowered. Peduncle almost entirely enclosed in the scales of the young shoot or up to 7 cm extending. Rhachis curved to pendulous, not or slightly zigzag, 7–17(–28) cm long; internodes 15–22(–30) mm long. *Floral bracts* (ob)ovate, 10–25(–30) by 9–17 mm; top rounded to acute; the lowest 1–2 sterile. *Flowers* rather widely open, perianth, ovary and up to half of the pedicel extending from the bract. Pedicel 23–33 by 1–2 mm; ovary 5–8 by 1.5–3 mm, sparsely to rather densely hairy. *Median sepal* narrowly elliptic, 25–36 by 8–15 mm; top acute; nerves 7–11, midrib prominent or a low rounded keel. *Lateral sepals* narrowly ovate, 25–35 by 7–12 mm; top acute to acuminate; nerves 7–9, midrib a low rounded keel to 0.5 mm high. *Petals* ligulate, 22–35 by 3.5–7 mm; top acute; nerves 5–7, midrib prominent. *Lip* 3-lobed, when flattened in outline elliptic to ovate, 24–33 mm long. *Hypochilium* when flattened in outline elliptic, orbicular or ovate, 20–27 by 18–27 mm; lateral lobes large, in front (rather) broadly rounded and hardly recurved, entire; keels 2 or 3 (the median one absent or developed in the front half to three quarters of the hypochilium only, not continued on the epichilium), low or very low plate-like, the lateral ones starting 1–1.5 mm from the base of the lip, there to 1.5–3 mm high including the one or two rows of long slender tooth-like projections, gradually lowering and from about halfway the hypochilium c. 0.3 mm high, with irregular or (rather) shallowly dentate margin, continuing in the median keels of the epichilium. *Epichilium* convex, when flattened ovate to transversely elliptic, sometimes with a short and broad claw, 7–14 by 9–13 mm; top broadly acute, to emarginate with a broad triangular tip; keels 4 or 6, plate-like, with irregular to irregularly dentate, more or less swollen margin, 0.8–1.5 mm high, ending 2–4 mm from the top margin of the epichilium. *Column* curved to the front, when flattened spatulate, 18–24 by 5–10 mm, sometimes hairy at front and back of the stalk; hood large, widest in the middle, gradually narrowing to the base; top margin almost entire to irregularly dentate, hardly recurved. Anther ovate to bell-shaped, 3.5–4.5 by 3–4 mm. Pollinia 2.5–3 by 1–1.5 mm. *Stigma* semi-elliptic, 2–2.5 by 2.5–3 mm; rostellum semi-orbicular, 2.5–3 by 3.5–4 mm; top broadly rounded, sometimes laterally notched. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Kuching, Samarahan, Miri), Brunei (Temburong), 10 collections (BO, BRUN, FI, K, L, SAR, SING). Probably also Sabah (Bahagian Sandakan, no specimen seen).

Habitat & Ecology – Epiphyte on big branch of canopy tree (once recorded). Altitude (?165–)800–1850 m. Fl. May–July.

Collector's notes – Leaves greyish green. Sepals and petals (brownish) ochre. Lip white, median inside with brown lines, lateral lobes outside in front with a brown band, inside brown with whitish nerves, keels with a brown line and brown lines in between; epichilium

yellow to the top, with brown margin. Column ochre, median at the back yellowish, median in front cream-coloured; anther cream-coloured, with brown margin.

Note – This species is dedicated to Odoardo Beccari (1843–1920), collector of the type specimen. Beccari was an Italian professional biologist who carried out field work in West Borneo, mainly Sarawak, from June 1865 to January 1868, collecting c. 20,000 plant specimens and gathering a huge zoological collection too. The first set of his collections is preserved in Florence. He described his work and travels in the magnificent book 'Nelle foreste di Borneo' (1902, translation: Wanderings in the great forests of Borneo). Later he collected in Abyssinia, Sumatra, Java, Celebes, the Lesser Sunda Islands, the Moluccas, New Guinea (3 visits), Australia, New Zealand, and Tasmania.

14. *Coelogyne pholidotoides* J.J. Smith – Fig. 14; Plate 2c.

Coelogyne pholidotoides J.J. Smith, *Icones Bog.* 2 (1903) 24, t. 106b; Schltr., *Orchis* 9, 6 (1915) 179, fig. 37; Pfitzer & Kränzlin, *Pfl. R.* Heft 32 (1907) 71. – Syntypes: Hallier s.n., Molengraaf s.n., both cultivated in Hort. Bogor, but no indication of the collector on the herbarium labels: Bogor, cult. Hort. 33 (holo L). The following are probably duplicates collected in later years from the same living plants: Bogor, cult. Hort. II M.A.104 (L, G); 41 (K); 43 (SING); 80 (P); 435 (AMES); s.n. (1905) (BO); s.n. (1911) (W); s.n. (W).

Roots 1.5–3 mm diam. Rhizome rather short to more or less long creeping, 6–8 mm thick; rhizome scales rather soon desintegrating. Inflorescence-bearing young shoot terete, cylindric, (4.5–)6–10.5 cm long; scales 9–11, (rather) tightly imbricate. *Pseudobulbs* 1.3–3 cm apart, ovoid, (3–)4–8.5 cm long, shallowly grooved, when dried smooth with coarse sharp longitudinal folds. *Leaves* herbaceous, rather stiff. Petiole 2–5 cm long. Blade elliptic, 14.5–22 by 2.5–4.5 cm; top acute to rounded; main nerves 5. *Inflorescence* synanthous with the almost fully, rarely only just-emerging young leaves, 24–62-flowered. Peduncle erect or curved, extending (5–)8–29 cm beyond the scales of the young shoot, rarely almost entirely enclosed. Rhachis pendulous, about straight or sometimes zigzag, 22–46 cm long; internodes 5–12 mm long. *Floral bracts* ovate to elliptic, 9–12 by 7.5–10 mm; top rounded; sterile ones 3–9, imbricate at the base of the rhachis. *Flowers* rather widely open, perianth and ovary, and sometimes part of the pedicel extending from the bract. Pedicel angular, 8–14 by 0.3–0.7 mm; ovary 2.5–4 by 1–1.5 mm, (rather) densely hairy. *Median sepal* long elliptic to narrowly ovate, 9.5–11.5 by 2.5–4 mm; top acute; nerves 5–7, midrib prominent. *Lateral sepals* (narrowly) ovate, 9.5–12 by 2.5–4 mm; nerves 5–7, midrib prominent or a low keel. *Petals* linear, 8–11.5 by 0.7–1.3 mm; top acute to rounded; nerves 1–3, midrib more or less prominent. *Lip* 3-lobed, when flattened slender pandurate, 9.5–13 mm long. *Hypochilium* when flattened obovate, 6.5–8.5 by 6–8 mm; lateral lobes small, in front more or less rounded and recurved, entire; keels 2 (rarely also the median one developed), entire, low, rounded, starting at the base of the lip up to 2 mm from the base, sometimes to the epichilium disappearing, normally continuing in the median keels of the epichilium. *Epichilium* broadly spatulate, 3.7–5 by 2.7–5 mm; claw broad, 1–2 by 2–3 mm; blade more or less distinctly two-lobed, almost truncate to deeply emarginate, with rounded to acute tip; lobes rounded with entire, undulating margin; keels 4 (but sometimes the lateral ones not developed or the latter with extra lateral warts), low and swollen, ending 1.5–2.5 mm from the top margin of the epichilium, either with undulating top margin or broken into low wart-like projections. *Column* little curved to the

front, when flattened somewhat spatulate, 7.5–9 by 2–4 mm; hood narrow, widest near the top, gradually narrowing to the base; top margin laterally notched, irregularly dentate. Anther broadly cordate in outline, 1.2–2.2 by 2–2.5 mm; top almost truncate to very broadly acute. Pollinia 0.7–1 by 0.4–0.7 mm. *Stigma* semi-elliptic, 1.5–2 by 1–2 mm; rostellum broadly triangular, 1–2 by 1.7–2.2 mm. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Kuching, Bintulu), Sabah (Bahagian Pedalaman), Kalimantan (Kalimantan Barat), 15 collections (AMES, BO, G, K, L, P, SING, W).

Habitat & Ecology – Epiphytes on trunks and branches of trees, sometimes lithophytic on sandstone or rock outcrops and exposed to the sun. Altitude 1000–1500 m. Fl. ?June, Sep.–Oct., Dec.

Collector's notes – Flowers white to cream-coloured, lateral lobes of the lip in front with a (dark) brown spot, epichilium with one or two (light) yellow markings, keels sometimes yellow in the centre with brown edges. Column white, stalk in front sometimes yellow, anther light brown with a white spot, rostellum with a brownish rim. Somewhat scented.

Note – The epithet *pholidotoides* refers to the resemblance of a flowering plant to *Pholidota* species.

15. *Coelogyne radioferens* Ames & C. Schweinf. – Fig. 15; Plate 2d.

Coelogyne radioferens Ames & C. Schweinf., Orch. 6 (1920) 38, pl. 81. — Type: Clemens 200 (holo and iso AMES).

Roots 1.5–3 mm diam. Rhizome rather long creeping, 5–10 mm thick; rhizome scales 5–9 between two pseudobulbs, soon eroding into fibres, tubular and appressed with broad triangular top, 2–5 mm long, overlapping. Scale part of the inflorescence-bearing shoot 9–17 cm long; scales more or less loosely imbricate, with narrow to broad triangular top. *Pseudobulbs* 2–7 cm apart, more or less ovoid, 5–10 cm long, shallowly grooved, when dried smooth with coarse sharp longitudinal folds. *Leaves* herbaceous, more or less stiff. Petiole 6.5–19 cm long. Blade long elliptic, 26–47 by 2.5–7.5 cm; top long acute; main nerves 5–9. *Inflorescence* proteranthous, 6–15-flowered. Peduncle (almost) entirely enclosed in the scales of the young shoot, in fruit much elongating. Rhachis curved at the base, top part pendulous, about straight to more or less zigzag, 9.5–28 cm long; internodes 13–25 mm long. *Floral bracts* about ovate, 25–50 by 12–25 mm; top acute; the lowest 0–2 sterile. *Flowers* widely open, the perianth laterally extending from the top of the bract. Pedicel angular, 11–32 by 1–1.5 mm; ovary 6–11 by 1.5–3 mm, rather sparsely to densely hairy. *Median sepal* (narrowly) elliptic, 32–40 by 8–12 mm; the margins somewhat recurved; top acute; nerves 7–11, midrib a low rounded keel. *Lateral sepals* somewhat asymmetric, (narrowly) elliptic to lanceolate, 32–40 by 7.5–12 mm; top acute; margins somewhat recurved; nerves 7–11, the midrib a low rounded keel. *Petals* almost straight, narrowly elliptic to linear, 32–40 by 3.5–6.5 mm; top acute to rounded; nerves 5–7, the midrib a prominent or low rounded keel. *Lip* 3-lobed, when flattened in outline elliptic, 28–37 mm long. *Hypochilium* rather broadly attached, somewhat saccate at the base, when flattened in outline broadly elliptic, 22–28 by 20–28 mm; lateral lobes large, in front broadly rounded and more or less recurved, slightly erose; keels 2, plate-like, starting at the base of the lip (there rarely with 1–2 short additional keels), there swollen and with slender tooth- or hair-like processions, to 1.5 mm high, the middle half c. 1 mm high,

more or less deeply lacerate to dentate, front part with low cross-ridges or dentate, rarely almost entire, both continuing up to the mass of papillae on the epichilium. *Epichilium* convex, when flattened butterfly-shaped to transversely elliptic in outline, sometimes with a broad short claw, 8–13 by 10–17 mm; margin erose, recurved; top more or less deeply emarginate to retuse, with broadly acute tip; median at the base a mass of low, rounded, separate papillae 0.5–1.3 mm high which laterally continues into radiating rows of papillae and/or low elongated warts, at the base often with additional keels with cross-ridges. *Column* curved to the front, when flattened spatulate, 16–18 by 6–9.5 mm; hood large, widest in the middle, gradually narrowing to the base, its top margin more or less truncate, laterally notched, irregularly dentate, the middle part hardly recurved. Anther elliptic to orbicular or bell-shaped in outline, 4–4.5 by 3–3.5 mm; top truncate to very broadly rounded; median often with a swollen crest. Pollinia 2–2.5 by 0.7–1 mm. *Stigma* semi-elliptic, 2–2.5 by 2–2.5 mm; rostellum semi-orbicular, 3–4 by 3–5 mm, top broadly rounded. Fruit body slender ellipsoid, 4.3–5 by 1.5–2 cm; jugae flat, band-like, valvae with a median keel.

Distribution – Borneo: Sarawak (Bahagian Miri), Sabah (Bahagian Pedalaman, Pantai Barat), Kalimantan (Kalimantan Timur), 35 collections (AMES, B, BM, BO, E, K, L, NY, SING).

Habitat & Ecology – Epiphytes on (mossy) trunks and big branches of trees in montane forest, sometimes lithophytic on (mossy) rocks. Altitude 1300–2400(?–3500) m. Fl. all year round.

Collector's notes – Floral bracts bright green. Sepals and petals light to deep ochrish yellow. Lip white or cream-coloured, lateral lobes outside in front with a brown band with often whitish lines, inside light to deep brown with white lines and white margins, median whitish with often brown lines between the keels. Epichilium brown with a white margin and whitish to yellow papillae. Column whitish to ochrish to cream-coloured flushed pale yellow near the apex, streaked brown below.

Note – The epithet *radioferens* refers to the rows of papillae and warts radiating from the central mass of papillae on the epichilium.

16. *Coelogyne reflexa* J.J. Wood & C.L. Chan – Fig. 16; Plate 3a.

Coelogyne reflexa J.J. Wood & C.L. Chan in J.J. Wood, *Lindleyana* 5 (1990) 87. – Type: de Vogel 8666 (holo L; iso K).

Roots 1–2.5 mm diam. Rhizome short to rather long creeping, 4–9 mm thick; rhizome scales c. 5 between the pseudobulbs, overlapping, soon desintegrating. Scale part of the inflorescence-bearing young shoot long conical, terete, 3.5–6 cm long; scales tightly imbricate, but sometimes the pseudobulb already partly developed and then rather spread. *Pseudobulbs* 0.5–2 cm apart, ovate, 2.5–5.5 cm long, when dried smooth with coarse sharp longitudinal folds. *Leaves* (sub)coriaceous. Petiole 2–5 cm long. Blade (long) elliptic, 5.5–14 by 1.6–3.5 cm; top acute, the tip sometimes rounded; the main nerves 5–7. *Inflorescence* synanthous with the halfway to entirely developed leaves, (14–)20–36 flowered. Peduncle erect, curved, (2–)5–12 cm long. Rhachis pendulous, 13–25 cm long, more or less zigzag, rather densely hairy; internodes 6–10 mm long. *Floral bracts* often reflexed, ovate to almost orbicular, 8.5–13 by 8–10 mm; top rounded to broadly

acute; the lowest 3–4 sterile, often larger. *Flowers* reflexed, (rather) widely open, perianth free from the bract. Pedicel 8–9 by 0.4–0.7 mm; ovary 2.5–3 by 0.8–1 mm. *Median sepal* ligulate, 9–11 by 2–3 mm; top acute; nerves 3–5, midrib prominent. *Lateral sepals* ligulate, 9–10.5 by 2.8–3.5 mm; top acute; nerves 3–5, midrib a low, more or less sharp keel. *Petals* linear, strap-shaped, 8.5–10 by 0.8–1 mm; top acute; nerves 3, the midrib prominent. *Lip* 3-lobed, when flattened in outline about long elliptic, 9–10.5 mm long. *Hypochilium* when flattened in outline about elliptic, c. 5 by 3.8–4.2 mm; lateral lobes in front rounded and recurved, entire; keels 4, only developed on the junction of epichilium and hypochilium, short, more or less high, simple, with entire margin, rounded, sometimes 2 continuing as a low rounded keel further down on the hypochilium. *Epichilium* reflexed and strongly recurved, when flattened ligulate, c. 5 by 2–2.8 mm; top acute; margin entire, straight. *Column* curved to the front, when flattened spatulate in outline, 8–9 by 2.8–4 mm; hood widest below the middle, sides projecting to the front, laterally notched, below abruptly narrowed; top broadly rounded with more or less irregular margin. Anther (broadly) cordate in outline, 1–1.5 by 1.5–2 mm; base retuse; top broadly rounded to acute with notched tip. Pollinia 0.8–1 by 0.6–0.7 mm. *Stigma* more or less semi-orbicular, c. 1 by 1.2–2 mm; rostellum large, semi-orbicular, c. 1 by 1.2–2 mm. *Fruit* body obovoid, c. 3 by 1 cm; valvae keeled, keels disappearing in the top 2 mm; jugae band-like, not keeled.

Distribution – Borneo: Sabah (Bahagian Pedalaman, Pantai Barat), 6 collections: Beaman 9047 (L, drawing MSU); Clemens 31455 (BM); Collenette 629 (K); SF (Carr 3566) 27860 p.p. (SING); Vermeulen & Duistermaat 1014 (L); de Vogel 8666 (L).

Habitat & Ecology – Epiphytes on trunks and major branches of trees, in low, dense to open (mossy) montane forest. Altitude 1450–2000 m. Fl. Feb.–March, Oct., Dec.

Collector's notes – Flowers deep cream-coloured, greenish yellow or creamy-green, lip similarly coloured or whitish with a (light citron-) yellow blotch on the epichilium. Pseudobulbs olive green or tinged brownish to reddish. Leaves light to dark green above, paler below. Bracts pale green to ochrish, tinged brownish to reddish. No scent.

Note – The epithet *reflexa* refers to the strongly reflexed epichilium of the lip.

17. *Coelogyne rhabdombulbon* Schltr. – Fig. 17; Plate 3b; Cover plate.

Coelogyne rhabdombulbon Schltr., Notizbl. Bot. Garten Berlin 8 (1921) 15. – Type: Beccari 1868 (the duplicate in B, probably lost, not the specimens Beccari 1342, 1868 and 2045 in FI which belong to *C. echinolabium*); lecto: the drawing by Carr (K). See note.

Coelogyne pulverula auct. non Teijsm. & Binnend.: Lamb & Chan in Luping, Kinabalu, Summit of Borneo (1978) 238, pl. 28.

Roots 1–3.5 mm diam. Rhizome short; rhizome scales soon eroding. Scale part of the inflorescence-bearing shoot 5–14 cm long; scales rather loosely imbricate, with broad triangular top. *Pseudobulbs* close together, slender spindle-shaped to long cylindrical, 7–28 cm long, with few shallow grooves, when dried with rather coarse sharp longitudinal folds. *Leaves* herbaceous. Petiole 2.5–17 cm long. Blade (long) obovate to (long) elliptic, 13–49 by 4–14 cm; top acute, tip often slightly acuminate; main nerves 5–9. *Inflorescence* synanthous with the just emerging to somewhat developed young leaves, 10–45-flowered. Peduncle (almost) entirely enclosed in the scales of the young shoot. Rhachis limply pendulous, about straight to slightly zigzag, 16–63 cm long; internodes 7–23 mm long. *Floral bracts* almost orbicular, ovate or elliptic, 16–28 by 15–26 mm; top obtuse to broadly

rounded; the lowest 0–2 sterile, often larger. *Flowers* more or less closed, the perianth and sometimes the ovary extending from the bract. Pedicel 7–17 by 0.8–1.5 mm; ovary 4–7 by 1.5–3 mm, rather sparsely hairy. *Median sepal* narrowly ovate to oblong or elliptic, 22–30 by 6–11 mm; top acute; nerves 7–9, the midrib prominent or a low rounded keel. *Lateral sepals* somewhat asymmetric, narrowly ovate to oblong or elliptic, 22–28 by 7–11.5 mm; top acute; nerves 7–9, midrib a low rounded keel to 0.3 mm high. *Petals* almost straight to somewhat falcate, narrowly lanceolate to linear, 22–28 by 2–5 mm; top acute; nerves 5–7, midrib more or less prominent. *Lip* 3-lobed, when flattened in outline elliptic, 22–26 mm long. *Hypochilium* rather broadly attached, somewhat saccate at the base, when flattened in outline broadly elliptic to almost orbicular, 18–22 by 16.5–23 mm; lateral lobes large, in front rounded and not recurved, entire or erose; keels 4 (the lateral ones only developed in the upper half to one quarter of the hypochilium, sometimes only partly developed), plate-like, with entire to more or less irregular, simple or double margin, starting near the base of the lip and there 0.5–1.3 mm high, gradually lowering and all continuing in the keels of the epichilium. *Epichilium* somewhat concave, more or less irregularly orbicular to transversely elliptic, 8–10 by 8.5–12 mm; margin curved upwards, more or less undulate, erose; top more or less deeply retuse to truncate, rarely acute, tip usually projecting, acute; keels (4–)6–8 (the lateral ones sometimes short, midrib without keel), plate-like, with irregular undulating and irregularly incised margin, sometimes double or with teeth, in front highest, 0.5–1.5 mm high, irregular in length, ending 2–5 mm from the front margin of the epichilium. *Column* curved to the front, when flattened spatulate, 18–23.5 by 4.5–7.5 mm; hood large, widest below the top, gradually narrowing to the base, its top margin more or less shallowly laterally notched and there sometimes the nerves ending in a mucro, irregularly dentate, the middle part often more or less deeply retuse to truncate, recurved. Anther more or less broadly bell-shaped to almost orbicular in outline, 2.5–4 by 2.5–4 mm; top truncate to broadly rounded, tip sometimes notched. Pollinia 1.5–2 by 0.8–1.2 mm. *Stigma* semi-elliptic, 2–2.5 by 1.5–2.5 mm, margin a high rim; rostellum semi-orbicular, laterally more or less indented, 2–3.5 by 2–4 mm, top broadly rounded. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Kapit, Miri, Limbang), Sabah (Bahagian Pedalaman, Pantai Barat), 18 collections (AMES, E, K, L).

Habitat & Ecology – Epiphytes on (base of) trunks of forest trees in montane forest, sometimes lithophytic on rocks. Altitude 900–2000(–4000?) m. Fl. Feb., May–June, Sep.–Oct.

Collector's notes – Flowers white or cream-coloured, sometimes tinged pale violet or pink, lip median up to the end of the keels with a broad yellow to ochrish band or longitudinal lines, sometimes the lateral lobes with a similar line. Fragrant ('rich chocolate smell'), sometimes recorded to have an unpleasant smell. Bracts pinkish, (pale reddish) brown or (pale) greenish flushed tan. Young leaves brownish liver coloured.

Notes – 1. See note 1 under *C. echinolabium* for a discussion about the confusion concerning the type collections of that species and *C. rhabdombulbon*.

2. The epithet *rhabdombulbon* refers to the slender cylindrical, stick-like pseudobulbs.

18. *Coelogyne rochussenii* de Vriese – Fig. 18; Plate 3c.

Coelogyne rochussenii de Vriese, Ill. Orch. Livr. 1 (1854) pl. 2; Livr. 2 (1854) pl. 11, fig. 6; J.J. Smith, Orch. Java (1905) 144; Reichb. f., Xenia Orch. 1 (1856) 212, t. 85; Pfitzer & Kränzlin, Pfl. R. Heft 32

(1907) 70, fig. 22e, 23; Ridley, Mat. Fl. Mal. Pen. 1 (1907) 128; J.J. Smith, Orch. Java, Fig.-Atl. (1909) fig. 107; Schltr., Orchis 9, 6 (1915) 170, fig. 31; Ridley, Fl. Mal. Pen. 4 (1924) 131; J.J. Smith, Fedde, Rep. 32 (1933) 167; Holttum, Orch. Malaya ed. 3 (1964) 257, fig. 54; Seidenf., Dansk Bot. Arkiv 29, 4 (1975) 63, fig. 25; Backer & Bakh. f., Fl. Java 3 (1968) 282. – *Pleione rochussenii* (de Vriese) Kuntze, Rev. Gen. Pl. 2 (1891) 680. – Type: Bogor, cult. Hort. from G. Salak, Java (not seen, probably not collected; lecto: the plate in De Vriese, Ill. Orch. Livr. 2 (1854) pl. 11, fig. 6).

Coelogyne plantaginea Lindley, Gard. Chron. (1855) 20. – *Pleione plantaginea* (Lindley) Kuntze, Rev. Gen. Pl. 2 (1891) 680. – *Coelogyne rochussenii* de Vriese var. *plantaginea* (Lindley) Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 70. – Type: Bishop of Winchester s.n. (K, not seen, probably lost).

Chelonanthera convallariifolia Blume, nom. nud. – *Coelogyne convallariifolia* (Blume) Zörnig, Bot. Jahrb. 33 (1904) 2551. – *Coelogyne rochussenii* de Vriese var. *convallariifolia* (Blume) Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 70. – Type: Blume 2234 (holo L; iso AMES, P).

Coelogyne macrobulbon Hook. f., Fl. Brit. India 5 (1890) 830. – *Pleione macrobulbon* (Hook. f.) Kuntze, Rev. Gen. Pl. 2 (1891) 680. – Syntypes: Wallich s.n. (Penang, not seen), King's collector s.n. (11-1884) (K), Scortechini s.n. (16-1-1888) (K).

Coelogyne stellaris Reichb. f., Gard. Chron. ser. 2, 26 (1886) 8; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 55 – Syntypes: O'Brien s.n., not seen, probably not collected (lecto: the coloured plate, W); Lobb s.n. (one flower, W) (syn. nov.).

Coelogyne steffensii Schltr., Fedde, Rep. 21 (1925) 130. – Type: Konsul Steffens' Sammler s.n. (B, not seen, probably lost) (syn. nov.). See note 1.

Roots 1–3 mm diam. Rhizome rather long creeping, 4–8 mm thick; rhizome scales 5–9 between two pseudobulbs, tubular and appressed to the rhizome, those at the base overlapping, soon desintegrating, with broad triangular top. Scale part of the inflorescence-bearing shoot 2–4 cm long; scales rather loosely imbricate. *Pseudobulbs* 2–6 cm apart, spindle-shaped, (4–)6–18(–23) cm long, shallowly grooved, when dried with many small to coarse, sharp, longitudinal folds. *Leaves* herbaceous. Petiole 1–9 cm long. Blade broadly obovate, sometimes elliptic, (8.5–)10–32 by (3.5–)5–12.5 cm; top shortly acuminate; main nerves (5–)7. *Inflorescence* heteranthous, (5–)10–30(–38)-flowered. Peduncle entirely enclosed in the scales of the young shoot. Rhachis curved at the base, pendulous, not or somewhat zigzag, (11.5–)15–58 cm long; internodes 12–30 mm long. *Floral bracts* ± ovate, 13–33 by 8.5–19 mm; top acute; the lowest 0–4 sterile. *Flowers* widely open, the perianth and usually also the ovary extending from the bract. Pedicel 6–22 by 0.5–1.3 mm; ovary 4–7 by 1.5–2.5 mm, rather sparsely hairy (scaly) to almost glabrous. *Median sepal* narrowly elliptic, 20–32 by 4–8 mm; margin hardly recurved; top acute; nerves 5–9, midrib prominent or a low rounded keel. *Lateral sepals* somewhat asymmetric, narrowly ovate, 18–31 by 3.5–7 mm; top acute; nerves 5–9, midrib a low, rounded, to 0.4 mm high keel. Petals narrowly elliptic, 18–31 by 1.8–5 mm; top acute; nerves 3–7, midrib not or hardly prominent. *Lip* 3-lobed, when flattened in outline long elliptic, 18–27 mm long. *Hypochilium* narrowly attached, slightly saccate at the base, when flattened in outline elliptic, 13–19 by 7.5–17 mm; lateral lobes relatively low, in front broadly rounded, somewhat recurved, erose in front; keels 3, plate-like, gradually lowering to the front, with simple or double, fimbriate margin, the lateral keels starting at the back of the lip and there 1.3–1.8 mm high, continuing in the keels of the epichilium, median keel starting 1–2.5 mm from the back of the lip, either or not reaching the base of the epichilium. *Epichilium* more or less convex, more or less slender ovate, sessile or with a short broad claw, 8–14 by 5–9 mm; margin erose or irregular, recurved and curved upwards; top (rather) long acuminate to long acute;

keels 4(–6), plate-like, with fimbriate margin, 1.2–1.8 mm high, ending 4–7 mm from the top margin of the epichilium. *Column* curved to the front, when flattened spathulate, 12–18 by 4.5–6 mm; hood rather pronounced, widest in the middle, gradually narrowing to the base, its top margin truncate to retuse, irregular or with small teeth, either or not laterally notched, the middle part not or slightly recurved. Anther in outline almost orbicular to bell-shaped, 2.2–3 by 2–2.8 mm; top consisting of a lobe separated from the main body, triangular to strap-shaped and more or less tapering to the top, 0.3–1 by 1–1.2 mm, with retuse tip; margin fimbriate. Pollinia 1–1.6 by 0.7–1 mm. *Stigma* semi-orbicular to semi-elliptic, 1–2 by 1.3–2.5 mm; rostellum semi-elliptic, 1.5–2 by 2.2–3 mm, the top broadly rounded. *Fruit body* ellipsoid, 3.5–5.5 by 1.5–2.5 mm; valvae very distinctly keeled, keels plate-like, 3–5 mm high; jugae band-like, with a low plate-like keel c. 1 mm high.

Distribution – Thailand (Peninsula), 3 collections (BKF, C, L). Malay Peninsula (P. Pinang, Perak, Pahang, Selangor, Negeri Sembilan, Malacca, Johore), 23 collections (BO, K, KLU, SING). Singapore, 4 collections (K, E, SING). Sumatra [Aceh, Sumatera Utara, Mentawai Isl. (Nias, Siberut), Sumatera Barat, Riau, Riau Arch., Jambi, Bengkulu, Sumatera Selatan, Bangka, Belitung, Lampung], 29 collections (AMES, BM, BO, C, K, L, SING). Java (Jawa Barat, Tengah), 9 collections (BO, K, L, W). Borneo: Sarawak (Bahagian Kuching, Kapit, Miri), Sabah (Bahagian Pedalaman, Labuan Isl., Pantai Barat, Sandakan, Tawau), Kalimantan (Kalimantan Barat, Tengah, Selatan and Timur), 37 collections (AMES, BM, BO, K, L, SING, W). Philippines (Luzon, Palawan, Banga Isl. near Mindanao), 3 collections (AMES, K, L). Celebes (Sulawesi Utara, Tengah), 2 collections (BO, L). Moluccas (Sula Arch., Sulabesi), 1 collection (BO). Cultivated, origin not known, 17 collections (AMES, BO, E, K, L, P, SING, W).

Habitat & Ecology – Epiphytes in primary dryland forest, sometimes in peat swamp and fresh water forest, often near streams, on major branches and (the base of) tree trunks, sometimes lithophytic on (steep sandstone) rocks, often near the base. Fl. probably all year round, most records in Oct.–Feb., none in April and June. Altitude 0–1500 m.

Collector's notes – Bracts pale (yellowish) green, soon dry and brownish. Sepals and petals pale to bright (citron) yellow, yellowish green to light green, rarely recorded as whitish. Lip whitish, rarely flesh-coloured, lateral lobes inside light to darker brown with whitish nerves and margin, outside with vague brown lines, in front with a brown band, median white and there sometimes with yellow; epichilium white, often at the base with a yellow spot, keels white or yellow, often in front brown. Column white, sometimes stalk in front yellow or brownish or with a brown line on the wings or two brown spots at the top. Anther pale ochre to flesh-coloured, sometimes with a darker margin. Faint to strong sweet fragrance several times recorded.

Anatomy – See Zörnig, Bot. Jahrb. 33 (1904) 678 (as *C. convallariifolia*).

Notes – 1. The holotype of *C. steffensii* is probably lost; its description fits *C. rochussenii* (which is the only species of section *Tomentosae* in Celebes) very well. Schlechter pointed to the close relationship with *C. rochussenii*, but distinguished it from this because of the broader lip (13 mm when flattened) and the different column. However, the lip width is not exceptional, and the description of the column does not give discriminating characters. Since the epichilium is described as ovate and long acuminate with denticulate margin there is hardly any doubt that it is conspecific with *C. rochussenii*.

2. This species is dedicated to J.J. Rochussen, appointed Minister of the Colonies in 1858. In his earlier position as Governor-General of the Dutch East Indies he encouraged the scientific investigations of Teijsmann and Binnendijk, and appointed J. van Aken as Iconographer at 's Lands Plantentuin Buitenzorg, who made the watercolours of the book in which *C. rochussenii* was published.

19. *Coelogyne rupicola* Carr – Fig. 19; Plate 3d.

Coelogyne rupicola Carr, Gard. Bull. Str. Seutl. 8 (1935) 210. – Type: Carr (SF 27793) 3552 (SING), not seen.

Roots 2–3 mm diam. Rhizome more or less short creeping, to 10–12 mm thick; rhizome scales soon desintegrating. Scale part of the inflorescence-bearing shoot 7–15 cm long; scales (rather) loosely imbricate, with (broad) triangular top. *Pseudobulbs* rather close together to 3 cm apart, (ovoid to) slender fusiform, (4.5–)8–16.5 cm long, grooved, when dried smooth with coarse sharp longitudinal folds. *Leaves* herbaceous to hard coriaceous. Petiole 4–14.5 cm long. Blade (narrowly) obovate to (slender) elliptic, 12–29 by 1.5–4.5 cm; top acute; main nerves 3–9. *Inflorescence* synanthous with the almost entirely developed young leaves, 5–19-flowered. Peduncle wiry to sturdy, erect or curved, extending 5.5–28.5 cm beyond the scales of the young shoot. Rhachis suberect to curved with top pendulous, zigzag, 6.5–22.5 cm long; internodes 13–22 mm long, the basal ones sometimes much shorter. *Floral bracts* ovate, 19–35 by 13–20 mm; top acute; the lowest 1–3 sterile. *Flowers* widely open, the perianth, ovary and the top part of the pedicel extending from the bract or sometimes only the perianth laterally extending from the top of the bract. Pedicel angular, 5–33 by c. 1 mm; ovary 6–10 by c. 2 mm, rather sparsely to rather densely hairy. *Median sepal* narrowly elliptic, 22–34 by 6.5–10 mm; margin sometimes recurved; top acute; nerves 5–11, midrib prominent or a low rounded keel. *Lateral sepals* slightly asymmetric, narrowly elliptic to long ovate, 22–34 by 7–10 mm; top acute; nerves 7–11, midrib a low rounded keel to 0.3 mm high. *Petals* almost straight, narrowly elliptic to obovate, 22–34 by 4.5–7 mm; top acute; nerves 5–9, midrib prominent, lateral nerves branched. *Lip* 3-lobed, when flattened in outline elliptic, 21–29 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline elliptic, 15.5–20 by 12–16 mm; lateral lobes rather large, relatively low, in front more or less rounded and not or slightly recurved, entire to somewhat erose; keels 2, low plate-like, with distinctly swollen, laterally widened and smooth to minutely warty margin which is sometimes double, 0.5–1 mm high, starting near or at the base of the lip and there for 2.5–5 mm much lower with entire margin, sometimes each at the very base with a swollen, double projection with more or less deeply incised margin, all continuing in the keels of the epichilium. *Epichilium* somewhat convex, almost quadrangular to ovate or transversely elliptic, sometimes with a short broad claw, 5–11 by 6.5–8 mm; margin more or less undulate, erose; top acute to truncate with broad triangular tip; keels 2, 4 or 5, the lateral ones plate-like with more or less swollen, minutely warty to shallowly incised to dentate margin, 0.4–1.2 mm high, irregular in length, ending 2–5 mm from the top margin of the epichilium; the median keel absent or very low with entire margin, sometimes extending on the hypochilium. *Column* curved to the front, when flattened spatulate, 17–21 by 6–8 mm; hood large, widest in the middle, gradually narrowing to the base, its top margin truncate to rounded, irregular or shallowly dentate, the middle part hardly recurved. Anther ovate to

almost orbicular or bell-shaped in outline, 3–4 by 2.7–3 mm; top truncate to very broadly rounded, tip sometimes retuse. Pollinia 1.5–2 by 0.8–1.2 mm. *Stigma* semi-elliptic, 2–3 by 1.5–2 mm; rostellum semi-orbicular, 2.5–3 by 2.5–3.5 mm, top broadly rounded, laterally sometimes widened. Fruit body long ellipsoid, 22–26 by 8–10 mm; valvae keeled, distinctly so at the base of the fruit, keels lowering and widening to the top; jugae band-like, median ridge vague to absent.

Distribution – Borneo: Sabah (Bahagian Pantai Barat), 11 collections (AMES, B, BM, K, L, P, SING).

Habitat & Ecology – Epiphytes, often on the base of mossy shrubs, and terrestrial or lithophytic on rocks, sometimes in very damp places, in deep shade to rather exposed. Altitude 1400–3500 m. Fl. April, June, Aug., Sep., Dec.

Collector's notes – Flowers white, sometimes tinged green. Lip median on the hypochilium and base and centre of the epichilium including the keels rather deep yolk-yellow to ochrish, keels to the base sometimes white. Column white, stalk sometimes salmon-coloured, stigma sometimes pink to orange-red, anther sometimes brown. Sweet scented.

Notes – 1. The isotype in P is deviating in the 3-flowered inflorescence and in the lateral lobes of the hypochilium which are very low and in front hardly developed, and there rather gradually passing in the margins of the epichilium. All other characters fit the description.

2. The epithet *rupicola* refers to the lithophytic stand of the type collection.

20. *Coelogyne swaniana* Rolfe – Fig. 20; Plate 4a.

Coelogyne swaniana Rolfe, Kew Bull. (1894) 183; Hook. f., Bot. Mag. 124 (1898) t. 7602, fig.; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 68, fig. 22c, d; Schltr., Orchis 9, 6 (1915) 171, fig. 32; J.J. Smith, Fedde, Rep. 32 (1933) 170; Backer & Bakh. f., Fl. Java 3 (1968) 283. – Type: Sander, cult. s.n. (IV-1894), probably wrongly recorded from the Philippines (K).

Coelogyne quadrangularis Ridley, J. Linn. Soc. Bot. 32 (1896) 323; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 72. – Type: Ridley s.n. (7-1893) (SING).

Roots 1.5–3 mm diam. Rhizome (rather) long creeping, 4–9 mm thick; rhizome scales 6–9 between two pseudobulbs, rather soon desintegrating, tubular and appressed to the rhizome, with broad triangular top, 8–30 mm long, somewhat overlapping. Scales covering the pseudobulb persistent till after flowering, 3.5–12.5 cm long with acute top, enclosing the base of the inflorescence. Inflorescence-bearing young shoot hidden between the scales covering the pseudobulb from below which it develops, c. 2 cm long. *Pseudobulbs* (1.5–)2–5 cm apart, rather fat to slender ovoid, 3.5–14.5 cm long, (obscurely to) distinctly 4(–5)-angular, usually with sharp ridges and hollow sides, when dried with many small, sharp, longitudinal folds. *Leaves* herbaceous to subcoriaceous. Petiole (1–)3.5–14 cm long. Blade broadly elliptic to obovate, 7.5–40 by 1.8–10 cm; top acute, tip more or less shortly acuminate; main nerves 3–5(–7). *Inflorescence* heteranthous, emerging from between the scales which cover the new pseudobulb, 5–17-flowered. Peduncle entirely enclosed in the scales covering the pseudobulb. Rhachis curved at the base, pendulous, not or somewhat zigzag, 5–30 cm long; internodes 10–33 mm long. *Floral bracts* ovate to transversely elliptic, 10–22 by 8–22 mm; top broadly acute to rounded; the basal 0–1 sterile. *Flowers* widely open, the perianth and usually also the ovary and part of the pedicel extending from the bract. Pedicel (3–)13–28 by 0.8–1.7 mm; ovary 4–8 by 1.5–3 mm, rather densely

to sparsely hairy. *Median sepal* narrowly elliptic, 25–33 by 5.5–10.5 mm; margin somewhat recurved; top acute; nerves 7–9, midrib prominent, lateral nerves branched. *Lateral sepals* somewhat asymmetric, narrowly ovate, 24–33 by 8–9.5 mm; top acute; nerves 5–7, midrib a low rounded to 0.8 mm high plate-like keel. *Petals* narrowly elliptic, 24–33 by 3.5–7.5 mm; top acute; nerves 5, midrib slightly prominent. *Lip* 3-lobed, when flattened in outline elliptic, 21–29 mm long. *Hypochilium* narrowly attached, not saccate at the base, when flattened in outline broadly obovate to transversely elliptic, 14–23 by 18.5–26 mm; lateral lobes large, in front broadly rounded and not to somewhat recurved, entire; keels 3, the lateral ones 0.5–2 mm from the back of the lip abruptly drawn out in a high, thin, triangular to strap-like, lacerate procession 1.5–3 mm high (rarely on either side of these with a subsidiary, similar procession), the median keel 2–3 mm from the back of the lip drawn out in a high, thin, plate-like, triangular to broadly rounded lacerate procession, all descending into plate-like keels with irregular to slightly dentate margin but sometimes near the base with tooth-like processions, all continuing in the keels of the epichilium; lateral keels 0.3–1 mm high, the median one lower. *Epichilium* convex, ovate to broadly ovate, sometimes with a short broad claw, 5.5–9.5 by 4.7–11.5 mm; margin entire, recurved or curved upwards; top acute; keels 5(–7), plate-like, with somewhat thickened, irregular to slightly dentate margin, 0.5–1.5 mm high, ending 2.5–3 mm from the top margin of the epichilium. *Column* curved to the front, when flattened rather distinctly spatulate, 16–21 by 5–9 mm; hood pronounced, widest in the middle, sometimes near the top, gradually narrowing to the base, its top margin almost entire to irregularly dentate, the middle part not or slightly recurved. Anther narrowly bell-shaped to (ob)ovate, 2.5–4 by 1.5–3.3 mm; top broadly rounded to slightly retuse. Pollinia 1.5–2 by 0.7–1 mm. *Stigma* semi-elliptic, 2–3 by 1.5–3 mm; rostellum semi-orbicular, 2–3 by 2.5–4 mm, top broadly rounded. *Fruit body* ellipsoid, ± triangular in section, to 4.5 by 2 cm; valvae very distinctly keeled; jugae band-like, with a vague longitudinal ridge.

Distribution – Malay Peninsula (Perak), 1 collection (SING). Sumatra (Sumatera Barat, Sumatera Selatan, Mentawai Isl.), 6 collections (BO, K, L). Borneo: Sarawak (Bahagian Kuching, Kapit, Bintulu, Miri), Sabah (Bahagian Pedalaman, Pantai Barat, Sandakan), Kalimantan (Kalimantan Barat, Selatan and Timur), 47 collections (BO, E, K, L, NY, SING). Philippines (probably wrong record, see note 1), 4 cultivated collections including the holotype (K). Cultivated or origin not known, 19 collections (AMES, BM, BO, E, G, K, L, SING).

Habitat & Ecology – Epiphytes in crowns and on major branches of small to big trees in dense to open forest, also often terrestrial, in humus, moss or lithophytic on limestone, sandstone or ultrabasic rock, also invading bare rocky roadsides, sometimes very exposed and then remaining small. Altitude 650–1650(–2000?) m. Fl. probably all year, most in May to Nov. but less in July, no records in Jan.

Collector's notes – Rhachis, ovary and bracts white to pale brownish. Flowers white to cream-coloured. Lip whitish, lateral lobes outside with ochre or brown shimmering through and an ochre to brown band in front, inside ochre to dark brown with white veins and median white with often 2 brownish lines between the keels; epichilium with an ochrish to brown transverse band or blotch, keels brown or white with brown apex. Column white, often with ochrish or brown markings or tinge on the stalk.

Anatomy – See Zörnig, Bot. Jahrb. 33 (1904) 640, fig. 14; Beumée, Trop. Nat. 12 (1923) 88, fig. 3, 4.

Notes – 1. Only few specimens cultivated in Kew up till 1922 are annotated as originating from the Philippines. Probably Sander supplied a wrong origin for the specimen on which Rolfe based *C. swaniana*, to protect his commerce. All records in literature of *C. swaniana* from the Philippines are evidently based on Rolfe's type description.

2. This species is dedicated to Mr. J.M. Swan, a British artist.

21. *Coelogyne testacea* Lindley – Fig. 21; Plate 4b.

Coelogyne testacea Lindley, Bot. Reg. New Ser. 15, Misc. (1842) 38; Bot. Mag. 80 (1854) t. 4785, fig.; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 71, fig. 22h; Schltr., Orchis 9, 6 (1915) 174, fig. 34; Holtum, Orch. Malaya ed. 3 (1964) 259. – *Pleione testacea* (Lindley) Kuntze, Rev. Gen. Pl. 2 (1891) 680. – Type: Loddiges s.n. (not seen).

Coelogyne sumatrana J.J. Smith, Bull. Dép. Agric. Ind. Néerl. 15 (1908) 5; Schltr., Orchis 9, 6 (1915) 174, fig. 33; J.J. Smith, Bull. Jard. Bot. Buit. III, Suppl. 2¹ (1930) tab. 13, fig. 3; J.J. Smith, Fedde, Rep. 32 (1933) 170. – Type: Bogor, cult. Hort. (Storm van 's Gravesande) s.n. (1907) (holo BO; iso AMES, L, SING). See note 1.

Roots 2–4 mm diam. Rhizome rather short, rhizome scales soon eroding. Scale part of inflorescence-bearing shoot 2.2–6.5 cm long; scales rather loosely imbricate, with triangular top. *Pseudobulbs* (rather) close together, to 2.5 cm apart, more or less compressed, more or less narrowly ovoid, 4–11 cm long, (shallowly?) grooved, when dried smooth with coarse sharp longitudinal folds. *Leaves* herbaceous. Petiole 2–16.5 cm long. Blade oblanceolate to narrowly elliptic, 10.5–45 by 2.5–6 cm; main nerves 5–7. *Inflorescence* proteranthous or synanthous with the just emerging very young leaves, 6–18-flowered. Peduncle almost entirely enclosed in the scales of the young shoot, rarely projecting considerably. Rhachis pendulous, almost straight to more or less zigzag, 8–26 cm long; internodes 10–25 mm long, the basal ones sometimes only 5 mm long. *Floral bracts* almost orbicular to (ob)ovate, 11–25 by 9.5–20 mm; top obtuse to acute; the lowest 0–2 sterile. *Flowers* widely open, the perianth and often the ovary and part of the pedicel extending from the bract. Pedicel angular, 8–23 by 1–1.5 mm; ovary 5–7 by 2–2.5 mm, (almost) glabrous to rather sparsely hairy. *Median sepal* long ovate to lanceolate, 21–27 by 6.5–9. *Lateral sepals* somewhat asymmetric, lanceolate, 21–27 by 6.5–9 mm; top acute; nerves 5–9, midrib a low rounded to plate-like keel to 0.3 mm high. *Petals* (ob)lanceolate to narrowly elliptic, 21–26 by 2.5–5.5 mm; top rounded to acute; nerves 3–5, the midrib slightly prominent. *Lip* 3-lobed, when flattened in outline elliptic, 17–25 mm long. *Hypochilium* broadly attached, slightly saccate at the base, when flattened in outline elliptic or obovate, 11–18 by 12–23 mm; lateral lobes large, in front rounded and more or less recurved, erose; keels 4, rarely 2 or 5, (the lateral ones sometimes developed from base to top but mostly only in the upper half or one quarter of the hypochilium, rarely entirely absent and developed on the epichilium only, sometimes partly broken up; very rarely a median keel also developed), plate-like, to 1 mm high, its top margin more or less deeply incised into one, sometimes two rows of slender, soft, tooth- or hair-like processions, starting near or at the base of the lip, continuing in the keels of the epichilium. *Epichilium* convex, broadly spatulate, sometimes transversely elliptic, 5–12.5 by 6–15 mm; margin more or less undulate and erose to irregularly dentate; top retuse to broadly acute; keels 4 or 6, low plate-like with many slender, soft, tooth- or hair-like processions to 1 mm high (sometimes additional short keels on other nerves, midrib without keel), ending 1–3 mm from the top

margin of the epichilium. *Column* curved to the front, spatulate, 15–19 by 5–7 mm when flattened; hood widest near the top, gradually narrowing to the base, its top margin irregularly dentate, truncate, sometimes retuse or deeply laterally notched, the middle part not or slightly recurved. Anther (ob)ovate in outline, 2.7–3 by 2–3 mm; top broadly rounded, sometimes retuse. Pollinia 1–2 by 0.5–1 mm. *Stigma* cup-shaped, semi-elliptic, 1.7–2 by 2–3 mm, margin a high rim; rostellum semi-orbicular, 2–2.5 by 2.7–3 mm, top broadly rounded. *Fruit body* c. 5.3 by 2 cm; valvae with a broadly rounded keel, especially to the top; jugae broadly rounded.

Distribution – Malay Peninsula (Kelantan, Pahang, Johor), 12 collections. Singapore, 6 collections. Sumatra (Sumatera Utara, Sumatera Barat, Bengkulu), 19 collections. Borneo, only one locality given: Sabah (Bahagian Pedalaman), 4 collections.

Habitat & Ecology – Epiphytes on trunks and branches of trees, often near the ground, also terrestrial, often growing in large clumps, quite often near the coast or along rivers. Altitude 0–1400 m. Fl. June–July and Oct.–March.

Collector's notes – Flowers dull clay- or flesh-coloured or dull (creamy-)ochrish. Lip similarly coloured or whitish, lateral lobes of the lip in- and outside (dark) brown except the margin, without lighter coloured nerves; epichilium with some brown. Column coloured as the sepals or whitish, in front sometimes with brown. Scent recorded as 'like candle wax', or in general as unpleasant or absent.

Anatomy – See Zörnig, Bot. Jahrb. 33 (1904) 637, fig. 12, 13.

Notes – 1. The holotype of *Coelogyne sumatrana* is the specimen Bogor, cult. Hort. s.n. (1907); it is annotated Padang Pandjang, without indication that it was collected by Storm van 's Gravesande. Five other sheets of plants cultivated in Bogor, collected in 1907 and 1908, probably belong to the same collection; they are isotypes. Since J.J. Smith stated explicitly that the description of *C. sumatrana* was based only on a specimen cultivated in Bogor ('Buitenzorg') it must be concluded that Schlechter 16016 is not a syntype but a paratype.

2. The position of *C. testacea* in section *Tomentosae* is not entirely certain; according to the flower characters it may be closer related to e.g. *C. trinervis* of section *Flaccidae*. A decision has to wait till after revision of that section.

3. The epithet *testacea* refers to the dull ochrish colour of the sepals which resembles that of certain baked pottery or tiles.

22. *Coelogyne tomentosa* Lindley – Fig. 22; Plate 4c.

Coelogyne tomentosa Lindley, Fol. Orch. Coelog. (1854) 3. – *Pleione tomentosa* (Lindley) Kuntze, Rev. Gen. Pl. 2 (1891) 680. – Type: Lobb 187 (K, iso W). See note 1.

Coelogyne massangeana Reichb. f., Gard. Chron. n.s. 10 (1878) 684; Hook. f., Bot. Mag. 114 (1888) t. 6979; J.J. Smith, Orch. Java (1905) 143; Orch. Java, Fig.-Atl. (1909) fig. 106; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 67, fig. 22b; Schltr., Orchis 9, 6 (1915) 168, fig. 29; J.J. Smith, Fedde, Rep. 32 (1933) 165; Holtum, Orch. Malaya ed. 3 (1964) 257; Seidenf., Dansk Bot. Arkiv 29, 4 (1975) 61, fig. 24; Backer & Bakh. f., Fl. Java 3 (1968) 282. – *Pleione massangeana* (Reichb. f.) Kuntze, Rev. Gen. Pl. 2 (1891) 680. – *Coelogyne dayana* Reichb. f. var. *massangeana* (Reichb. f.) Ridley, Mat. Fl. Mal. Pen. 1 (1907) 127. – *Coelogyne tomentosa* Lindley var. *massangeana* (Reichb. f.) Ridley, Fl. Mal. Pen. 4 (1924) 130. – Type: Massange s.n. (W). See note 2.

? *Coelogyne densiflora* Ridley, J. Str. Br. R. As. Soc. 39 (1903) 81; Mat. Fl. Mal. Pen. 1 (1907) 128; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 76; Ridley, Fl. Mal. Pen. 4 (1924) 130. – Type: Kelsall s.n. (1891) (K). See note 3.

Coelogyne cymbidioides auct. non Reichb. f.: Ridley, J. Linn. Soc. Bot. 38 (1908) 329; J. Fed. Mal. St. Mus. 2 (1908) 135. – *Coelogyne tomentosa* Lindley var. *cymbidioides* (Ridley) Ridley, Fl. Mal. Pen. 4 (1924) 130. – Type: Robinson 5465 (BM). See note 4.

Roots 2–5 mm diam. Rhizome short, rhizome scales soon dry, soon eroding. Scale part of the inflorescence-bearing shoot 2.5–4(–5.5) cm long; scales short and broad, rather loosely to rather tightly imbricate, with broad triangular top. *Pseudobulbs* close together, slightly flattened, more or less long ovoid, 4–15 cm long, shallowly grooved, when dried with sharp longitudinal folds. *Leaves* herbaceous. Petiole (2–)6–17 cm long. Blade ovate to long elliptic, 13.5–70 by 2.5–10 cm; top abruptly acuminate, sometimes acute; main nerves 5–7. *Inflorescence* heteranthous, 10–30-flowered. Peduncle entirely enclosed in the scales of the young shoot. Rhachis pendulous, about straight to more or less zigzag, 28–55 cm long; internodes 15–35 mm long. *Floral bracts* (transversely) elliptic, 14–40 by 12–22 mm; top obtuse; the lowest 1–4 sterile. *Flowers* widely open, perianth and usually ovary and part of the pedicel extending from the bract. Pedicel 20–38 by 1–2 mm; ovary 6–10 by 2–3 mm, sparsely to very densely hairy. *Median sepal* (narrowly) elliptic, 23–42 by 7.5–11 mm; margin either or not recurved; top acute; nerves 9–11, midrib hardly prominent. *Lateral sepals* somewhat asymmetric, (narrowly) elliptic, 23–40 by 7–11 mm; top acute; nerves 7–9, midrib a low rounded to thick plate-like keel. *Petals* almost straight, narrowly elliptic to oblanceolate, 24–39 by 4–8 mm; top acute to acuminate; nerves 5–7, midrib more or less prominent. *Lip* 3-lobed, when flattened in outline elliptic, 21–31 mm long. *Hypochilium* rather narrowly attached, not saccate at the base, when flattened in outline elliptic to transversely elliptic, 15–23.5 by 14–23 mm; lateral lobes large, in front broadly rounded and more or less recurved, entire; keels 3, more or less broadly plate-like, starting at the base of the lip and there somewhat swollen and with tooth-like processions, lateral ones to 1–2.5 mm high, gradually to rather abruptly descending to 0.5–1 mm high in the middle part and there with a single or double row of blunt processions, the front part with low cross ridges or blunt processions, all continuing up to the mass of processions or keels on the epichilium. *Epichilium* convex, transversely elliptic to almost orbicular in outline, sometimes about spatulate with a more or less short and broad claw, 5–11 by 5–13.5 mm; margin more or less irregular, recurved; top retuse to obtuse, sometimes acute to triangular, tip pronounced, acute; keels dissolved into a mass of truncate, interconnected, molar-like processions to 1–1.5 mm high, sometimes these processions in the centre separated and keel-like, all ending 2–4 mm from the top margin of the epichilium. *Column* curved to the front, when flattened spatulate, 15–20 by 6–9 mm; hood large, widest in the middle, gradually narrowing to the base, its top margin more or less deeply laterally notched, rarely entire, irregularly dentate, the middle part hardly recurved. Anther about elliptic to bell-shaped in outline, 4–4.5 by 3–3.8 mm; top broadly rounded, sometimes notched. Pollinia 2–2.5 by 0.8–1.3 mm. *Stigma* semi-elliptic, 1.5–2.5 by 1.5–3 mm; rostellum semi-orbicular, 2–3.5 by 3–4 mm, top broadly rounded. *Fruit body* ellipsoid, to 5.5 by 2 cm; valvae distinctly keeled; jugae band-like, without keel.

Distribution – Malay Peninsula (Kedah, Kelantan, Perak, Pahang, Selangor, Malacca), 34 collections (AMES, BM, BO, G, K, L, SING). Java (Jawa Barat), 13 collections (BO, L). Cultivated or origin not known or suspect, 31 collections (AMES, BM, E, G, K, L, S, W). See note 5.

Habitat & Ecology – Montane forest; epiphytic on tree trunks and major branches, litho-phytic on steep limestone cliffs; alt 1500–2100 m. Fl. all year long, mostly in March–Oct.

Collector's notes – Bracts mauve to brown. Sepals and petals (dull) light (greenish) yellow to mauve-yellow (or whitish?). Lip whitish or cream-coloured, keels similar coloured or yellowish, often separated by brown lines; lateral lobes outside in front brown, inside brown with whitish veins; epichilium brown around warts, warts yellow, sometimes brown between, margin whitish. Column whitish with brown in front; anther yellow.

Notes – 1. The short description by Lindley in 1854 of *Coelogyne tomentosa* (holotype Lobb 187) is not very adequate because it does not mention the truncate, molar-like processes on the epichilium. This confused later authors who often interpreted the described 3 serrate keels as if situated on the epichilium; these are in fact on the hypochilium. Lobb 187 has a 'downy ovary' but a sparsely hairy inflorescence. Later authors included specimens under *C. tomentosa* with a densely tomentose inflorescence which belong to another species with plate-like keels on the epichilium, here newly described as *C. velutina*. Lobb 187 is identical with a species which was in 1878 described by Reichenbach f. under the name *C. massangeana*. The rules of priority of older names over younger ones unfortunately leave no other choice than reducing this well-known and widely cultivated species to a synonym of *C. tomentosa*.

2. The Reichenbach herbarium contains one sheet with the type description and sketches of a flower of *Coelogyne massangeana*. Two sheets with only an inflorescence are also present, one annotated as 'comm. Weigel', the other without annotations. This latter specimen is probably the holotype.

3. *Coelogyne densiflora* Ridley is a small-flowered form regarded as synonym of *Coelogyne tomentosa* by Holttum, with short internodes 5–10 mm long and 25–36 flowers per inflorescence. The flowers of the type (Kelsall s.n., 1891) are so badly preserved and damaged by insects that no details could be studied. The flowers are exceptionally small for *C. tomentosa*; no comparable specimens are extant. On authority of Holttum it is here tentatively considered to belong to that species.

4. *Coelogyne cymbidioides* (type Robinson 5464) is a large-flowered form of *C. tomentosa*, it fits entirely in the variation of that species.

5. All specimens studied with reliable localities are from the Malay Peninsula and from West Java. Surprisingly no collections are extant from Sumatra, although some authors state that it occurs there, without citing specimens. The supposed occurrence in Assam, India, is based on few cultivated specimens; these records are unreliable. The record from Thailand is based on Kerr 561, but this belongs to *C. velutina*. The record from Vietnam by Ho & Duong probably represents a *Coelogyne* of a different section, unfortunately no specimens were present for study. The drawing they published is not adequate for recognition but the number of flowers is too small for *C. tomentosa*.

6. The epithet *tomentosa* refers to the tomentose ovary.

23. *Coelogyne velutina* de Vogel, *spec. nov.* – Fig. 23; Plate 4d.

Inflorescentia densissime pubescens pilis (rubro-)brunneis, hypochilii carinae 3 humiliter laminiformes, ad labelli basin laciniis longis interdum ramosis distaliter margine irregulariter dentato, epichilii carinae 3–7 laminiformes, margine irregulari ad dentato. – Typus: van Beusekom & Phengkklai 957 (holo L; iso BKF, C, E, K, P).

? *Coelogyne tomentosa* Lindley var.? *penangensis* Hook. f., Fl. Brit. India 5 (1885) 830. – Type: Maingay s.n. (not seen, possibly Maingay 2238 (1633) in K). See note 1.

Coelogyne tomentosa auct. non Lindley (excl. the type Lobb 187): Veitch, Manual Orch. Pl. 6 (1890) 51, fig.; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 66, fig. 22a; Schltr., Orchis 9, 6 (1915) 166, fig. 28; Holttum, Orch. Malaya ed. 3 (1964) 256; Seidenf., Dansk Bot. Arkiv 29, 4 (1975) 60, fig. 23. See note 2.

Roots 2–5 mm diam. Rhizome short; rhizome scales soon dry, often soon eroding into fibres. Scale part of the inflorescence-bearing shoot 2.2–4 cm long; scales more or less tightly imbricate, with more or less broad triangular top. *Pseudobulbs* close together, more or less ovoid, 4.5–10 cm long, when dried smooth with irregular longitudinal folds. *Leaves* herbaceous, sometimes quite stiff. Petiole 3–13 cm long. Blade (long) elliptic to obovate, 16–38 by 3.5–10.5 cm; top acute, tip more or less distinctly acuminate; main nerves 5–7. *Inflorescence* heteranthous, (8–)12–26-flowered. Peduncle entirely enclosed in the scales of the young shoot. Rhachis pendulous, about straight, (19–)23–59 cm long, very densely hairy with (red)brown velutinous hairs; internodes 15–35 mm long. *Floral bracts* ovate to almost orbicular, 15–28 by 13–27 mm; top acute to rounded; the lowest 1–2 sterile. *Flowers* widely open, the perianth and usually also the ovary extending from the bract. Pedicel 11–38 by 1–1.5 mm; ovary 5–8 by 1.5–2.5 mm, very densely hairy with (red)brown velutinous hairs. *Median sepal* narrowly elliptic, 25–33 by 6–10.5 mm; the margin not recurved; top acute; nerves 7–11, midrib a low rounded keel. *Lateral sepals* somewhat asymmetric, narrowly elliptic, 25–33 by 6.5–9.5 mm; top acute; nerves 8–9, midrib a low, rounded to thick plate-like keel to 0.5 mm high. *Petals* almost straight, narrowly elliptic, 25–32 by 3.5–7.5 mm; top acute; nerves 3–11, midrib prominent. *Lip* 3-lobed, when flattened in outline elliptic, 22–26 mm long. *Hypochilium* rather narrowly attached, not saccate at the base, when flattened in outline broadly elliptic, 17–24 by 16–20 mm; lateral lobes large, in front broadly rounded and only at the junction with the epichilium recurved, entire; keels 3, low plate-like, starting 1.5–2 mm from the base of the lip, highest near the attachment of the lip, there to 1.3–2 mm high, deeply incised with long, sometimes branched laciniae, rather gradually lowering to 0.5 mm, the front three quarters with irregularly dentate, sometimes double margin, all continuing in the keels of the epichilium. *Epichilium* strongly recurved, strongly convex, when flattened ovate to almost orbicular, sometimes with a very short and broad claw, 6–9 by 6–10 mm; margin entire to somewhat irregular, more or less curved upwards; top broadly acute, rarely almost obtuse, then tip projecting; keels 3–7, plate-like, with irregular to dentate margin, to 1.5 mm high, irregular in length, the median one sometimes much shorter and developed on the base of the epichilium only, lateral ones ending 2.5–4 mm from the top margin of the epichilium. *Column* curved to the front, when flattened spatulate, 16–21 by 6–8 mm; hood large, widest in the middle, gradually narrowing to the base, its top margin rounded to emarginate, irregularly dentate, sometimes laterally notched or the end of the nerves apiculate, the middle part hardly recurved. Anther obovate to almost orbicular in outline, 2.5–3.5 by 2.5–3.5 mm; top almost truncate to very broadly rounded. Pollinia 1.5–2.3 by 0.8–1 mm. *Stigma* semi-elliptic, 2–3.5 by 1.5–2.5 mm; rostellum semi-orbicular, 2–2.5 by 3–4.5 mm, top broadly rounded. *Fruit* not seen.

Distribution – Thailand (Peninsula), 6 collections (AMES, BKF, C, E, K, L, P). Malay Peninsula (Kedah, Perak, Pahang), 7 collections (AMES, BO, K, L, LAE, SING, W). Cultivated, origin not known, 26 collections (E, K, W).

Habitat & Ecology – Epiphytes on trees and shrubs in evergreen, sometimes open forest, sometimes lithophytes on rocks. Altitude 800–1950 m. Fl. Feb.–May, one flowering record in Aug. and Dec.

Collector's notes – Bracts brown. Sepals and petals white or pinkish, lip whitish, lateral lobes of the lip outside on the junction with the epichilium with a brown band, inside (dark) brown with whitish or pinkish nerves and a narrow white margin, median part of hypochilium with 4 longitudinal brown lines, at the base whitish, the front half and base of the epichilium including the keels bright (golden) yellow. Top and margins of epichilium brown, keels in front brown, lower down tinged brownish along the margin. Column whitish or pinkish with some brown.

Anatomy – See Zörnig, Bot. Jahrb. 33 (1904) 647, fig. 19 (as *C. tomentosa*).

Notes – 1. Although it is probable that Hooker described this species as var. ? *penangense* this cannot be proven because of the uncertainty about the type collection. No indication is given by Hooker why he added a question mark after var. In addition there is the confusion in the literature with *C. dayana* and *C. massangeana*, and the synonymy of *C. massangeana* and *C. tomentosa* which was discovered during the present revision. For these reasons this taxon is described here as a new species.

2. Most records of *C. tomentosa* in literature actually concern *C. velutina*. See also note 1 under *C. tomentosa*.

3. The epithet *velutina* refers to the velutinous indument on the rhachis and ovary.

24. *Coelogyne venusta* Rolfe – Fig. 24; Plate 5a.

Coelogyne venusta Rolfe, Gard. Chron. ser. 3, 35 (1904) 259; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 71, fig. 24b; Rolfe, Bot. Mag. 135 (1909) t. 8262; Schltr., Orchis 9, 6 (1915) 179, fig. 36. – Type: Glasnevin (Sander & Sons) s.n. (?holo BM). See note 1.

Roots developing only on the older part of the rhizome, 2–2.6 mm diam. Rhizome (rather) long creeping, 4–9 mm thick. Scale part of the inflorescence-bearing shoot terete, tapering to the top, 3–9 cm long; scales tightly imbricate. *Pseudobulbs* 2.5–5.5 cm apart, straight or curved, (slender) ovoid, 3.5–7.5 cm long, shallowly grooved, when dried smooth with few to many coarse longitudinal folds. *Leaves* herbaceous, sometimes rather stiff. Petiole 1.2–5.5 cm long. Blade elliptic or ovate to linear, 10.5–25 by 1.5–6 cm. *Inflorescence* synanthous with the just emerging to less than halfway developed young leaves, 16–35-flowered. Peduncle almost entirely enclosed in the scales of the young shoot or up to 7 cm extending. Rhachis pendulous, not or slightly zigzag, 14.5–42 cm long; internodes 9–20 mm long. *Floral bracts* (ob)ovate to orbicular, 10.5–18 by 7.5–15 mm; top rounded to acute; the lowest 0–3 sterile. *Flowers* widely open, perianth and often also the ovary extending from the bract. Pedicel 8.5–16 by 0.3–0.8 mm; ovary 3.5–5 by 0.7–1.8 mm, sparsely to rather densely hairy. *Median sepal* narrowly ovate, 13.5–17 by 3.5–5.8 mm; top acute; nerves 5–7, midrib prominent or a low rounded keel. *Lateral sepals* (narrowly) ovate, 13.5–17 by 3.5–5.5 mm; top acute; nerves 5–7, midrib a low rounded keel to 0.2 mm high. *Petals* linear, 13–17 by 1.2–3 mm; top acute; nerves 1–3, midrib prominent. *Lip* 3-lobed, when flattened in outline ovate, 13–17 mm long. *Hypochilium* when flattened in outline ± obtriangular, 8–12 by 8–15 mm; lateral lobes ± triangular, in front projecting and distinctly recurved, rounded to (rather) acute, entire, sometimes on the junction with the epichilium erose; keels 2 (sometimes the lateral ones from the epichilium descending on the front one quarter of the hypochilium), low plate-like, to 0.3 mm high, with irregular to somewhat dentate, double margin, starting 2–3.5 mm from the base of the lip, continuing in the median keels of the epichilium. *Epichilium* more or less

convex, when flattened obovate to almost rectangular, 6.5–9 by 5.5–9 mm, tapering to the base and there 3.5–5.5 mm wide; top rounded to emarginate, erose, usually with a broad triangular tip; keels 4–6, low plate-like, to 0.7 mm high, with irregular to dentate margin, ending 1.5–2.5 mm from the top margin of the epichilium, lateral ones shorter. *Column* curved to the front, when flattened spatulate, 9–13 by 4–5.5 mm; hood rather large, widest near the top, gradually narrowing to the base; top margin truncate to retuse, almost entire to irregularly dentate, not or hardly recurved, often laterally notched. Anther ovate to bell-shaped, 1.5–2 by 1.5–2.5 mm. Pollinia 1–1.2 by 0.6–0.8 mm. *Stigma* semi-elliptic, 1.3–2 by 1–2 mm; rostellum semi-orbicular, 1.5–1.8 by 1.5–2 mm, top broadly rounded. *Fruit* not seen.

Distribution – Borneo: Sarawak (Bahagian Miri), Brunei (Temburong Distr.), Sabah (Bahagian Pedalaman, Pantai Barat), 44 collections (AMES, B, BM, BO, BRUN, E, G, HBG, K, L, NY, SING).

Habitat & Ecology – Epiphytes on trunks and branches of trees in lower montane forest, sometimes terrestrial on rocks and (sandstone) boulders, sometimes very exposed to the sun. Altitude 1000–2350 m. Fl. Oct.–June, but no record in April.

Collector's notes – Flower white or cream-coloured, sometimes tinged pink. Lip white with a yellow to ochre spot on the lateral lobes and a similar spot or band at the base of the epichilium across the keels; keels sometimes tipped with brown. Column white, sometimes flushed with yellow or pink. Anther white or light brown, pollinia yellow. Bracts creamy-ochre, pinkish, greenish or brownish. Smell rather unpleasant (once recorded).

Notes – 1. In Kew no specimen cultivated in Glasnevin or by Sander & Sons was found. It is possible that the plant in the British Museum with the label '*Coelogyne venusta*, Rolfe. Yunnan', which was cultivated in Glasnevin, is the holotype or the isotype; the label does not, however, state that this plant was cultivated by Sander. The locality Yunnan (China) is undoubtedly wrong; in those days orchid firms often provided false information on localities to protect their sources. All records of *C. venusta* from China are evidently based on the record in the type description.

2. The epithet *venusta* refers to the graceful nature of the plant.

INSUFFICIENTLY KNOWN SPECIES

Coelogyne palawanensis Ames

Coelogyne palawanensis Ames, Orch. 5 (1915) 51. – Type: Merrill 9499.

Roots sturdy, pubescent. *Pseudobulbs* close together, elongate, when dried strongly sulcate, narrowing to the top, at the base c. 1 cm diameter, 5–7 cm long, yellowish when dried, two-leaved, erect. *Leaves* long petiolate, to 26 cm long; petioles slender, 5.5–8 cm long, when dried sturdy; blade narrowly elliptic-lanceolate, base and top gradually tapering, to 20 cm long and 3.5 cm wide, nerves prominent below. *Inflorescence* synanthous, to 17 cm long, scales (of the young shoot) imbricate, acute, 5-flowered. *Floral bracts* boat-shaped, persistent, exceeding pedicel and ovary, to 2 cm long, acute, glumaceous. *Raceme* laxiflorous, flowers 1.5–2 cm apart, c. 2.5 cm long, white and yellow. Ovary black puberulous. *Lateral sepals* oblong, acute, gradually tapering to the top, when dried membranous, with a low keel, 27 by 9–10 mm. *Median sepal* similar, without keel. *Petals* narrower, oblong,

obtuse, slightly tapering to the top, 29 by 6 mm. *Lip* 12 mm long, trilobed; lateral lobes one fifth shorter, broadly semicordate, top rounded; epichilium hardly with a claw, rounded, denticulate, 6 by 9 mm; keels 2, lightly curved, converging at the base of the lip, near the top of the epichilium extensively biseriate, composed of short blunt teeth or digitate processes, on the middle of the epichilium on both sides with an additional short keel. *Column* curved, 15 mm long, at the top broadly winged, minutely denticulate.

Distribution – Philippines (Palawan).

Note – The description above is a slightly modified translation of the type description. This species has a black indument on the ovary, which suggests its position in section *Tomentosae*. It was by Ames regarded as a near relative of *Coelogyne swaniana*. I have not seen the type, nor any other specimens under the name *C. palawanensis*. The combination of long sepals and petals (resp. 27 and 29 mm) and a short lip (12 mm) is not present in other species of section *Tomentosae*, hence it is doubtful whether it belongs to this section.

EXCLUDED SPECIES

Coelogyne veitchii Rolfe

Coelogyne veitchii Rolfe, Kew Bull. (1885) 282; Pfitzer & Kränzlin, Pfl. R. Heft 32 (1907) 72, fig. 24a; Schltr., Fedde, Rep. Beih. 1 (1914) 104; Orchis 9 (1915) 165, fig. 27; Fedde, Rep. Beih. 21 (1923) fig. 139. – Type: Burke s.n. (K).

Distribution – New Guinea (West).

Note – This species, included by many authors in section *Tomentosae*, does not belong there. The lip has keels which are only developed at its base, the lip structure is very different compared with all other species of section *Tomentosae*, and the ovary is entirely glabrous. With section *Rigidiformes* Carr it has in common a similarly structured lip with rather indistinct lateral lobes, but there the pseudobulbs are always one-leaved. It is possibly better placed in a section of its own.