NOTES RELATING TO THE FLORA OF BHUTAN: XXXVII. NEW SPECIES AND RECORDS OF *ORCHIDACEAE* FROM BHUTAN AND INDIA (SIKKIM)

N. PEARCE* & P. CRIBB*

Three new species of Bhutanese orchids, *Aphyllorchis sanguinea*, *Cheirostylis sherriffii* and *Hetaeria pelota*, and one new Sikkimese species, *Lecanorchis sikkimensis*, are newly described. Their generic placement and affinities are discussed. A new combination in *Cheirostylis* is made for the Taiwanese *Zeuxine tabiyahanensis* Hayata. Records of five orchid species new to Bhutan are also presented.

Keywords. Himalayas, orchids, Taiwan.

INTRODUCTION

During the preparation of the forthcoming *Orchidaceae* account for the *Flora of Bhutan*, three new species of orchids from Bhutan and one from the Indian state of Sikkim have been recognized and are described here for the first time. Five further species are recorded for the first time in Bhutan.

NEW SPECIES

Aphyllorchis sanguinea N. Pearce & P.J. Cribb, **sp. nov. Fig. 1**
Affinis *A. montana* Rchb. f. sed floribus atrosanguineis; sepalis quinquenervis; petalis heptanervis; labello ad apicem late rotunadato, obscure bilobato; callis duobus semilunatis satis differt.
Type: Bhutan, Thimphu district, just below Talukah Gompa, above Simtokha, 19 vi 1988, *J.R.I. Wood* 6403 (holo. E!).

Plant terrestrial, aphyllous. *Stem* woody, glabrous, ridged towards the apex, c.23.5cm long, 4mm diam., tapering to c.1.5mm at apex; with two appressed, amplexicaul bracts, 4.5–5cm long. *Inflorescence* racemose, laxly flowered; rachis tapering towards the apex, c.9cm long; floral bracts lanceolate-oblong, acute, 2.5–4mm long. *Flowers* dark red; ovary c.15mm long. *Dorsal sepal* elliptic-lanceolate, acute, 5-nerved, c.11 × 2.6mm; lateral sepals broadly elliptic-lanceolate, falcate, acute, c.8.5 × 2–3mm. *Petals* broadly elliptic, obtuse, subfalcate, 7-nerved, c.9 × 3mm. *Lip* unguiculate, nerved, 6.5–9 × 6mm (at base, when spread); claw c.1.5 × 2mm; base simple, widening to midpoint; apex broadly bilobed, rotund; central disc with two short, semilunar calli,

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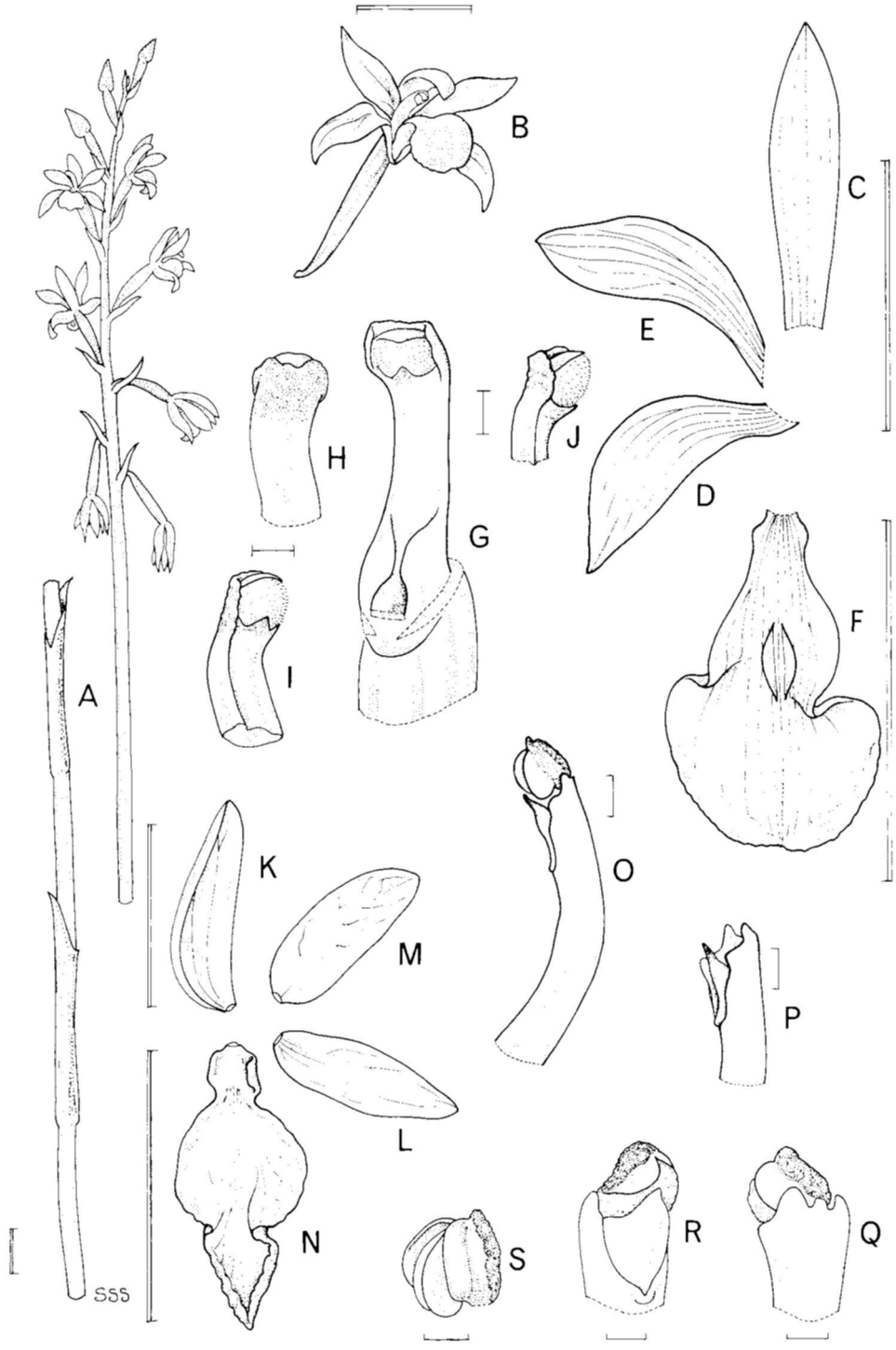
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c.1.75mm long. *Column* arcuate, anther terminal, 5–6.5mm long. *Fruit* twisted, ridged, 12 16mm long.

Distribution and ecology. Bhutan; not known elsewhere. On grassy tracksides in shady moist mixed forest; at 2800m.

The genus *Aphyllorchis* Blume, a genus of saprophytic orchids that are usually self-pollinated, was established in 1849. About 33 species, distributed from the Himalayas and SE Asia, south through the Malaysian Archipelago to Queensland, are currently recognized in the genus. Seidenfaden (1978) divided the genus into two groups, one with and the other without, caudate sepals. Two species, *A. alpina* King & Pantling and *A. montana* Rchb. f., have previously been found in Bhutan, and both belong to the group without caudate sepals.

The type material of *A. sanguinea* comprises a section of stem and inflorescence and a mounted floral dissection. The flowers are described as being dark red, the sepals are all strongly 5-nerved and the petals are 7-nerved. It is closely related to *A. montana* Rchb. f. but the flowers of that species are pale purple-brown and the sepals are 3-nerved.

Cheirostylis sherriffii N. Pearce & P. Cribb, **sp. nov. Fig. 2.**
Affinis *Z. tabiyahanense* Hayata et *Z. odorata* Fukuyama sed planta 20cm alta; foliis oblongo-lanceolatis, 5 12 × 2.5–4.5cm; pedunculo breve, usque ad 4.5cm longo; bracteo florali 2 × 0.5cm; sepalo dorsali 9 × 6mm; labello usque ad 1cm longo, hypochilo labelli callis duobus multidigitatibus ornato, mesochilo brevi et constricto, epichilo late bilobato, lobis apicalibus quadratis, subtiliter papillosis, marginibus sinuato-dentatis; columna usque ad 4mm longa, alis duobus, carnosis, verrucosis ad basin ferente; rostello bifido, usque ad 4mm longo; stigmatibus duobus lateralibus; anthera dorsali; polliniis duobus profunde divisis granulatis distinguendo.
Type: Bhutan, Chungsing, 20m. N of Hatisar (Gaylephug), in moss on rocks, 29 iii 1949, *Ludlow, Sherriff & Hicks* 18539 (holo. BM!).

A terrestrial herb, 15 20cm tall; rooting from nodes; roots fleshy, thick, pubescent. *Stem* 8 9cm tall, covered in sheathing leaf bases. *Leaves* 4–5, 5–12 × 2.5–4.5cm, oblong-lanceolate, acute to acuminate, veined and reticulate, petiolate; petiole sheathing at base, sheath hyaline, c.8mm across, petiole 2–4cm long. *Inflorescence* terminal, racemose, 6- to 10-flowered; peduncle 4.5cm long, pubescent, with two sheathing, lanceolate, apiculate bracts of 2 × 0.5cm; rachis 6.5cm long, pubescent;

FIG. 1. *Aphyllorchis sanguinea*: A, habit; B, flower; C, dorsal sepal; D, lateral sepal; E, petal; F, lip; G, column and top of ovary, ventral view; H, I, J, column apex, two views. *Aphyllorchis montana*: K, dorsal sepal; L, lateral sepal; M, petal; N, lip; P, column apex with anther removed, side view; Q, R, column apex, two views; S anther cap. A–J drawn from *J.R.I. Wood* 6304. K S drawn from the type collection. All drawn by Susanna Stuart-Smith. Single bar = 5mm, double bar = 10mm.

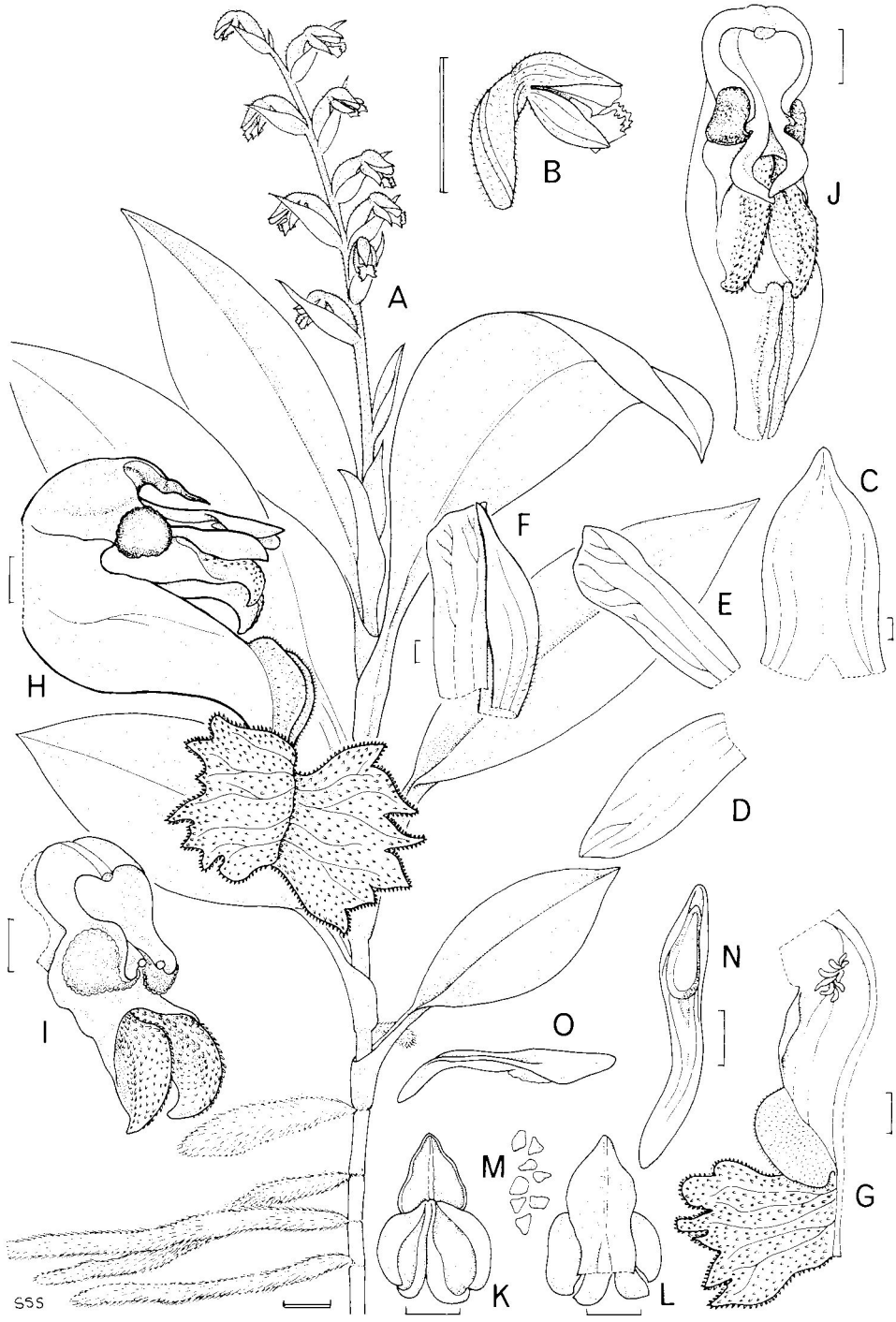
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TABLE 1. Comparison of *Zeuxine odorata* and *Cheirostylis sherriffii*

Character	*Zeuxine odorata*	*Cheirostylis sherriffii*
Habit	Up to 50cm	Up to 20cm
Leaves	Obliquely elliptic, 10×5.5cm	Oblong-lanceolate, 12×4.5cm
Inflorescence	Longly pedunculate	Shortly pedunculate
Floral bracts	To 1.5cm long	To 2cm long
Lip	2–3 retrorse callosities	2 sea-anemone-like calli

floral bracts 2×0.4cm, elongate-lanceolate, apiculate, hyaline, longer than the flowers, glabrous. *Flowers* 10×5mm, glabrous; pale green sepals and petals, lip white; ovary 7×3mm, sessile, twisted, pubescent. *Dorsal sepal* 9×6mm (when spread), elliptic, obtuse, sparsely pubescent on dorsal surface, cymbiform, 3-nerved, forming a hood with the petals over the column, joined at base to the petals; lateral sepals 10×4mm, joined at base, lanceolate, acute, 3-nerved, dorsally pubescent. *Petals* 9×3.5mm, joined at base to dorsal sepal, ovate, obtuse. *Lip* 10×8mm (at the epichile), 3-lobed; hypochile bowl-shaped, with a central lamellae and two raised, stalked, sea-anemone-like calli arising from the lateral nerves, margins infolded towards the mesochile, 5×4mm (when spread); mesochile short, constricted; epichile broadly 2-lobed, lobes quadrate, finely papillose, margins sinuate-dentate. *Column* 4mm long, with two fleshy, verrucose, wings at base; rostellum bifid, 4mm long; stigmas 2, lateral; anther dorsal; pollinia 2, deeply divided, granular.

Distribution and habitat. S Bhutan only. Endemic. 1200m. Humid, lower montane, evergreen forest. Known only from the type collection.

Cheirostylis sherriffii is superficially similar to the Taiwanese *Zeuxine odorata* Fukuyama but it is a smaller plant, the leaves being oblong-lanceolate rather than obliquely elliptic, the inflorescence shortly pedunculate, the floral bracts and dorsal sepal longer and the calli not retrorse (Table 1). It also resembles two other Taiwanese orchids *Cheirostylis tabiyahanensis* (Hayata) N. Pearce & Cribb (see below) and *Cheirostylis nemorosa* Fukuyama, but it differs in having much longer floral bracts, a papillose lip apex, two sea-anemone-like calli rather than bristle-like appendages on the hypochile of the lip, and a different column. In addition, *C. nemorosa* is said to be epiphytic.

Ormerod (annot. on sheet 1994, 1995) examined the type collection of *C. sherriffii*

FIG. 2. *Cheirostylis sherriffii*: A, habit; B, flower; C, dorsal sepal; D, lateral sepal; E, petal; F, dorsal sepal and petal; lip apex; G, lip in longitudinal section showing calli at base; H, column and lip side, view view; I, column, oblique view; K, L, anther cap; stipites; M, pollinia; N,O, stipes and viscidium, two views. All drawn from *Ludlow, Sherriff & Hicks* 18539 by Susanna Stuart-Smith. Single bar = 5mm, double bar = 10mm.

and was undecided whether it belonged to *Zeuxine* or *Cheirostylis*. However, he is now convinced that it belongs in *Cheirostylis* because of its lip shape and calli, the structure of the column with well-developed additional processes (P. Ormerod, pers. comm. Aug. 1997). The Taiwanese material also belongs there, the new combination for *C. tabiyahanensis* being made below.

Subtribe *Goodyerinae* presents many problems and inconsistencies taxonomically and there is a pressing need for re-evaluation of the included genera, e.g. using molecular techniques. Brieger (1970) separated the genera on the basis that *Cheirostylis* lacks column wings and noted that the mesochile of the lip of *Zeuxine* abruptly changes to an elliptic or T-shaped epichile. Seidenfaden (1978) stated that the circumstances and exact delimitation of the genus *Zeuxine* remains uncertain. Dressler (1993) noted that the rhizome of *Cheirostylis* is thick and fleshy and the roots mere bumps of ridges on the rhizome. Ormerod (1995) commented that there are a few species in each genus with atypical features. The sepals of *Cheirostylis* are usually connate halfway to form a tube with the petals, and the floral bracts are generally smaller than the flowers; in *Zeuxine* the petals are adnate to the base of the dorsal sepal only and the floral bracts are generally larger than the flowers.

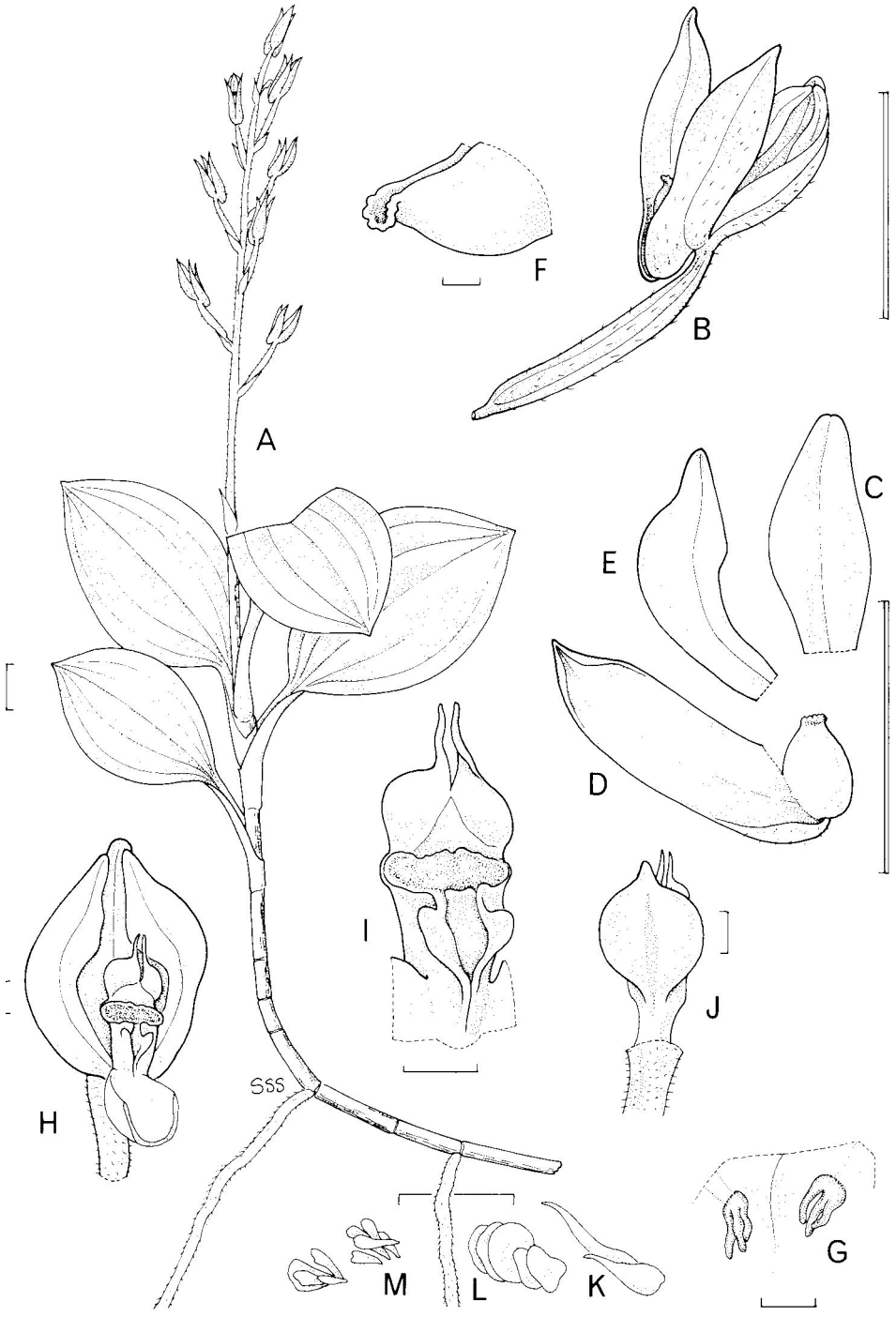
Cheirostylis tabiyahanensis (Hayata) N. Pearce & P.J. Cribb, **comb. nov.**
Basionym: *Zeuxine tabiyahanensis* Hayata, Icon. Pl. Formos. 6: 89 (1916). Type: Taiwan, Tabiyanhazan, v 1916, *Hayata* s.n. (holo. TI).

Although described by Hayata as a *Zeuxine* we believe that this little-known Taiwanese orchid is better placed in *Cheirostylis*, so the necessary transfer is made here.

Hetaeria pelota N. Pearce & P.J. Cribb, **sp. nov. Fig. 3.**
Affinis *H. rubenti* (Lindl.) Benth. ex Hook.f. sed the inflorescence laxe pauciflоribus, floribus albis grandioribus, petalis falcatis non-malleotis, et ovario grandiore differt. Type: Bhutan, Upper Mo Chu district, Gichha (Gasa), 24 viii 1914, *R.E. Cooper* 2714 (holo. E!).

Plant terrestrial, 15–17cm tall; rhizome terete, rooting at nodes; nodes 10–18mm apart; roots 1–2mm thick. *Leaves* 4–5, broadly elliptic to elliptic-ovate, acute, petiolate, veined, softly reticulate, 4–7 × 2.5–4cm; petiole widening and sheathing at base, 1–2cm long. *Inflorescence* terminal, racemose, laxly 6- to 8-flowered; peduncle tapering towards apex, softly pubescent, 9–10cm long; rachis 5–6cm long, somewhat compressed, few glandular hairs; floral bracts short, triangular, pilose, 3–4mm long.

FIG. 3. *Hetaeria pelota*: A, habit; B, flower; C, dorsal sepal; D, lateral sepal; E, petal; F, lip apex; G, calli at base of lip; H, column, petals and dorsal sepal, ventral view; I, column apex, ventral view; J, column, dorsal view; K, stipites; L, M, pollinia. All drawn from *Cooper* 2714 by Susanna Stuart-Smith. Single bar = 5mm, double bar = 10mm.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Flowers non-resupinate, c.8mm long; white; pedicellate ovary long, 10–15mm long. *Dorsal sepal* large, oblong-ovate, obtuse, concave, cucullate with petals, 1-nerved, 7–8 × 3–4mm; *lateral sepals* oblong, subacute to acute, 1-nerved, joining at base of saccate lip, 8.5–10 × 2.5–3.5mm. *Petals* oblong-oblanceolate, falcate, obtuse, 1-nerved, 7.5–8.5 × 2.5–3.5mm (at widest point). *Lip* broad pyriform in outline, c.5.5mm long; base deeply saccate, connate with column for initial third, with an elongate, stalked, furcate callus on either side within; tapering to a slightly expanded, serrate, apex. *Column* 3.3–5mm long; base with two flap-like wings, c.1.5mm long; stigmas 2, merging together at centre; rostellar arms extended upwards; anther cucullate, c.3.3 × 2.4mm; anther-cap dorsal, rotund, apiculate, c.3.3 × 2.4mm.

Distribution and ecology. Bhutan, not known elsewhere. Montane forest; 2330m.

Hetaeria rubens (Lindl.) Benth. ex Hook. f. is the only species previously reported from Bhutan. The material upon which the present description is based is rather poor but it clearly represents a new species. Ormerod (1995) outlined some of the distinguishing features of the genus and, in a personal communication, considers that the present plant belongs there. *Hetaeria pelota* is more closely related to those *Hetaeria* species that have a saccate hypochile and tapering serrate epichile, than to *H. anomala* (Lindl.) Hook.f., which has a bifid epichile lacking a saccate hypochile.

Hetaeria pelota is allied to *H. rubens* but differs in having a lax, few-flowered inflorescence, larger white flowers, and petals which are falcate and not malleolate. The ovary, petals, lip and column are all larger than in *H. rubens* but the plant and leaves are smaller (Table 2).

Etymology. Named because of a resemblance of the lip to the *cesta* (basket-like racket) used in the endemic game of pelota.

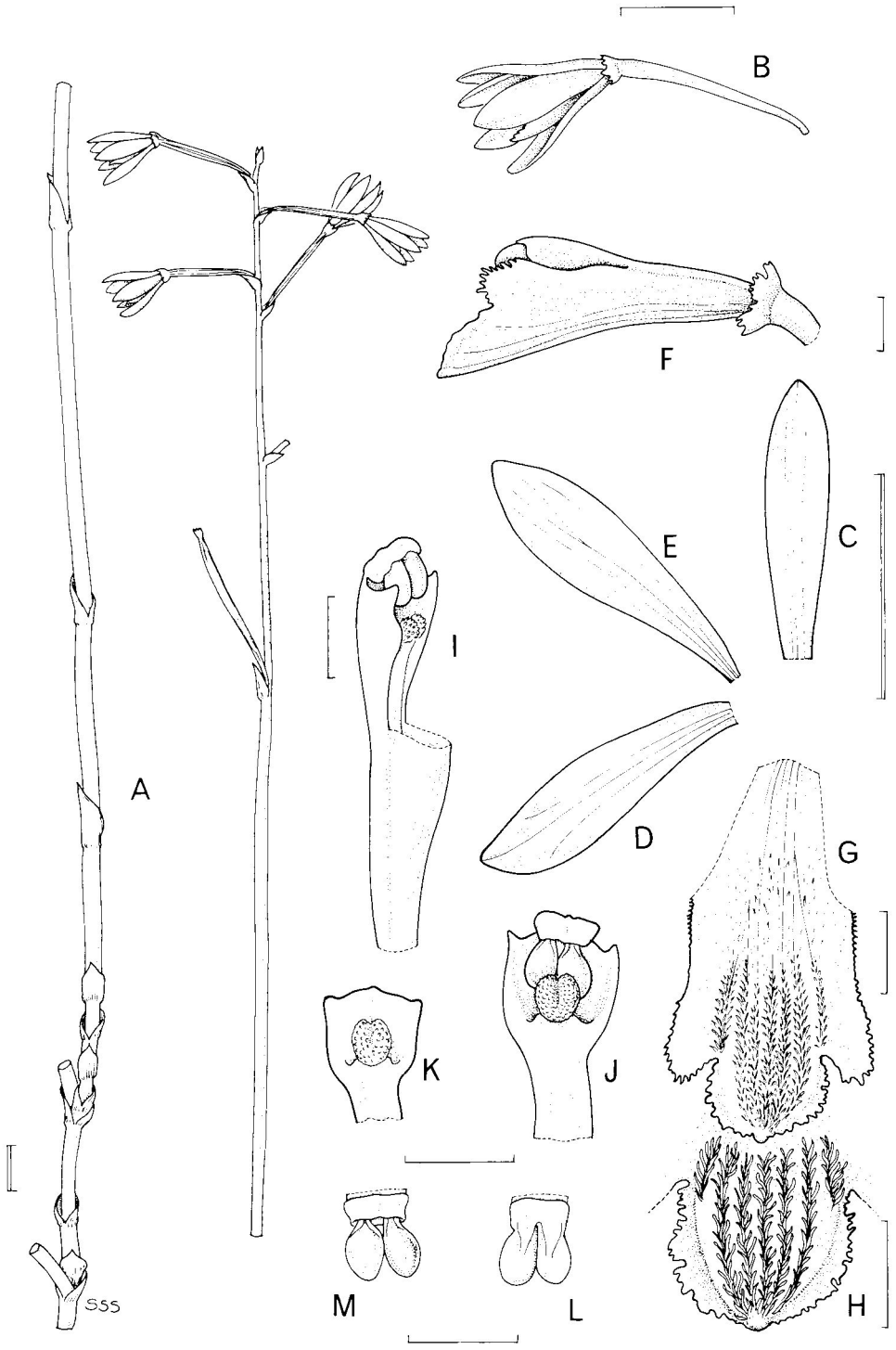
Lecanorchis sikkimensis N. Pearce & P. Cribb, **sp. nov. Fig. 4.**

Affinis *L. flavicante* Fukuyama sed bracteis floralibus 3–4mm longis, sepalis petalisque obscure purpureis, lobo medio labelli pallide luteo labellis lateralibus obscure purpureis, ovario et pedicello 1.5–3cm longo, nervis apicalibus labelli molliter pubescentis differt.

Type: Sikkim, above Rungbee (Rimbi Chhu), at 7000ft., 13 vi 1902, *Prain's collector* s.n. (holo. K!).

Plant terrestrial, saprophytic, herbaceous, 35–45cm tall; rhizome coiled, woody, c.3mm thick. *Stem* 35–45cm tall and up to 1.5mm thick, erect, thin, ridged, narrowing towards apex, glabrous; basal half covered with glabrous, tubular sheaths, 1–2cm

FIG. 4. *Lecanorchis sikkimensis*: A, habit; B, flower; C, dorsal sepal; D, lateral sepal; E, petal; F, lip and column, side view; G, lip; H, lip apex showing details of the callus; I, column and ovary, oblique view; J, column, ventral view; K, column apex, ventral view; L, M, pollinarium. All drawn from the type by Susanna Stuart-Smith. Single bar = 5mm, double bar = 10mm.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long; upper part with well-spaced, deltoid, acute, glabrous bracts, c.9mm long. *Inflorescence* terminal, racemose, laxly 3- to 5-flowered; floral bracts 3–4mm long, short, ovate, acute, glabrous. *Flowers* 1 1.4cm long, campanulate, semi-open; sepals and petals a dull purple, lip with a pale yellow midlobe and dull purple side lobes; ovary 1.5 3cm × 0.5mm, narrow, calyculate at apex, dull purple; calyculus erose-denticulate. *Sepals* subsimilar; dorsal sepal 12–15 × 3–4mm, oblong, obtuse; lateral sepals up to 15 × 4mm, oblong-oblanceolate, obtuse. *Petals* 13–15 × 3–4mm, clavate, obtuse. *Lip* 10–12mm long and 6mm wide; base tubular, softly hairy, attached to the column for about half the length; apex 3-lobed, 5-nerved, lateral lobes broadly triangular to subquadrate, edges erose-denticulate, midlobe softly hairy, hairs retroflexed; disc ecallose. *Column* 6–7mm long, erect, slender, clavate, connate with the base of the lip; column wings rectangular to trapezoid; stigma central, projecting; pollinia 2.

Distribution and habitat. India (Sikkim only). Endemic. Damp montane woods. 2100m. Known only from the type collection.

Lecanorchis, comprising about saprophytic 15 species distributed in Sikkim, Japan (Honshu) to Java and Papua New Guinea, was established by Carl Blume in 1856.

Lecanorchis sikkimensis has a three-lobed lip with an odd number of major nerves and trapezoid column wings and belongs to section *Flavicantes*. It differs from the closely related *L. flavicans* in having purple, rather than yellow, flowers and a lip with a softly, rather than coarsely, hairy apex.

Rolfe had identified the type material in the Kew Herbarium as *L. japonica* Bl. but Tang & Wang re-examined the material (3 viii 1938) and considered it to belong to a new species, to which they gave the provisional name *L. sikkimensis* on a *determinavit* label attached to the sheet. This name has not apparently been published. We agree with Tang and Wang that this is a new species and have used the name that they suggested.

Seidenfaden (1978) discussed this specimen, concluding that it was more closely related to *L. flavicans* Fukuyama than to *L. japonica*, but mentioned that the genus required revision. Hashimoto (1990) revised the Japanese species and proposed a new sectional delimitation.

TABLE 2. Comparison of *Hetaeria pelota* and *H. rubens*

Character	*Hetaeria pelota*	*Hetaeria rubens*
Ovary	10 15mm	8 9mm
Petals	8.5 10mm	3 4mm
Lip	c.5.5mm	4 5mm
Column	3.3–5mm	c.2mm

NEW RECORDS

The following are new records for Bhutan and Sikkim:

Cephalanthera damasonium (Miller) Druce in Ann. Scot. Nat. Hist. 1906: 225 (1906). Type: based upon '*Helleborine flore albo vel Damasonium montanum latifolium*' in C.Bauhin's *Pinax*: 187 (1623).

Specimen examined: Bhutan, Punakha district, between Zamjetin and Tang Chu, 9 vi 1969, *Bowes Lyon* 15004 (BM).

Habitat: Terrestrial in semi-evergreen oak forest at 2700m.

Cephalanthera damasonium is widespread in Europe across to Iran and has also recently been reported from the Himalayas, northern Burma and China (Cribb & Chen, 1997). Bowes Lyon collected it in Punakha District in Bhutan in June 1969 and one of us (PC) saw flowering plants north of Wangdi in June 1998 (in grassy patches by a track in open oak forest at 2250m elevation, below the Tashi La Pass).

Chamaegastrodia asraoa (J. Joseph & N.R. Abbareddy) Seidenfaden & A.N. Rao in Nordic J. Bot. 14(3): 299 (1994). *Evrardia asraoa* J. Joseph & N.R. Abbareddy in Bull. Bot. Surv. India 25(1-4): 232 (1983). Type: India, Meghalaya, Khasia Hills, *Joseph* 73566A (holo. CAL), *Joseph* 73566B–D (iso. ASSAM), *Joseph* 73566E (iso. MH).

Specimen examined: Bhutan, Tongsa district, Nimjong, 25km ESE of Shemgang, 1985, *Broad* s.n. (E).

Habitat: Growing in shade of trees in montane forest at 3000m.

A very distinctive red-stemmed saprophyte, closely allied to *Hetaeria* and *Zeuxine*.

Cymbidium goeringii (Rchb.f.) Rchb.f. in Walpers, Ann. Bot. Syst. 3: 547 (1852). Type: Japan, *Goering* 592 (holo. W!).

Specimen examined: Bhutan, Punakha district, Lobesa NRTI, 2 iii 1969, *D.B. Gurung* s.n. (E).

Habitat: Evergreen forest; 1600m.

Cymbidium goeringii is a variable species that is widely distributed across eastern Asia from Japan and Taiwan to China and the eastern Himalayas.

Eriodes barbata (Lindl.) Rolfe in Orchid Rev. 23: 326 (1915). *Tainia barbata* Lindl. in Gard. Chron. 17: 68 (1857), *Eria barbata* (Lindl.) Rchb.f. in Walpers, Ann. Bot. Syst. 6: 270 (1861). Type: India, Khasia Hills, *Griffith* 5297 (holo. K!).
Syn.: *Eriodea* sp. Griff., Itin. Pl. Khasyah Mts.: 83 (1848).
Eriae sp. Griff., Not. Pl. Asiat. 3: 308 (1851).

Specimen examined: Bhutan, Punakha district, Samadingkha, 4 i 1994, *D.B.Gurung* 33 (E).

Habitat: Epiphyte in evergreen forest; 1260m.

Eria ferruginea Lindl. in Bot. Reg. 25; t.35 (1839), *non* Tijsmann & Binnendijk (1862). *Pinalia ferruginea* (Lindl.) Kuntze, Rev. Gen. Pl. 2: 679 (1891). Type: India, cult. *Loddiges* s.n. (holo. K!).

Specimen examined: Bhutan, Punakha district, between Wangdi Phodrang and Chirang, 1994, *D.B. Gurung* s.n. (E).

Habitat: Epiphyte in evergreen forest; 800m. Flowering in May.

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