

**NOTES RELATING TO THE FLORA OF BHUTAN:
XLIV. TAXONOMIC NOTES, NEW TAXA AND
ADDITIONS TO THE *ORCHIDACEAE* OF BHUTAN
AND SIKKIM (INDIA)**

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The terrestrial orchid genus *Bhutanthera* Renz (subfamily *Orchidoideae*, tribe *Orchideae*), comprising five species, three newly described here, is established. A new species, *Herminium pygmaeum* Renz, and three new varieties, *Bulbophyllum cauliflorum* Hook.f. var. *sikkimense* N. Pearce & P. J. Cribb, *Cephalanthera erecta* (Thunb.) Bl. var. *oblanceolata* N. Pearce & P. J. Cribb, and *Gymnadenia orchidis* Lindl. var. *pantlingii* Renz, are here newly described. Five new combinations and one new name are proposed. Four new sections of *Bulbophyllum* are also established and their relationships discussed.

Keywords. Bhutan, new combinations, new taxa, orchids, Sikkim.

INTRODUCTION

During the preparation of the account of subfamily *Orchidoideae* for the orchid account for the *Flora of Bhutan* project, the late Jany Renz of Basel, Switzerland, identified a new genus, which he called *Bhutanthera*, four new species and a new variety. We validate his new taxa below.

A new name and a number of new taxa and combinations are also necessary prior to the publication of the account for the *Flora*. Discussions with J. J. Vermeulen (SING) and P. Ormerod (Cairns, Australia) suggested that four new sections of *Bulbophyllum* be established to accommodate Bhutanese species that fall outside the sections that are currently accepted.

***Bhutanthera* Renz, gen. nov.**

Plantae pusillae, alpinae, tuberosis globosis, stigmatibus conjunctis, in montibus Himalayae orientalis, ad altitudinem 4000–5000m indigenae; species 5 adhuc notae. Genus *Habenariae* et *Platantherae* affinis, ab illa stigmatibus pulvinatis, ab haec labello basi trilobato vel basi indistincte lobato, ab utraque habitu graciliore distinguenda. Type: *B. albomarginata* (King & Pantling) Renz.

[Basionym: *Habenaria albomarginata* King & Pantling in Ann. Roy. Bot. Gard. (Calcutta) 8: 322, t.425 (1898)].

Plants terrestrial, small; *tubers* globose-ovoid. *Leaves* 2, subopposite, ovate to lanceolate. *Inflorescence* terminal, racemose, 1–20-flowered. *Sepals* and *petals* similar. *Lip* 3-lobed, spurred; spur conical-cylindrical. *Column* short; stigmas 2, conjoined, pulvinate; rostellar arms distinct; pollinia 2.

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Etymology. From Bhutan, where most of the species are found.

The genus *Bhutanthera* comprises five terrestrial species confined to the alpine zone of the eastern Himalayas. It falls between *Habenaria* and *Platanthera* but is distinguished by having globose tubers, a 3-lobed lip and conjoined cushion-like stigmas.

The three new species of *Bhutanthera* described here, along with *Habenaria albomarginata* King & Pantling and *H. alpina* Hand.-Mazz., represent a difficult taxonomic group. *Habenaria albomarginata*, for example, has also been placed in *Platanthera* and *Peristylus*. Renz (personal communication) suggested that these five taxa might represent a sufficiently distinct taxonomic group to justify the establishment of a new genus for which he proposed the name *Bhutanthera*. He considered that it was related to *Platanthera* but differed in having a 3-lobed lip. This feature is not found in other *Platanthera* species from the region but is found in the genus elsewhere.

Some botanists (Inoue & Lin, 1980; Inoue, 1988) consider that the tuber shape is of particular taxonomic significance in the subtribe *Orchidinae*. On this basis alone it is difficult to justify the inclusion of this group in *Platanthera*. Luo (personal communication) considers that their distinctly globose tubers place them closer to the *Habenaria*–*Peristylus* complex. When King & Pantling described *H. albomarginata* they placed it in subgroup *Peristylus* (now considered a distinct genus). The globose tubers and 3-lobed lip of these five species place them nearer to *Habenaria* and *Peristylus* but they cannot be comfortably accommodated in either because of their conjoined cushion-like stigmas.

A more detailed investigation of the entire complex is undoubtedly needed before the complex can be satisfactorily resolved. Renz considered that the establishment of a new genus to accommodate this group was the most satisfactory solution given the present state of knowledge of the subtribe, and we concur.

Key to the species of Bhutanthera

- 1a. Lip obscurely 3-lobed; lateral lobes reduced, much shorter than the mid-lobe _____ **B. alpina**
- 1b. Lip 3-lobed; lateral lobes equal to the mid-lobe _____ 2
- 2a. Inflorescence 1–2-flowered _____ 3
- 2b. Inflorescence more than 3-flowered _____ 4
- 3a. Sepals white; petals and lip red _____ **B. albosanguinea**
- 3b. Sepals yellowish-green; petals yellowish-green to white; lip white _____ **B. albovirens**
- 4a. Sepals green with white margins; flowers less than 5mm across; inflorescence more than 5-flowered _____ **B. albomarginata**
- 4b. Sepals white; flowers more than 5mm across; inflorescence less than 5-flowered _____ **B. himalayana**

Bhutanthera albomarginata (King & Pantling) Renz, **comb. nov.**

Basionym: *Habenaria albomarginata* King & Pantling in Ann. Roy. Bot. Gard. (Calcutta) 8: 322, t.425 (1898). Type: India, Sikkim, Jongri [Dzongri], *Pantling* 450 (holo. K!, iso. BM!).

Syn.: *Platanthera albomarginata* (King & Pantling) Kränzlin, Orch. Gen. Sp. 1: 939 (1898).

Peristylus albomarginata (King & Pantling) M. L. Banerji & P. Pradhan, Orch. Nepal Himalaya: 92 (1984).

Distribution and ecology. India (Sikkim). On alpine meadows and yak-grazed slopes, 3720–4270m. Flowering between July and September.

Additional specimens examined. INDIA. Sikkim, Nathang, 13 vii 1877, *King* 4367 (K); Sikkim, Tsomgo Chho, 8 vii 1996, *Long & Noltie* 71 (E); Sikkim, Yampung, 12 viii 1913, *Rohmo* 1098 (E).

Bhutanthera albomarginata, selected as the type for the genus, is well illustrated on plate 425 by King & Pantling (1898). They originally described it as *Habenaria albomarginata*, commenting that ‘the centrifugal inflorescence is a very unusual feature in *Habenaria*’. It was transferred by Kränzlin (1898) to *Platanthera* with the comment ‘Erinnert habituell an ein etwas gestauchtes massiv gebautes Exemplar von *Platanthera viridis* Lindl.’ (*Platanthera viridis* is now treated as *Coeloglossum viride* (L.) Hartman). Finally, Banerji & Pradhan (1984) transferred it to *Peristylus* but without any explanation.

Bhutanthera albosanguinea Renz, **sp. nov. Fig. 1.**

Bhutantherae albomarginatae affinis sed planta minore, usque 5cm alta, inflorescentia biflora, sepalis albis, petalis et labello rubris bene distinguenda.

Type: Bhutan, Thimphu district, Darkey Pang Tso, 4 viii 1991, *J.R.I. Wood* 7405 (holo. E!).

Plant terrestrial, small, 4.5cm tall; tuber not seen. *Stem* erect, glabrous, sheathed at base, 3cm tall; stem sheath tubular, apex unknown (specimen damaged), 1.1cm long. *Leaves* 2, towards apex of stem, lanceolate, acute, tapering gradually to a sheathing base, margins entire to subundulate, strongly nerved, 2.3–2.5 × 0.4–0.8cm. *Inflorescence* terminal, racemose, 2-flowered; rachis 1cm long; floral bract very reduced. *Flowers* large for plant, 1–1.3cm across; sepals white, petals red, lip red; pedicel and ovary twisted, 7–9mm long. *Dorsal sepal* elliptic-obovate, rounded, margins glandular, 1-nerved, 5 × 4mm; *lateral sepals* elliptic, subacute, margins glandular, 1-nerved, 6 × 4mm. *Petals* spathulate, rounded, cucullate at apex, margins entire, 5 × 2.2mm (at wide apex). *Lip* 3-lobed, narrowed and subunguiculate at base, spurred, base 1 × 1mm; lateral lobes ligulate, obtuse, 3 × 1mm; mid-lobe ligulate, obtuse, 3 × 1mm; spur conical, 2mm long. *Column* short, 1.5–2 × 1.5mm; pollinaria 1.6mm long. *Fruit* not seen.

Distribution and ecology. Bhutan. In rock crevices, on cliffs, 4100m. Flowering in August.

Bhutanthera albosanguinea is related to *B. albomarginata* but differs in having a 2-flowered inflorescence, white sepals, red petals and a red lip. The type sheet consists of a single, slightly damaged plant.

***Bhutanthera albovirens* Renz, sp. nov. Fig. 2.**

Bhutantherae albomarginatae affinis sed planta minore, usque 6cm alta, inflorescentia uni- vel biflora, sepalis luteo- viridibus, petalis luteo- viridibus vel albis, labello albo satis differt.

Type: Bhutan, Tongsa district, Thita Tso, Rinchen Chu, 13 vii 1937, *Ludlow & Sherriff* 3441 (holo. BM!).

Plant terrestrial, small, 4–6cm tall; tuber globose, 0.5–1 × 0.4–0.5cm. *Stem* glabrous, base covered by leaf-sheaths and basal sheath, 2-leaved, 1.8–2.2cm long; basal sheath tubular, widening upwards, fairly wide-mouthed, 1–1.6cm long. *Leaves* subopposite, lanceolate to ovate-lanceolate, subacute, nerved, margin entire, glandular, narrowed at base, 1–1.9 × 0.4–1.1cm. *Inflorescence* terminal, 1–2-flowered; floral bract lanceolate, acuminate, 3 × 0.5–1mm. *Flowers* medium-sized, 0.8–1cm across; sepals yellowish-green, petals yellowish green to pure white, lip white; pedicel and ovary fusiform, 6–8mm long. *Dorsal sepal* ovate, obtuse, 1-nerved, 5 × 3.5mm; *lateral sepals* obliquely ovate, falcate, subacute, 1-nerved, 6–6.5 × 3–4mm. *Petals* obovoid, rounded, 3-nerved, 3–5 × 2.5–4mm. *Lip* deeply 3-lobed, spurred, base quadrate, 0.5 × 2mm (wide); lateral lobes oblong, rounded, 3.5–4 × 0.8mm; mid-lobe oblong, rounded, 5 × 0.6mm; spur conical, globose, rounded, curved forwards, 2–3 × 0.8–1mm. *Column* short, broad, 1mm tall; anther-cap long-beaked, 1.5–1.9mm long. *Fruit* not seen.

Distribution and ecology. Bhutan. On moist rocks, wet grassy cliff-ledges, 4270–4720m. Flowering from July to September.

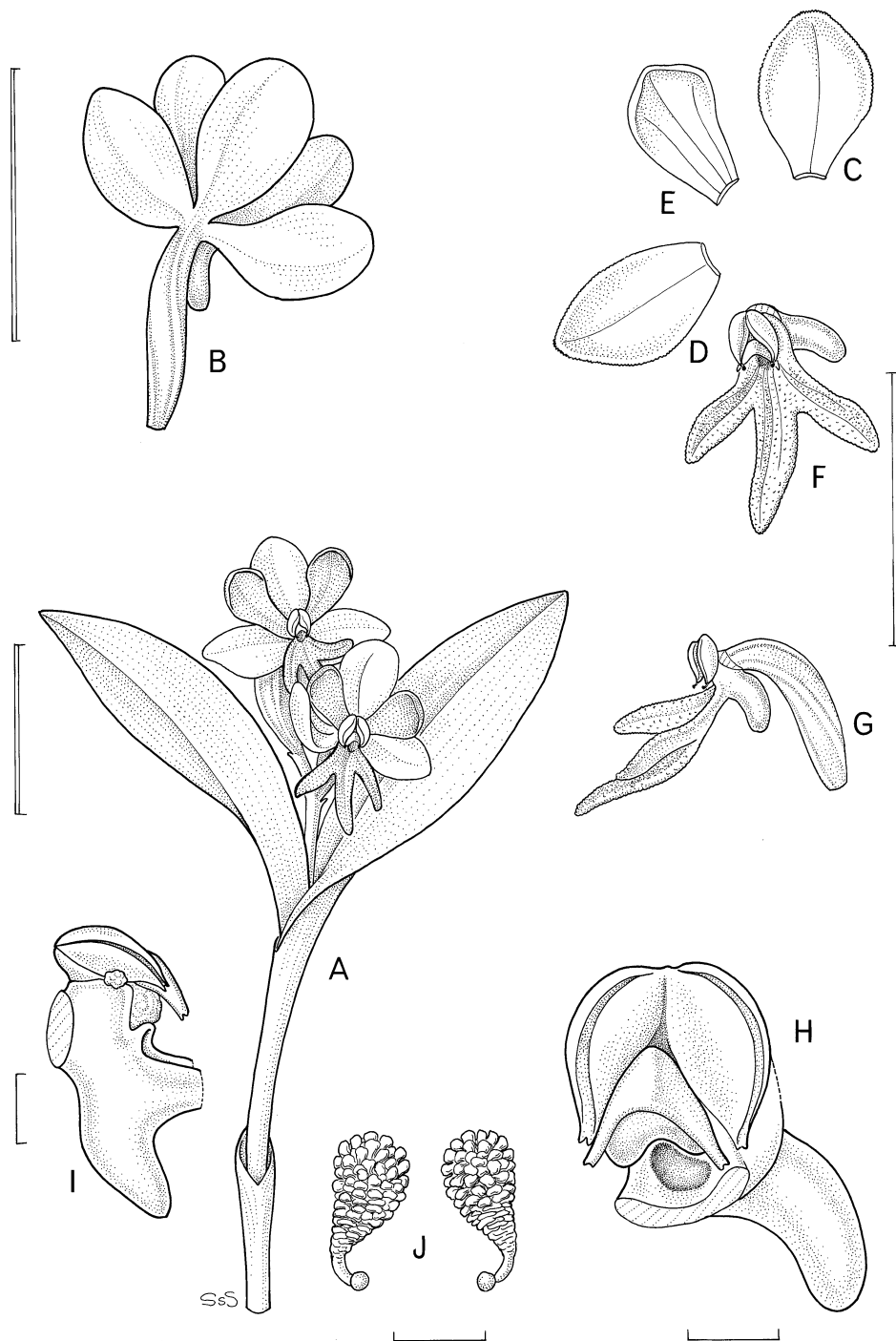
Additional specimen examined. BHUTAN. Upper Kulong Chi district, Shingbe, 17 ix 1949, *Ludlow & Sherriff* 21196 (BM).

Bhutanthera albovirens is related to *B. albosanguinea* but differs in having a 1–2-flowered inflorescence, yellowing-green sepals, yellowish-green to white petals and a white lip.

***Bhutanthera alpina* (Hand.-Mazz.) Renz, comb. nov.**

Basionym: *Habenaria alpina* Hand.-Mazz. in *Symb. Sin.* Pl. 7: 1336 (1936). Type:

FIG. 1. *Bhutanthera albosanguinea*: A, habit; B, flower (back view); C, dorsal sepal; D, lateral sepal; E, petal; F, lip (with spur); G, lip, column and ovary (side view); H, column (with spur); I, column (side view); J, pollinaria. Drawn by Susanna Stuart-Smith from *Wood* 7405 (E). Double bar-line = 1cm; single bar-line = 1mm.



China, Yunnan, between Mekong and Salwin, Yigöru, *Handel-Mazzetti* 9716 (holo. WU, iso. AMES!, E!, W!).

Distribution and ecology. India (Sikkim), Bhutan and China (Yunnan). In damp alpine meadows and yak-grazed slopes, 4270–4300m. Flowering in July.

Additional specimens examined. BHUTAN. Upper Kuru Chi district, Narim Thang, 25 vii 1949, *Ludlow, Sherriff & Hicks* 21345 (BM).

INDIA. Sikkim, Choktsering Chhu Valley, 14 vii 1992, *Long, McBeath, Noltie & Watson* 362 (E).

This species was first described as *Habenaria alpina* by the Austrian botanist Heinrich Handel-Mazzetti in 1936. It has the globose pseudobulbs, a trilobed spurred lip and conjoined stigmas characteristic of the genus. Its distinction from other species is given in the key above.

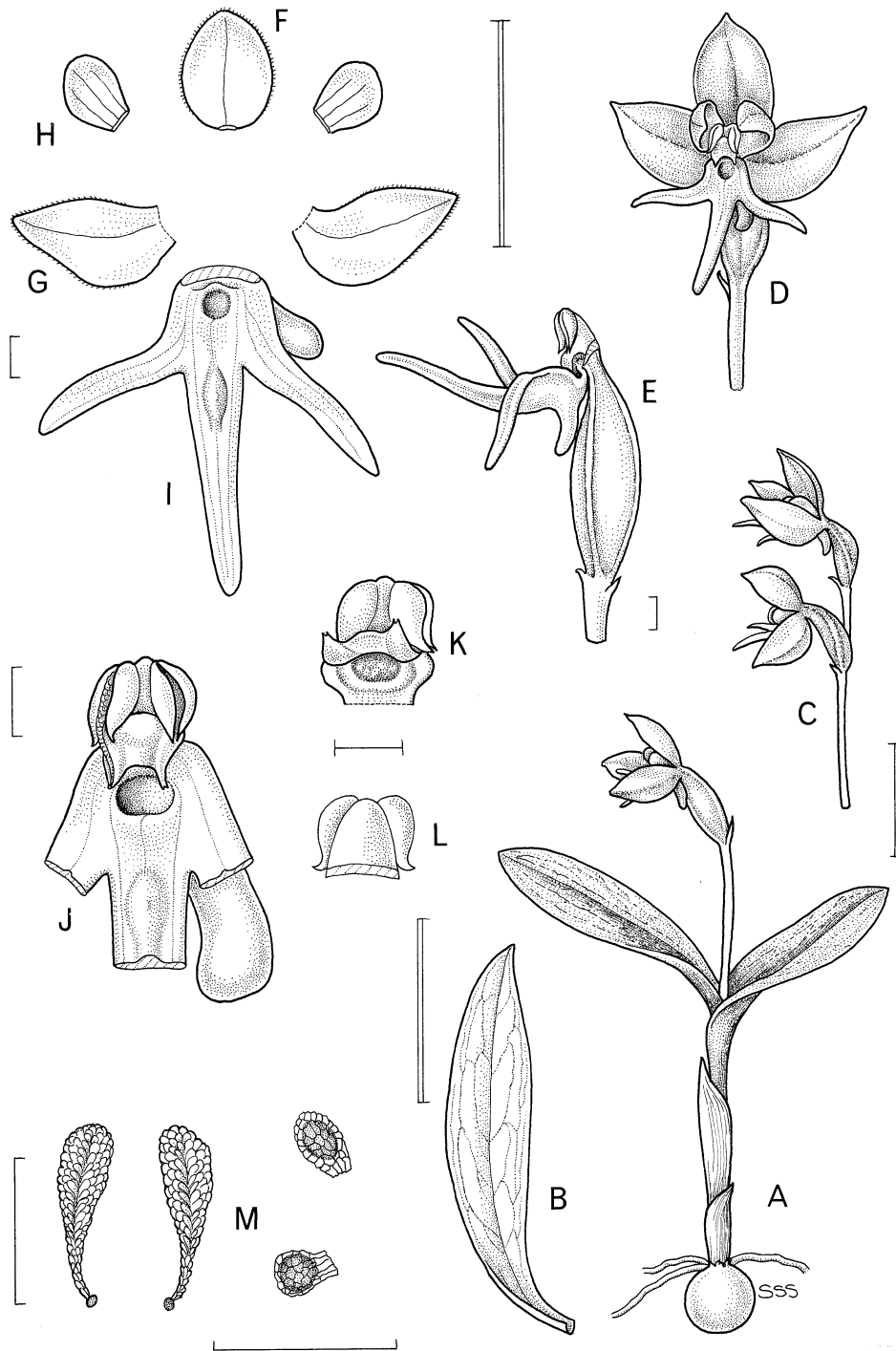
***Bhutanthera himalayana* Renz, sp. nov. Fig. 3.**

Bhutantherae albomarginatae affinis sed planta minore usque 6.5cm alta, inflorescentia minus quam 5-flores ferenti et floribus niveis satis differt.

Type: Bhutan, Upper Bumthang Chu district, Pangotang–Tsampa (Chamka), 1 vii 1949, *Ludlow, Sherriff & Hicks* 19304 (holo. E!, iso. BM!).

Plants terrestrial, small, 5–6.5cm tall; tuber ovoid to globose, 0.7–0.9 × 0.4–1cm. *Stem* erect, lower half sheathed by leaf-sheaths and basal sheath, 2-leaved, 2.5–4cm long; sheath tubular basally, splitting to form a broadly lanceolate, acute to subacute apex, 1.3–1.9cm long. *Leaves* 2, subopposite, sheathed, lanceolate-elliptic, obtuse to subacute, finely reticulate, 1.7–2.2 × 0.4–0.9cm; leaf-sheaths tubular, imbricate, 1.5–2cm long. *Inflorescence* terminal, simple-racemose, subsecund, laxly 3–4-flowered; rachis glabrous, 1–2cm long; floral bracts minute, triangular-lanceolate, acute, 0.5–0.6 × 0.6–0.8mm. *Flowers* medium-sized for plant, 0.7–0.9cm across; uniformly white, dorsal sepal with a green central nerve; pedicel and ovary glabrous, twisted, 5–6mm long. *Dorsal sepal* ovate-elliptic, subacute, 1-nerved, 5 × 3mm; *lateral sepals* ovate-lanceolate, obtuse to subacute, 1-nerved, 6 × 2.8mm. *Petals* short, spatulate, obtuse, cucullate at apex, 2.5 × 1.5mm. *Lip* 3-lobed, shortly unguiculate at base, spurred, base 1mm long; lateral lobes linear, widening slightly at base, acute, 2.5 × 0.6mm; mid-lobe linear to ligulate, obtuse, 4 × 0.8mm; spur cylindrical-conical, obtuse, 1.5–2mm long. *Column* short, 1–1.5mm long; rostellar processes 0.25mm long; pollinaria 1.2mm long. *Fruit* not seen.

FIG. 2. *Bhutanthera albovirens*: A, habit; B, leaf (detail); C, inflorescence; D, flower (front view); E, flower and ovary (side view); F, dorsal sepal; G, lateral sepals; H, petals; I, lip; J, column (with upper part of lip); K, column (front view); L, column (back view); M, pollinaria with pollen grains. Drawn by Susanna Stuart-Smith from *Ludlow & Sherriff* 3441 (BM). Double bar-line = 1cm; single bar-line = 1mm.



Distribution and ecology. Bhutan. Among dwarf rhododendrons on steep hillsides, on open grassy hills and cliff-ledges, 3960–4570m. Flowering from July to August.

Additional specimens examined. BHUTAN. Thimphu district: Barshong [Parshong], 27 vii 1914, Cooper 1979 (E); Pumo La, viii 1938, Gould 1294 (K); Upper Pho Chu district: Kesha La [Chesha La], 27 vi 1949, Ludlow, Sherriff & Hicks 16640 (BM); Upper Bumthang Chu district: Marlung, 12 vii 1949, Ludlow, Sherriff & Hicks 19413 (BM, E); Upper Kulong Chu district: Shingbe, 24 vi 1949, Ludlow, Sherriff & Hicks 20401 (BM).

Bhutanthera himalayana is closely related to *B. albomarginata* but differs in having flowers of more than 5mm across and white sepals, and less than five in an inflorescence.

The following new taxa and new combinations are also proposed here:

Herminium pygmaeum Renz, sp. nov. Fig. 4.

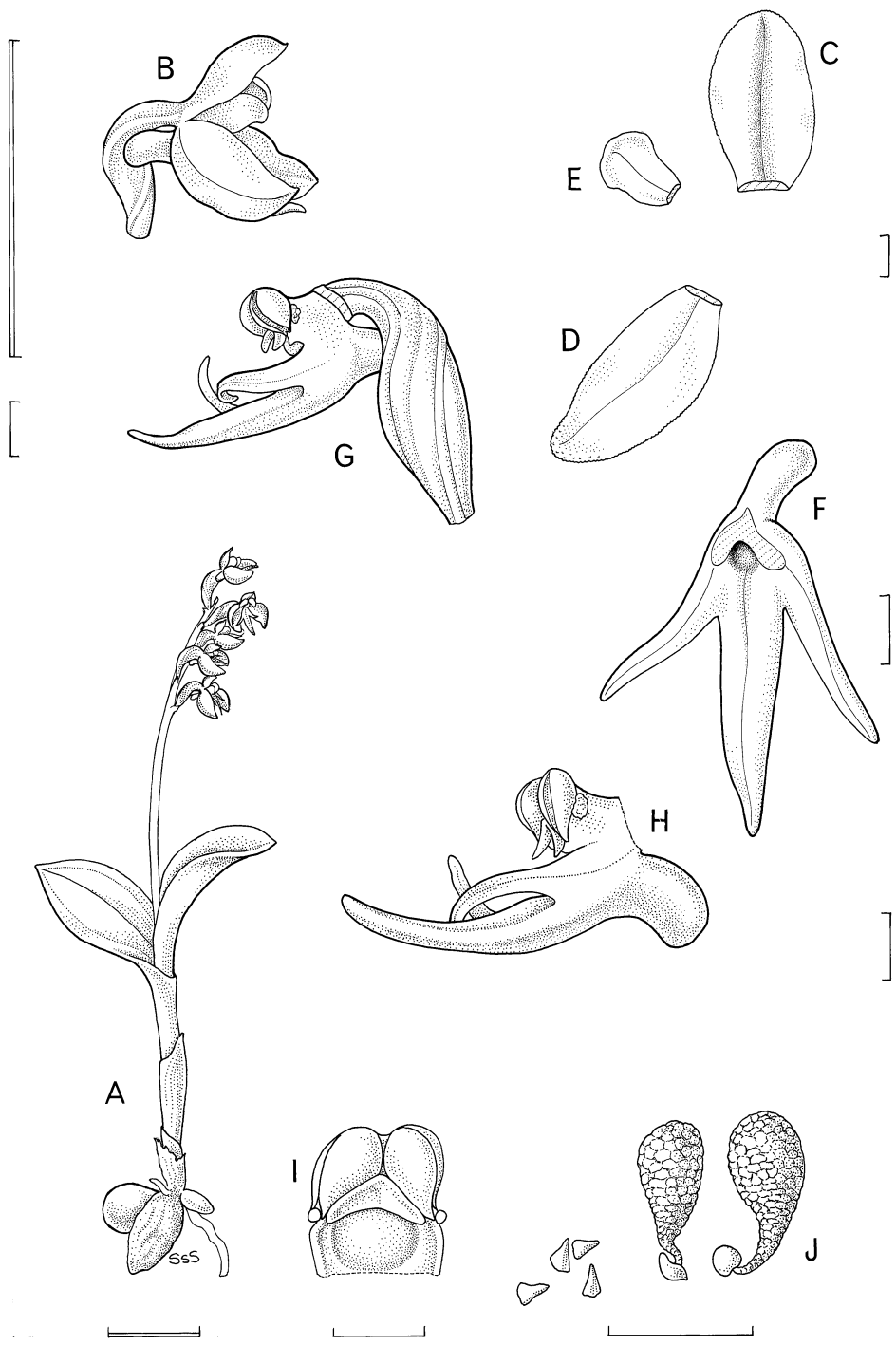
Herminio nivale Schltr. affinis sed foliis tribus anguste lineari-oblongis, inflorescentia 3–5-flora, petalis trullatis non erectis, labello trilobato ad basin petalis adnato distinguenda.

Type: Bhutan, Thimphu district, below Darkey Pang Tso, 4 viii 1991, Noltie 105 (holo. E!).

Plant terrestrial, minute, 2–5cm tall; *tuber* globose, 3–4 × 2–3mm. *Stem* erect, slender, base sheathed and a single sheath up bract up stem, 1.5–3.5cm long; basal sheath large for plant, mouth wide, apex ovate, subacute, 1–1.5cm long; stem bract lanceolate, acute, 2.5 × 0.5mm. *Leaves* 3, narrowly linear-oblong, subacute, emerging from within the sheath, 1.5–3.5 × 0.05–0.15cm. *Inflorescence* terminal, simple, racemose, secund, subdensely 3–5-flowered; rachis glabrous, 5–7mm long; floral bracts minute, lanceolate, acute, 0.5–1 × 0.5–0.6mm. *Flowers* small, 3mm long; sepals green, petals yellowish; pedicel and ovary tumid, narrowing towards apex, 3 × 1–1.3mm. *Dorsal sepal* ovate, subacute to obtuse, slightly verrucose on exterior surface, 3 × 2mm; *lateral sepals* lanceolate-ovate, subacute, 1-nerved, 4 × 1.5mm. *Petals* trullate, constricted towards apex, apex fleshy, subacute, 1-nerved, 3.5 × 1.5mm. *Lip* 3-lobed, base long and gradually widening, spurless, 4 × 1.5mm; lateral lobes triangular, obtuse; mid-lobe narrowly triangular, acute, 1mm long. *Column* short, 0.5mm tall. *Fruit* not seen.

Distribution and ecology. Bhutan, Thimphu district, below Darkey Pang Tso. Very wet cliff-ledge with *Juncus trichophyllus* and *Parnassia* sp., 3960m.

FIG. 3. *Bhutanthera himalayana*: A, habit; B, flower (side view); C, dorsal sepal; D, lateral sepal; E, petal; F, lip; G, lip, column and ovary; H, lip and column; I, column; J, pollinaria. Drawn by Susanna Stuart-Smith from Ludlow, Sherriff & Hicks 19304 (E). Double bar-line = 1cm; single bar-line = 1mm.



Herminium pygmaeum is allied to the Chinese *H. nivale* Schltr. and to the Sikkimese *H. angustilabre* King & Pantling. It is a minute plant with three narrowly linear-oblong leaves and three to five flowers that have a spurless lip that is adnate to the column base, and two pollinia with very short caudicles and large viscidia. The type was examined by Renz (personal communication), who proposed the name.

Bulbophyllum cauliflorum Hook.f., Fl. Brit. India 5 (2): 758 (1890); Icon. Pl. 21: t.2036 (1892). Lectotype (selected here): India, Khasia Hills, *Griffith* Kew. Dist. 5139 (K!). **Fig. 5.**

var. **sikkimense** N. Pearce & P. J. Cribb, **var. nov.**

In habitu varietati typicae similis sed petalis uninerviis differt.

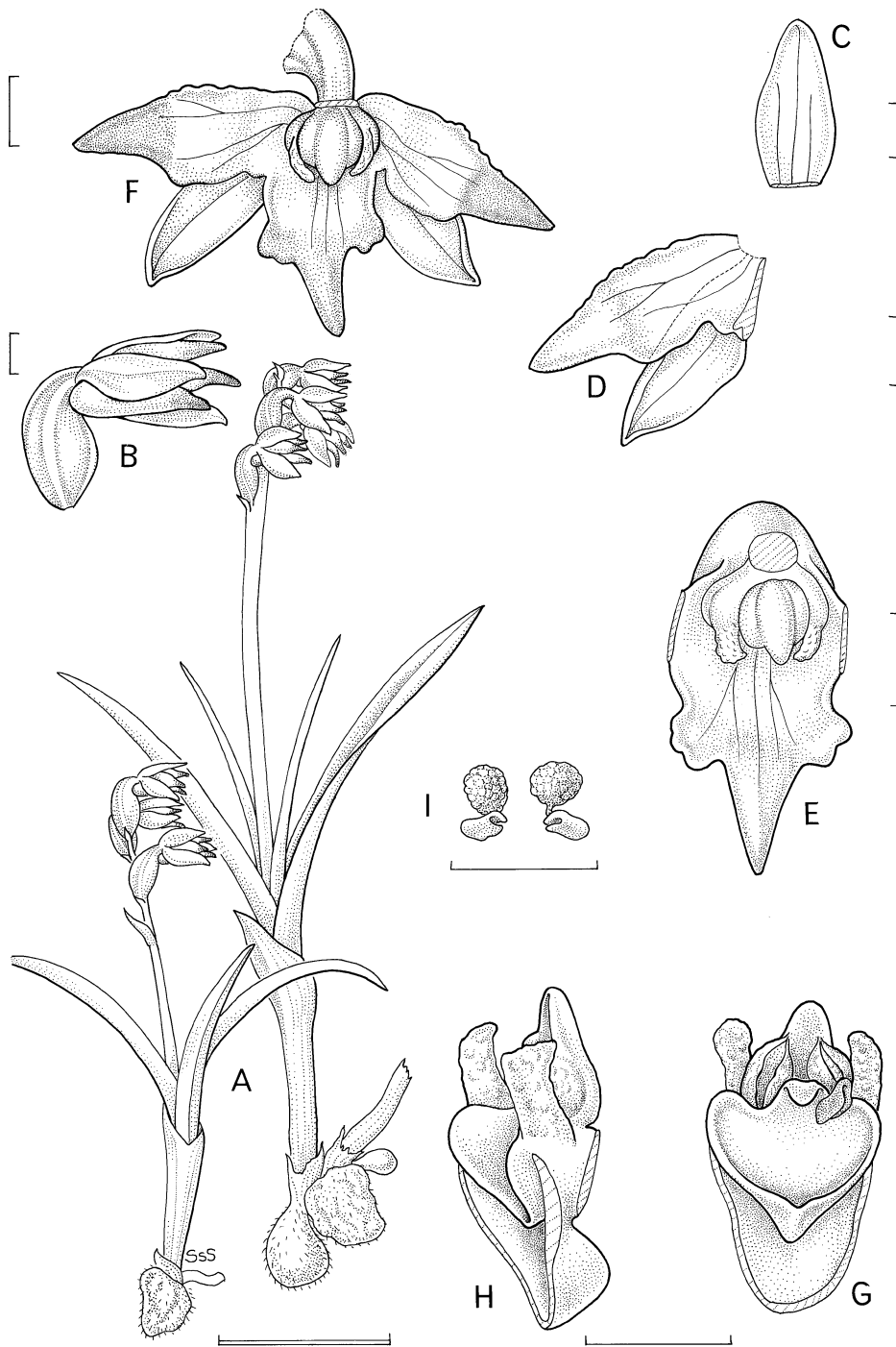
Type: India, Sikkim, Choongthang, *J.D. Hooker* 36B (holo. K-LINDL!, iso. K!).

Plant epiphytic; rhizome terete, woody, branched, 1.5–3mm thick; roots nodal, filiform, clustered. *Pseudobulbs* cylindrical to elliptic, slightly dilated towards base, obliquely attached to rhizome, spaced, 3.1–4.1 × 0.3–0.8cm; spaced at intervals of 6.1–12.1cm along the rhizome. *Leaf* single, oblong-elliptic, obtuse, narrowing and petiolate at base, 5.7–9.2 × 1.5–2.9cm; petiole channelled, 0.9–1.4cm long. *Inflorescence* basal from pseudobulb and along rhizome, subumbellately 4–5-flowered; peduncle slender, glabrous, sheathed at base, 1.2–2.1cm long; peduncle bract tubular, lanceolate, 5–7.7mm long; rachis slender, 2–4mm long; non-floral bract lanceolate, acuminate, 4–4.5 × 1.5–2mm; floral bracts linear-lanceolate, acute to acuminate, entire, 2.5–3 × 0.3–0.5mm. *Flowers* not fragrant, 6–8mm across; sepals and petals green flushed with brown (tips of sepals yellow), lip green-brown; pedicel and ovary slender, 3.5–4.5mm long. *Dorsal sepal* linear-lanceolate, caudate-acuminate, margins entire, 3-nerved, spreading, 4–8 × 0.3–0.4mm (at base); *lateral sepals* similar, subfalcate. *Petals* narrowly lanceolate, acuminate, 1-nerved, 2.5–5 × 0.3–0.4mm (at base). *Lip* simple, lanceolate, base truncate, deflexed below the centre, subacute, excavated-channelled from base to near the apex, margins entire, attached to column-foot, 1–1.5 × 0.3–0.5mm. *Column* short, broad, apex with 2 acuminate steldia, 0.5mm tall; column-foot short, arcuate, 1–2mm long; stigma large. *Fruit* not seen.

Distribution and ecology. India (Darjeeling and Sikkim). In tropical valleys, 660–2000m. Flowering June to August.

Additional specimens examined. INDIA. Sikkim, Lukrap [Sitong], vii 1893, *Pantling* 221A (BM, K, W); Lukrap [Sitong], vii 1895, *Pantling* 221B (K); Chunthang [Choongthang], vi 1897, *Pantling* 221C (BM, K, W); Sikkim, unlocalized, viii 1892, *Pantling* 230A (BM, E, K);

FIG. 4. *Herminium pygmaeum*: A, habit; B, flower and ovary; C, dorsal sepal; D, lateral sepal and petal; E, lip and column; F, lip, petals and lateral sepals with column; G, column (front view); H, column (side view); I, pollinaria. Drawn by Susanna Stuart-Smith from *Noltie* 105 (E). Double bar-line = 1cm; single bar-line = 1mm.



Sebu Chhu [Sibchu], viii 1894, *Pantling* 230B (BM, K, W); Tong [Toong], 29 vi 1903, *Younghusband* s.n. (K).

Examination of the type material of *B. cauliflorum* shows that there is variability in the number of veins on the petals. *Griffith* 5139 has distinctly lanceolate petals with three veins while *Griffith* 5165 and *Hooker* 36B both have petals with a single vein. All of the material from Sikkim has flowers with petals that have a single vein. We believe that this represents a local variation and propose varietal status for these plants. We propose to lectotypify *B. cauliflorum* with *Griffith* 5139, while *Griffith* 5165 and *Hooker* 36B are both referable to *B. cauliflorum* var. *sikkimense*.

King & Pantling (1898) identified *Pantling* 230, from Sikkim, as *B. protractum* Hook.f. but noted that his plants had petals with a single vein. We have examined this material and believe that it is referable to *B. cauliflorum* var. *sikkimense* and that *B. protractum* does not occur in our area.

Bulbophyllum cauliflorum is closely related to *B. collettii* King & Pantling from Assam. King & Pantling (1897) stated that the latter grows in dense masses, is a smaller plant with different sepals and petals and that there is a difference of two months in the flowering time. Pantling collected a plant from Shillong that was flowering in June. The type material of *B. collettii* (Assam, G. Rita & H. Collett) is at CAL and we have been unable to examine it. Further collections will have to be examined before its status can be clarified.

The floral structure of *B. cauliflorum* var. *sikkimense* resembles that of *B. laxiflorum* (Bl.) Lindl. but that species has clustered, rather than well-spaced, pseudobulbs.

***Cephalanthera erecta* (Thunb.) Bl., Coll. Orch.: 188, t.65, f.2 (1858). Fig. 6.**

Basionym: *Serapias erecta* Thunb., Fl. Jap.: 27 (1784). Type: Japan, Kutjinawa, Thunberg 21322 (holo. UPS!).

var. ***oblanceolata*** N. Pearce & P. J. Cribb, var. nov.

Varietati typicae similis sed labello petaloideo et calcare deficienti differt.

Type: Bhutan, Punakha district, between Mishichen and Khosa, 10 v 1967, Kanai, Murata, Ohashi, Tanaka & Yamazaki 13575 (holo. TI!).

Plant terrestrial, 18–30cm tall. *Stem* foliaceous, 1–3mm thick, leaves sheathing basally. *Leaves* distichous, ovate to ovate-lanceolate, acute to subacute, sessile, prominently 3–5-nerved, 5–7 × 1.5–2cm. *Inflorescence* terminal, racemose, 6–8-flowered; rachis 4–7cm long; floral bracts lanceolate, acute, 2–3 × 0.5–1mm, lowest floral bract

FIG. 5. *Bulbophyllum cauliflorum* var. *sikkimense*: A, habit; B, flower; C, petal; D, column; E, flower; F, dorsal sepal; G, lateral sepal; H, petal; I, lip (two views); J, column and lip (side view); K, column (front view); L, column (side view); M, pollinaria; N, pollinia; *B. cauliflorum* var. *cauliflorum*: O, flower; P, petal. Drawn by Susanna Stuart-Smith, A–D from *Hooker* 36B (K); E–N from *Griffith* 5165 (K); O–P from *Griffith* 5139 (K). Double bar-line = 1cm; single bar-line = 1mm.



foliaceous, lanceolate, acute, c.2 × 0.3cm. *Flowers* small, 0.7–0.9cm long; white; pedicel and ovary 5–8mm long. *Dorsal sepal* oblanceolate, subacute, 3-nerved, 1 × 0.2cm; *lateral sepals* lanceolate, subacute, 3-nerved, 9 × 2mm. *Petals* oblanceolate, obtuse, 3-nerved, 9 × 1.5mm. *Lip* simple, peloric, oblanceolate, obtuse, 3-nerved, 9 × 2mm. *Column* straight, erect, narrowly winged at apex, c.3.4mm long; stigma broad, fleshy; pollinia 1.5 × 1mm. *Fruit* not seen.

Distribution and ecology. Bhutan, Punakha and Upper Mo Chu districts (between Rimchu [Rinchu] and Khosa). 1400–1600m. Flowering May.

Material of this variety is identical in habit to that of the typical variety but the lip is simple, unadorned and lacks a spur. We believe that it is a peloric variant of *C. erecta*. We have examined several collections and they uniformly have such flowers. The typical variety has yet to be collected in Bhutan.

Gymnadenia orchidis Lindl., Gen. Sp. Orchid. Pl.: 278 (1835). Type: India, Kumaon, *Wallich* 7039B (lecto. K-LINDL!, iso. K-W! K!, selected here). **Fig. 7.**

var. ***pantlingii*** Renz, var. nov.

Varietati typicae similis sed floribus minoribus, sepalo dorsali lanceolato, sepalis lateralibus ovato-ellipticis, petalis late ovatis acutis, labello simplici vel obscure trilobato acuto, lobis lateralibus quum praesentibus anguste rotundatis, lobo medio oblongo ad apicem papilloso, calcare ad apicem angulato distinguenda.

Type: India, Sikkim, Tankra-la, vii 1987, *Pantling* 404B (holo. BM!, iso. K!).

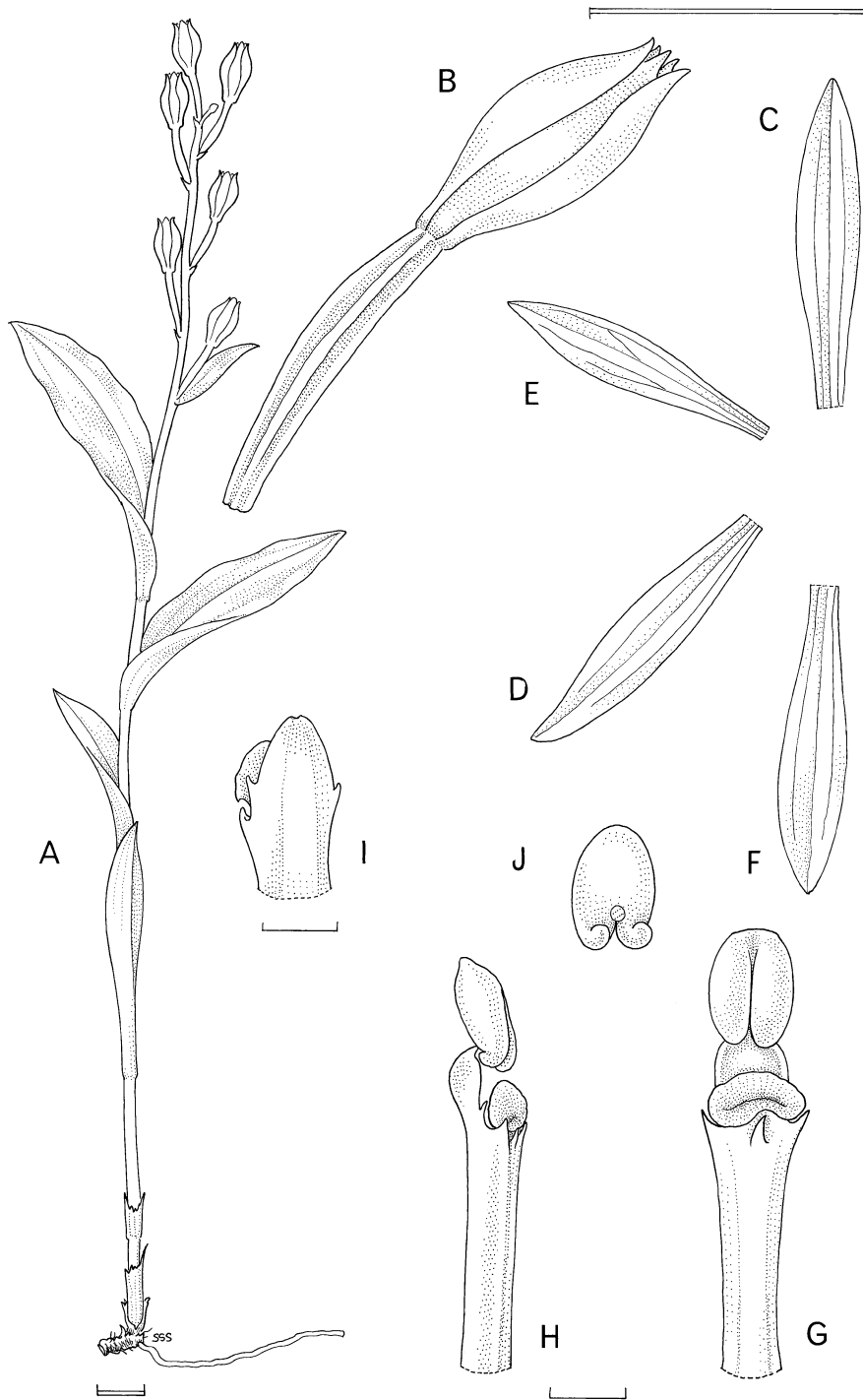
Plant habit, stem, leaves and inflorescence similar to *G. orchidis* var. *orchidis*. *Flowers* small, 3–4mm across. *Dorsal sepal* lanceolate, narrowing to acute apex, 3-nerved, 3.5–4 × 1.5–2mm; *lateral sepals* ovate-elliptic, subacute, spreading, 3 × 2mm. *Petals* broadly ovate, acute, 2.5 × 2mm. *Lip* simple to obscurely 3-lobed, 3 × 1mm; lateral lobes (when present) narrowly rounded; mid-lobe narrowly oblong, tapering to rounded, papillose apex, 1mm long; spur shorter than in typical variety, angled, curved forward, 5.5–6cm long, angled 2mm from the apex.

Distribution and ecology. Bhutan and India (Sikkim). In damp meadows and open hillsides, 3580–4270m. Flowering July to September.

Additional specimens examined. BHUTAN. Thimphu district, Chelai La [Cile La], 3 vii 1971, *Bedi* (K, THIM); Pajoding, 19 vii 1979, *Grierson & Long* 2775 (E).

INDIA. Sikkim: Dzungri, 2 vii 1983, *Starling, Upward, Brickell & Mathew* 287 (K); Lachung [Lachong], 18 vii 1937, *Lowndes* 606 (E); Yampung, 21 vii 1913, *Rohmoo* 842 (E).

FIG. 6. *Cephalanthera erecta* var. *oblanceolata*: A, habit; B, flower; C, dorsal sepal; D, lateral sepal; E, petal; F, lip; G, column (front view); H, column (side view); I, column apex (back view); J, pollinaria. Drawn by Susanna Stuart-Smith from *Kanai et al.* 13575 (TI). Double bar-line = 1cm; single bar-line = 1mm.



This variety can be distinguished from the typical one in having smaller flowers, a lip that is simple to obscurely 3-lobed with a papillose apex and a spur that is angled from the apex.

Habenaria diphylla Dalzell in Hooker's J. Bot. Kew Gard. Misc. 2: 262 (1850). Type: India, Concan, *Dalzell* s.n. (holo. K-LINDL!, iso. K!).

var. **josephi** (Rchb.f.) N. Pearce & P. J. Cribb, **comb. nov.**

Basionym: *H. josephi* Rchb.f. in Trans. Linn. Soc. London ser. 2, 3: 114 (1888). Type: India, Sikkim, *Hooker* 253 (holo. K-LINDL!, iso. K! (Herb. Ind. Or. No. 42)). Syn.: *H. aitchisonii* Rchb.f. var. *josephi* (Rchb.f.) Hook.f., Fl. Brit. India 6 (1): 152 (1890).

H. clarkei Kränzlin in Bot. Jahrb. Syst. 16: 215 (1893). Type: India, Sikkim, *Hooker* Herb. Ind. Or. 42 (holo. B†, iso. K!, LE?).

Distribution and ecology. NE India and Bhutan. On open, grassy subalpine hillsides, in *Betula utilis* D. Don forest, among dwarf *Rhododendron* spp., and on grassy stream banks, 3660–4880m. Flowering July–September.

Additional specimens examined. BHUTAN. Thimphu district: Sharna, 12 vii 1938, *Gould* 1083 (K); Upper Mo Chu district: Chomo Lhari, 12 ix 1912, *Rohmoo* 450 (E); Laya, 30 vii 1983, *Sargent* 113 (E); Lingshi, 20 vii 1914, *Cooper* 1608 (BM); Tharizam Chu, 24 ix 1984, *Sinclair & Long* 5289 (E, THIM); Upper Pho Chu district: Gyophu La [Gaffoo La], 4 vii 1949, *Ludlow, Sherriff & Hicks* 16725 (BM); Upper Bumthang Chu district: Marlung, 11 vii 1949, *Ludlow, Sherriff & Hicks* 19397 (BM); Upper Kulong Chu district: Me La, 1 vii 1949, *Ludlow, Sherriff & Hicks* 20444 (BM).

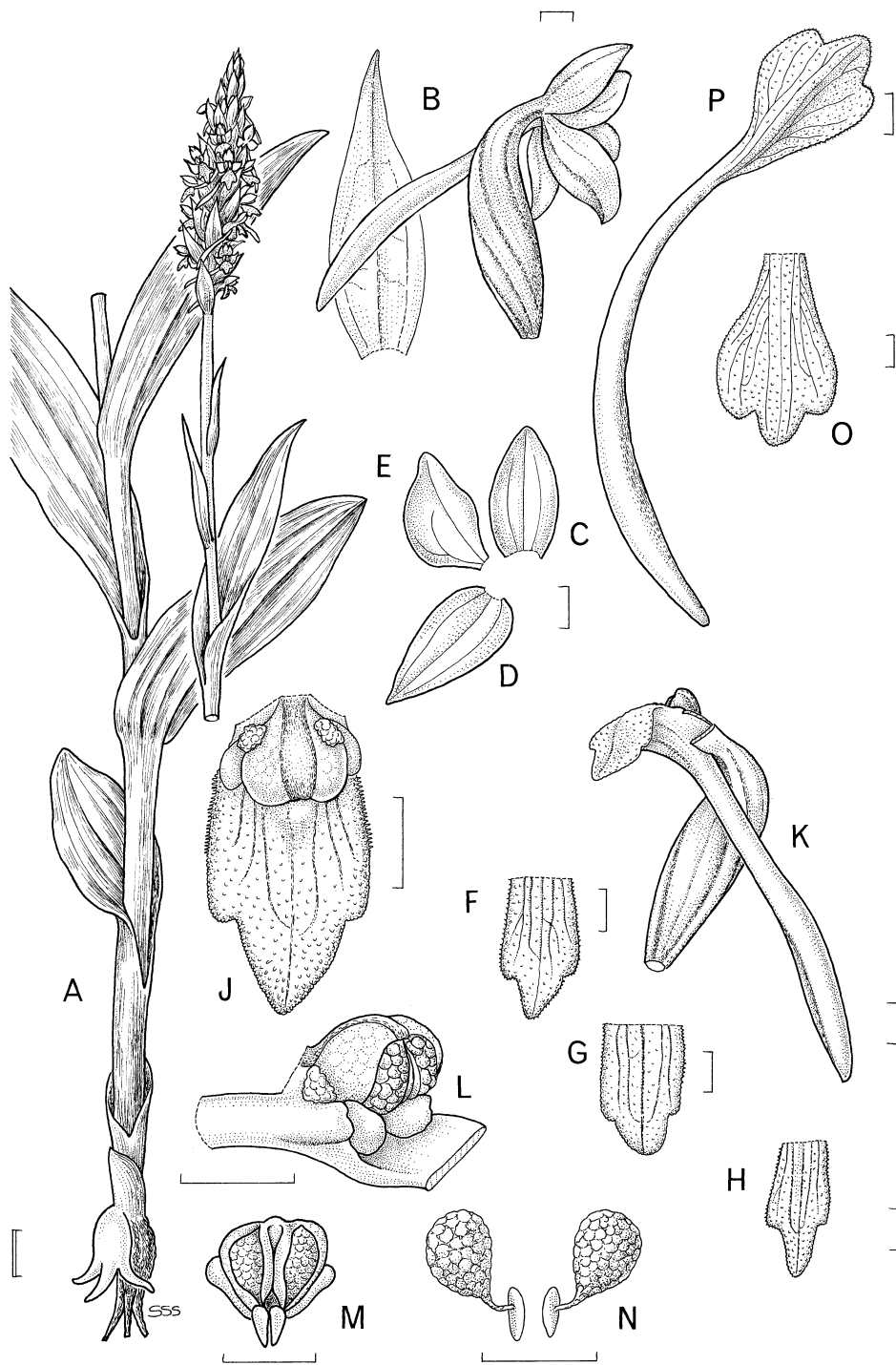
INDIA. Sikkim: Chhophtha, 17 vii 1996, *Long & Noltie* 305 (E); Lachen Valley, vii 1895, *Pantling* 398 (BM, K).

CHINA. Xizang [Tibet], Chumbi Valley, Lingmathang, 27 vii 1884, *King's collector* 22 (K); Chumbi Valley, Phari, vii 1879, *Dungboo* s.n. (K); Khambu, 10 vii 1939, *Gould* 2360 (K); SW of Lhozak Valley, 22 vii 1994, *Dickore* 9740 (GOET).

Renz (personal communication) considered *H. josephi* to be conspecific with *H. diphylla*. However, it differs from *H. diphylla* in that the stem is ebracteate while in *H. diphylla* there are many bracts above the leaves. It differs from *H. aitchisonii*, where it was placed as a variety by Joseph Hooker (1890), in having coiled tips to the lateral lobes of the lip.

Kränzlin (1893) described *H. clarkei*, based upon a collection (Herb. Ind. Or. No. 42), from Sikkim by Hooker. J. Hooker's collection number '42' from Sikkim

FIG. 7. *Gymnadenia orchidis* var. *pantlingii*: A, habit; B, flower with floral bract; C, dorsal sepal; D, lateral sepal; E, petal; F, lip (without spur); G, lip; H, lip; J, lip with column (detail); K, lip, spur and ovary (side view); L, column (side view); M, column (front view); N, pollinaria; *Gymnadenia orchidis* var. *orchidis*: O, lip; P, lip with spur. Drawn by Susanna Stuart-Smith, A and H from *Pantling* 404B (K); B–H, J–N from *Bedi* 394; O–P from *Wallich* 7039A (K). Double bar-line = 1cm; single bar-line = 1mm.



actually refers to part of the type collection of both *H. josephi* and *H. josephi* var. *aitchisonii*. The type material referred to by Kränzlin has probably been destroyed. The description closely resembles *H. diphylla* but the petals are described as ‘bipartitis’ which is not the case with *H. diphylla*. We are sure that the specimen referred to by Kränzlin is part of the type material referred to above and are therefore confident that it can be reduced to synonymy here.

Thunia alba (Lindl.) Rchb.f. in Bot. Zeitung (Berlin) 10: 764 (1852).

Basionym: *Phaius albus* Lindl. in Wall., Pl. Asiat. Rar. 2: 85, t.198 (1831). Type: Bangladesh, Silet (Sylhet), *De Silva* 3749B (lecto. K-LINDL!, iso. K-W!).

var. **bracteata** (Roxb.) N. Pearce & P. J. Cribb, **comb. et stat. nov.**

Basionym: *Limodorum bracteatum* Roxb. [Hort. Bengal.: 63 (1814) *nom. nud.*]; Fl. Ind., ed. 1832, 3: 466 (1832). Type: India, Meghalaya, Garrow [Garó] Hills, *M.R. Smith* s.n. (holo. probably lost). Neotype (selected by Seidenfaden in Opera Botanica 89: 12 (1986)): Nepal, Chandaghiry (Chandagherry), *Wallich* 3749A (K-W!).

Syn.: *T. bracteata* (Roxb.) Schltr. in Repert. Spec. Nov. Regni Veg. Beih. 4: 205 (1919).

T. venosa Rolfe in Orchid Rev. 13: 206 (1905).

Distribution and ecology. Nepal and NE India. Epiphytic, 660–1600m.

Additional specimen examined. INDIA. Sikkim, 1891, *Pantling* 171 (K).

There has been considerable debate as to the identity of this taxon since Rolfe (1905) distinguished *T. venosa* from plants previously grouped under *T. alba* (Lindl.) Rchb.f. Seidenfaden (1986) reviewed the position but it is worth pointing out that the Wallich plate of *Phaius albus* (t.198, 1831) has a lip with a yellow centre and pink branching veins. The only consistent difference between *T. bracteata* and *T. alba* seems to be the absence of yellow on the lip in the flowers of the former. The keels have been described as obscure but a photograph at Kew of *T. bracteata* clearly shows long, fimbriate keels on the lip.

It has been impossible to identify any authentic specimens of var. *bracteata* from Bhutan and Sikkim but Pradhan (1979) reported it from Sikkim and Darjeeling as *T. venosa* Rolfe. The original collection from the Garrow [Garó] Hills has probably been lost and Seidenfaden (1986) proposed the above neotypification.

Because the differences in vegetative and floral morphology between *T. alba* and *T. bracteata* are so slight we here propose that the plants lacking the yellow patch on the lip be treated as a variety of *T. alba*. Clearly further collections are required to test this solution.

Goodyera clavata N. Pearce & P. J. Cribb, **nom. nov.**

G. grandis King & Pantling in Ann. Roy. Bot. Gard. (Calacua) 8: 284 (1898), *non.* (Bl.) Bl. (1858). Type: India, Sikkim, Rumtek, Teesta [Tista] Valley, *Pantling* 460 (holo. CAL, iso. BM!, K!).

Distribution and ecology. India (Sikkim). 1200m. Flowering August.

King & Pantling (1898) described this species giving it the name *G. grandis*. However, they had apparently overlooked the earlier publication of the epithet by Blume for *Neottia grandis* when describing a plant from Bantam in Java in 1825. Later, in 1858, Blume transferred it to *Goodyera* as *G. grandis* in his *Flora Javae et Insularum adjacentium*. King & Pantling mentioned that the plant they described differed from all other *Goodyera* species by its characteristic clavate callosity on the anterior surface of the column below the stigma. We have examined the type specimen (*Pantling* 460) and material of *G. grandis* Bl. from Java and are confident that they are different species. The Himalayan plant has a lip lacking a claw, its apex is small, reflexed and adpressed to the sac which has setose swellings laterally, and the column has the characteristic clavate swelling. The Javanese plants have a lip with a central claw, a much longer recurved apex that is not adpressed to the sac, that has setose swellings mainly at the junction between the sac and the mesochile and a column lacking a clavate swelling.

Platanthera cumminsiana (King & Pantling) Renz, **comb. nov.**

Basionym: *Habenaria cumminsiana* King & Pantling in J. Asiat. Soc. Bengal 64 (3): 343 (1896). Type: India, Sikkim, *Pantling* 329 (holo. K!).

King & Pantling (1896) commented that their new species, *Habenaria cumminsiana*, was related to *H. pachycaulon* Hook.f. and belonged within section *Hologlossa* Hook.f. This section is characterized by plants with entire petals and a simple, entire, linear lip. Many of the species within this section have already been transferred to *Platanthera*, including *H. pachycaulon* Hook.f. (as *P. pachycaulon* (Hook.f.) Soó). The elongate rhizomatous tuber and the simple lip of *H. cumminsiana*, both characteristic of *Platanthera* species from the Himalayas, confirm that it belongs in *Platanthera*.

Peristylus alaschanicus (Maxim.) N. Pearce & P. J. Cribb, **comb. nov.**

Basionym: *Herminium alaschanicum* Maxim. in Bull. Acad. Imp. Sci. Saint-Pétersbourg 31: 105 (1887). Type: China, Tangut, *Przewalski* 1873 (holo. K!).

Syn.: *Habenaria spiranthiformis* Ames & Schltr. in Repert. Spec. Nov. Regni Veg. Beih. 4: 205 (1919), **syn. nov.** Type: China, Yunnan, *Maire* 2616 (holo. AMES!).

Seidenfaden (1977) considered this species to be conspecific with *Herminium lanceum* (Thunb. ex Sw.) Vuijk. However, we have examined several specimens from China that agree well with *H. alaschanicum* but are quite distinct from *H. lanceum*. It is also clear that *H. alaschanicum* does not belong in *Herminium*. Maximowicz (1887) mentions its 'calcar scrotoformi' in the protologue and examination of the type specimen confirms this. The genus *Herminium* does not have a distinct spur. This species is here transferred to *Peristylus*. The Chinese *Habenaria spiranthiformis* agrees well with *P. alaschanicus*, also having a short scrotiform spur, and we here reduce it to synonymy.

Cleisocentron pallens (Cathcart ex Lindl.) N. Pearce & P. J. Cribb, **comb. nov.** Fig. 8.

Basionym: *Saccolabium pallens* Cathcart ex Lindl. in J. Proc. Linn. Soc., Bot. 3 (9): 35 (1858). Type: India, Sikkim, icon. *Cathcart* (holo. K!).

Syn.: *S. trichromum* Rchb.f. in Hamburger Garten-Blumenzeitung 15: 51 (1859). Type: Himalayas, without precise locality, cult. Stange (holo. W! Herb. Reichenbach 19140/19141).

C. trichromum (Rchb.f.) Brühl, Guide Orchids Sikkim: 137 (1926).

Distribution and ecology. India (Sikkim). 330–630m. Flowering in July and August.

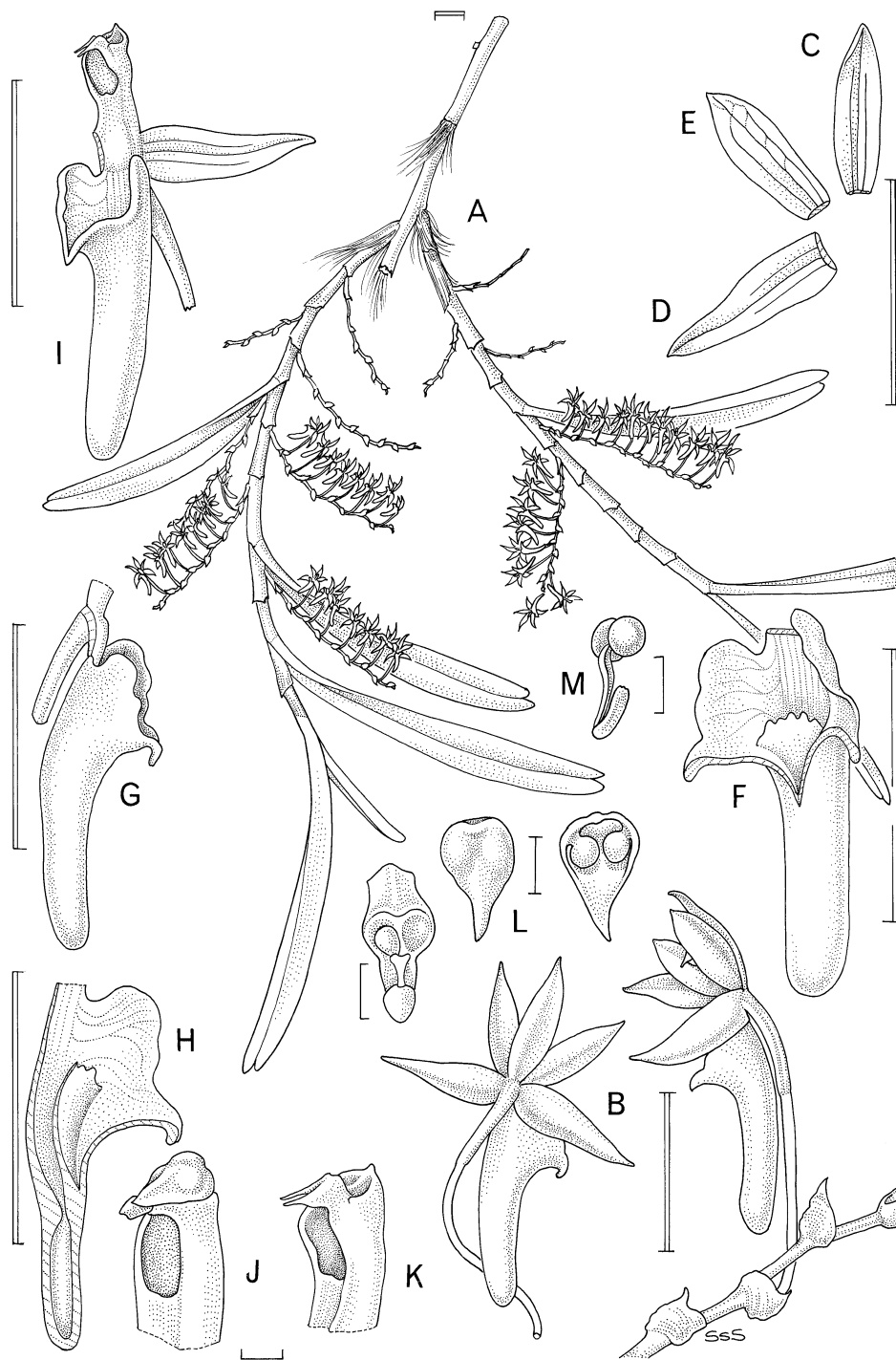
The taxonomy of this species has been the source of confusion for some time. Brühl (1926) based the description of his monotypic genus, *Cleisocentron*, on that of King & Pantling (1898). He selected *Saccolabium trichromum* as the type and reduced *S. pallens* to synonymy. Garay (in Seidenfaden, 1992) considered that these might be two distinct species based upon the difference in the appearance of the column-foot. Seidenfaden (1992) mentioned that the plate in *Xenia Orchidacea* (2: 119, t.139 (1874)) of *S. trichromum* shows no clear column-foot while the plate in King & Pantling (1898) showed a distinct column-foot. The illustration of Cathcart associated with the description of *S. pallens* clearly shows a column-foot and in all the Sikkim material we have seen has this feature. We believe that the plate in *Xenia Orchidacea* probably does indicate a decurrent column-foot by the constriction of the column into two equal parts. We have carefully examined these taxa and believe them to be conspecific. Garay (personal communication) agrees with this position.

There is an additional problem concerning the correct name for this species. The publication of *S. pallens* by Lindley was issued on 20 August 1858, while the reference by Reichenbach relating to *S. trichromum*, was published in February 1859. Therefore, the name *S. pallens* takes precedence over *S. trichromum* and the new combination based on the former is made above.

Bulbophyllum Thou.

We have chosen to accept *Bulbophyllum* as a broadly defined genus in the *Flora of Bhutan* treatment, whilst realizing that current work on the phylogeny of tribe *Bulbophyllinae* may lead to its narrower circumscription as advocated, for example, by Garay *et al.* (1994). Four new sections of *Bulbophyllum* are needed to accommodate Himalayan species of the genus that occur in the *Flora of Bhutan* region. These are as follows:

FIG. 8. *Cleisocentron pallens*: A, habit; B, flower with part of inflorescence (two views); C, dorsal sepal; D, lateral sepal; E, petal; F lip (front view); G, lip (side view); H, lip (sectioned); I, lip, column and lateral sepal; J, column; K, column (with anther removed); L, anther (three views); M, pollinarium. Drawn by Susanna Stuart-Smith from *Pantling* 92 (K). Double bar-line = 1cm; single bar-line = 1mm.



Bulbophyllum section **Biseta** J. J. Vermeulen, **sect. nov.**

Affinis *Bulbophyllo* sectioni *Racemosis* sed folio unico, inflorescentia basali, alis lateralibus duabus filiformibus elongatis ex ovario orientibus, petalis spathulatis et labello integro differt.

Type: *B. bisetum* Lindl., 1842.

Allied to *Bulbophyllum* sect. *Racemosa* Benth. & Hook.f. but differs in having unifoliate pseudobulbs, two characteristic filiform long lateral projections (jugae) that arise laterally from the ovary, spathulate petals and an entire lip.

Specimens of B. bisetum examined. BHUTAN. Sarbhang district: Dara Chhu, 12 iii 1982, Grierson & Long 3695 (E).

INDIA. Sikkim, Rimbi Chhu [Rungbee], ix 1892, *Pantling* 192A (K, W); Sikkim, Unlocalized, ix 1893, *Pantling* 192B (BM); Darjeeling, x 1881, *Gamble* 9881 (K); Khasia, *Griffith* s.n. (K-LINDL); Khasia, *Clarke* 6448 (K); Khasia, Churra, *Griffith* Kew. Dist. 5140 (K); Khasia, *Hooker & Thomson* Herb. Ind. Or. 23 (K); Khasia, *Hooker* 49 (K-LINDL).

Bulbophyllum bisetum Lindl. has been treated within section *Racemosa* Benth. & Hook.f. but it is easily distinguished from that section by the two characteristic filiform long lateral projections (jugae) that arise laterally from the ovary. Seidenfaden (1970) commented that his *B. bisetoides* has features closer to section *Desmosanthes* but 'the distinct setae place it near *B. bisetum*' and he used this sectional name with a note that its description was in preparation (Seidenfaden, 1992).

Bulbophyllum section **Henosis** (Hook.f.) P. Ormerod, **comb. et stat nov.**

Basionym: *Henosis* Hook.f., Fl. Brit. India 5 (2): 771 (1890). Type: *H. longipes* (Rchb.f.) Hook.f. (= *Bulbophyllum longipes* Rchb.f., 1861).

Specimens of B. longipes examined. BHUTAN. Deothang district: Deothang [Dewangiri], *Griffith* 65 (K-LINDL); Deothang [Dewangiri], *Griffith* Kew. Dist. 5133 (K); Upper Phu Chu district: Samadingkha, 3 i 1994, *D.B. Gurung* 32 (Herb. D. B. Gurung).

INDIA. E Bengal, Khasia, *Griffith* Kew. Dist. 5134 (K, W); Khasia, Jowye, *Clarke* 42549 (K); Sikkim, Engo, xii 1896, *Pantling* 357 (BM, K).

MYANMAR. Moulmein, *Lobb* s.n. (K-LINDL).

J. D. Hooker (1890) established the genus *Henosis* with the transfer from *Bulbophyllum* of *B. longipes*. He distinguished it from *Bulbophyllum* in having the lateral sepals at the apex of the elongate column-foot, the hyaline petals decurrent on the column-foot, and a villose lip. Hooker also thought that *B. gymnopus* Hook.f. and *B. wrayii* Hook.f. belonged to the same group. Garay *et al.* (1994) transferred *H. longipes* to *Monomeria* and *B. gymnopus* to *Dymoda*. We consider that *B. longipes* and *B. gymnopus* are too closely related to justify this separation. Ormerod (personal communication) suggested treating them as a section within *Bulbophyllum* but has not published a sectional name. Until further studies have resolved the many problems within the *Bulbophyllum* alliance, nomenclatural stability is better served by treating these species in a new section under *Bulbophyllum*.

Bulbophyllum section **Reptantia** J. J. Vermeulen, **sect. nov.**

Sectioni *Careyanis* affinis sed rhizomate filiformi ramificanti, folio unico, inflorescentia laxe multiflora, et labello integro distinguenda.

Type: *B. reptans* (Lindl.) Lindl., 1830.

Allied to *Bulbophyllum* sect. *Caryana* Pfitz. but with a branching filiform rhizome, unifoliate pseudobulbs, lax many-flowered inflorescences and flowers with an entire lip.

Specimens of B. reptans examined. BHUTAN. Tongsa district; Tashiling [Tassuling], Griffith 31 (K-LINDL); Tongsa, 6 iv 1982, Grierson & Long 4362 (K, E); Tashigang district: Tashi Yangtshi, Lichang, 30 v 2000, Dorji, Pearce & Cribb 74 (THIM); Sakden district: Takhtoo, 16 iii 1936, Ludlow & Sherriff 1191 (BM, E); Unlocalized, 11 ii 1983, Grierson & Long 3239 (E).

INDIA. Sikkim, Bakhim [Buckeen], 12 x 1875, Clarke 25308 (BM, K, W); Dingling, 29 xi 1871, Clarke 14814 (E, K, W); Kalej Kholo [Kuhart], 11 x 1870, Clarke 13010 (K, W); Unlocalized, ii 1891, Pantling 7A (BM, E, K); Unlocalized, 23 x 1974, Treutler 980 (K); Darjeeling: Sureil, ii 1893, Pantling 7B (K, W); Unlocalized, Griffith s.n. (W); Khasia, Griffith Kew. Dist. 5130 (K, W).

NEPAL. Mewa Kholo, 4 xi 1975, Beer 25703 (BM); Unlocalized, Rudge s.n. (holo. K-LINDL).

Bulbophyllum reptans (Lindl.) Lindl. has usually been included within section *Careyana* Pfitzer. However, it differs from other species of that section in having a racemose laxly-flowered inflorescence. Jaap Vermeulen (personal communication) proposed this new section for *B. reptans* and Seidenfaden (1992) used the sectional name with a note that its formal description was in preparation.

Bulbophyllum section **Striata** J. J. Vermeulen, **sect. nov.**

Sectioni *Racemosis* affinis sed folio unico longe petiolato, inflorescentia 2- vel 4-flora, floribus purpureo-striatis, petalis trivenosis et labello ad basin biauriculato distinguenda.

Type: *B. striatum* (Griff.) Rchb.f., 1861.

Allied to *Bulbophyllum* sect. *Racemosa* Benth. & Hook.f. but distinguished by its unifoliate pseudobulbs, longly petiolate leaf, 2–4-flowered inflorescences, purple-striped flowers, trinerved petals and lip that is biauriculate at the base.

Specimens of B. striatum examined. BHUTAN. Punakha district, Talo, 6 ix 1993, D. B. Gurung 28A (Herb. D. B. Gurung); Upper Pho Chu district: Kewa Nang, 25 x 1999, D. B. Gurung s.n. (Herb. D. B. Gurung).

INDIA. Assam, Mumbree, 11 xi 1836, Griffith 236/146 (holo. K-LINDL); Sikkim, x 1893, Pantling 298 (BM, K, W).

Bulbophyllum striatum (Griff.) Rchb.f. has formerly been included in section *Racemosa* Benth. & Hook.f., while Seidenfaden (1982) was unsure whether his *B. striatitipalum*, a closely related species, belonged within section *Desmosanthes* or in section *Racemosa*, having features of both. Vermeulen (personal communication)

suggested that they warranted a new section. Both *B. striatum* and *B. striatitopalum* are distinguished by their long petioles, purple-striped flowers and a bi-auriculate lip.

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