

NOTES ON AUSTRALASIAN ORCHIDS 8: EIGHT NEW SPECIES OF *HYMENOCHILUS* (PTEROSTYLIDINAE) AND CLARIFICATION OF TWO PREVIOUSLY DESCRIBED SPECIES

DAVID L. JONES¹, HEIDI C. ZIMMER^{2,3} & MARK A. CLEMENTS²

¹Heron Crescent, Kalaru, New South Wales, 2550, Australia.

² Centre for Australian National Biodiversity Research (Joint Venture Between Parks Australia and CSIRO), GPO Box 1700, Canberra, ACT, 2601, Australia.

³ Corresponding author: Heidi.Zimmer@csiro.au

ABSTRACT. Eight new species of *Hymenochilus* from Australia are described and illustrated. Six of the new species have affinities to (and are here compared with) *H. cynocephalus*: *H. anemophilus*, *H. calcicola*, *H. cymbellus*, *H. longipes*, *H. nemoralis* and *H. pachylus*. *Hymenochilus anemophilus* is shorter (2–8 cm), with dark green strongly veined rosette leaves, crowded dark green flowers, oblong to obovate labellum lamina and, a broader blunter beak on the labellum appendage; *H. calcicola* is shorter (3–12 cm), crowded green flowers with prominent dark green stripes, ovate petals with a strongly developed basal flange on the anterior side and narrow elliptic labellum lamina with a broad pointed beak on the labellum appendage; *H. cymbellus* differs by its sparser basal rosette with narrower rosette leaves, thinner scapes, flowers with distinct darker green stripes and shallowly saccate lateral sepals that narrow inwards to a distinctly pointed apex; *H. longipes* differs by its thin-textured rosette leaves, widely spaced darker green flowers with darker green veins, elliptic-obovate labellum lamina and a longer labellum basal appendage which protrudes prominently from the flower in side view; *H. nemoralis* has longer rosette leaves, thicker scape and darker green flowers with prominent narrow dark green stripes; *H. pachylus* has thicker rosette leaves, taller, thicker scape, flowers prominently striped, elliptic-obovate labellum lamina and labellum appendage with a short thick beak. Two of the new species have affinities (and are here compared) with *H. muticus*: *H. pagophilus* and *H. pisinnus*. *Hymenochilus pagophilus* differs by its moderately crowded to crowded flowers, broader, shinier flowers and rectangular-obovate labellum and *H. pisinnus* differs by its smaller rosette with smaller, narrower leaves, thinner scape, smaller flowers, that are often on long pedicels, shorter, shallowly saccate lateral sepals, smaller rhomboid petals and, smaller obovate labellum. In addition, *Hymenochilus cynocephalus* and *H. muticus*, are characterised in the strict sense with full descriptions, distribution, and habitat.

KEYWORDS / PALABRAS CLAVE: Arid orchid, Australia, conservation status, Cranichideae, estado de conservación, *Hymenochilus cynocephalus*, *Hymenochilus muticus*, orquídea árida, *Pterostylis*, taxonomía, taxonomy

Introduction. *Hymenochilus* D.L.Jones & M.A.Clem. is a genus of tuberous terrestrial orchids classified in the subtribe Pterostylidinae, tribe Cranichideae. Orchids in Pterostylidinae typically have green to greenish-white flowers with a hooded appearance, due to an inflated dorsal sepal which overlaps the petals to form a galea (hood), which encloses the column. They are often referred to as ‘greenhood orchids’.

Hymenochilus is a genus segregated from the genus *Pterostylis* (Jones & Clements 2002). Species in *Hymenochilus* are characterised by having basal, sessile or subsessile, scape-encircling rosette leaves, mul-

tiflowered racemes of small, spirally arranged greenish flowers with a short galea, weakly fused, recurved, arcuated, thin-textured lateral sepals, cupped (or rounded inward to a cup shape) towards the base, and with short blunt convergent apices, unlobed, thin-textured labellum lamina with an emarginate apex, vestigial callus and basal appendage more or less at right angles to the lamina, the apical part with thickened margins and a central ridge which can extend as a beak.

Three groups can be distinguished morphologically within *Hymenochilus*. Group one: *Hymenochilus muticus* group which is characterised by a pale green or

whitish labellum with a darker green recurved oblong appendage which has thickened margins and a short protruding ridge ending below the apex of the appendage. Group two: *Hymenochilus cycnocephalus* group which is characterised by the labellum appendage arising nearly at right angles to the labellum lamina and bearing a prominently protruding apical beak. Group three: *Hymenochilus bicolor* group which is characterised by a labellum with swollen dark blackish green appendage recurved at a steep angle and with thickened margins and short blunt protruding ridge ending below the apex of the appendage.

Currently *Hymenochilus* comprises of 24 species, with 22 species endemic to Australia, most in the south-east, and two species which are endemic in New Zealand (Jones 2008, 2009, 2021). A further eight new species, previously included as *ineditus* in Jones (2021), are described here, six in the *H. cycnocephalus* group and two in the *H. muticus* group. Because of substantial taxonomic changes in the genus, the opportunity is taken to characterise *Hymenochilus cycnocephalus* and *H. muticus* in the strict sense with full descriptions, distribution and habitat details.

Materials and Methods. This study is based on the morphological examination of living plants and fresh flowers, examination of dissected flowers mounted on cards, dried and spirit-preserved herbarium specimens and images of living flowers. Herbarium collections, spirit and dried or photographs, were examined from the following herbaria: AD, BRI, BM, CANB, CBG, HO, MEL, NSW and QVM. Protologues were reviewed, including Brown (1810) and Fitzgerald (1876), and descriptions of these (and related) taxa in other sources (e.g., Backhouse 2023, Brown 2022, Copeland & Backhouse 2022, Hoffman *et al.* 2019, Jones 2021, Neijalke 2022). Descriptions of the new taxa were made from fresh specimens. Drawings were prepared using ink and/or pencil on paper, based on study of living plants and fresh flowers, examination of dissected flowers mounted on cards, dried and spirit-preserved herbarium specimens and images of living flowers. Unless otherwise indicated, all types of *Hymenochilus* relevant to this study (or photographs thereof) have been seen by the senior author. Measurements given in the descriptions are from living plants or dissected flowers on cards. Notes on distribution,

habitat and ecology were derived from the senior author's own observations, from those of colleagues, or from herbarium labels. Suggestions on conservation status are based on field work, comments from colleagues and publications, and are evaluated using the IUCN Red List categories and criteria (IUCN 2022)

TAXONOMIC TREATMENT

1. *Hymenochilus anemophilus* D.L.Jones, *sp. nov.* (Fig. 1–2).

TYPE: Australia. South Australia: Mokota Grassland Reserve, 1 km N of Mt Cone, 25 Aug. 2000, *R.J.Bates 57244* (holotype, CANB 621066; isotype, AD).

DIAGNOSIS: With affinity to *H. cycnocephalus* but it differs by its dwarf habit (2–8 cm tall *cf.* 8–20 cm tall in *H. cycnocephalus*), dark green strongly veined rosette leaves (paler green and faintly veined leaves in *H. cycnocephalus*), crowded dark green flowers (moderately crowded to separated paler green flowers in *H. cycnocephalus*), oblong to obovate labellum lamina (oblong to elliptic in *H. cycnocephalus*) and, a broader blunter beak on the labellum appendage (narrower blunt or pointed beak in *H. cycnocephalus*).

Leaves 5–10; *lamina* elliptical, 10–25 mm long, 5–12 mm wide, dark green, fleshy, shiny, strongly veined, margins entire, apex acute to apiculate. *Scape* 2–8 cm tall, 2–3 mm wide, 2–12-flowered. *Sterile bracts* 1–2, closely sheathing to spreading, elliptic when flattened, 5–11 mm long, 3–5 mm wide, fleshy, acuminate. *Fertile bracts* similar, closely sheathing. *Pedicels* 4–7 mm long, straight, slender. *Ovaries* oblong to elliptic, 3–5 mm long, *ca.* 1.5 mm wide. *Flowers* porrect, crowded, 8–10 mm long, 4–5 mm wide, pale green, faintly striped. *Dorsal sepal* 9–11 mm long, 4–6 mm wide, slightly gibbous at the base, shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* deflexed, shallowly saccate, dorsally gibbous, when flattened 6–7 mm long, 6–7 mm wide, points subacute, *ca.* 4 mm apart. *Petals* asymmetrical, more or less ovate, 7–8 mm long, 3.5–4.0 mm wide, translucent green with darker veins, dorsal margin strongly thickened, dark green, with a dorsal gibbosity above the middle, ventral margin smooth. *Labellum claw* irritable, ligulate, *ca.* 1.6 mm long, *ca.* 1.3 mm wide. *Labellum lamina* oblong to obovate, 2.2–2.5 mm long, 1.8–2.2 mm wide, green

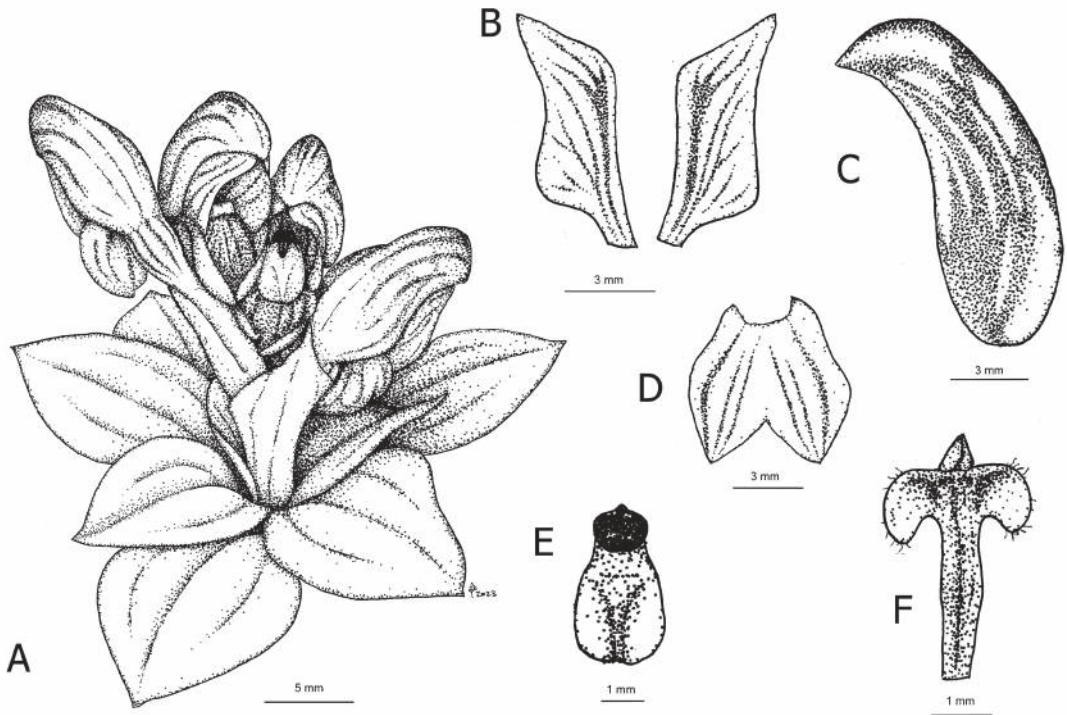


FIGURE 1. *Hymenochilus anemophilus* D.L.Jones. **A.** Habit. **B.** Petals. **C.** Flower, side view. **D.** Synsepal. **E.** Labellum flattened, from above. **F.** Column, front view. Illustration by Z. Groeneveld. Mokota Grassland Reserve SA, R. Bates 57244, 25 Aug. 2000.

with a dark green basal appendage, membranous, apex emarginate. *Basal appendage* recurved at right angles, oblong-tapered, 1.0–1.5 mm long, *ca.* 1 mm wide, margins dark green, thickened, central ridge narrow, raised above the margins, dark green, ending in a broad, blunt beak 0.8–1.3 mm long. *Callus* a thickened, darker green, tapered medial ridge on the labellum lamina. *Column* obliquely erect, 5–7 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, *ca.* 2.3 mm long, *ca.* 1.3 mm wide, basal lobe deltate, inner margins sparsely ciliate; barrier cilia *ca.* 0.3 mm long, clavate. *Anther* *ca.* 1 mm long, obtuse. *Pollinia* clavate, *ca.* 1 mm long, yellow, mealy. *Stigma* central, scutiform, *ca.* 3 mm long, *ca.* 1.5 mm wide, raised. *Capsules* not seen.

DISTRIBUTION AND ECOLOGY: Restricted to small areas of montane grassland near Mount Bryan and Spalding in the Northern Lofty district of South Australia, between 550–750 m elevation. Grows in bleak situations on high windswept grassy hills in heavy, moisture-

retentive red clay loam. Winter snowfalls and strong winds are relatively frequent at these sites (R. Bates pers. comm.).

FLOWERING: August and September.

RECOGNITION: *Hymenochilus anemophilus* is characterised by dwarf habit (to 8 cm tall); relatively large, dark green, fleshy, strongly veined rosette leaves; short, thick scape; crowded, pale green flowers with faint darker stripes; deeply saccate lateral sepals; ovate to oblong petals; and an oblong to obovate labellum lamina and labellum appendage with a blunt beak.

SIMILAR SPECIES: Compared with *Hymenochilus anemophilus*, *H. cynocephalus* is taller growing, with thinner-textured, paler, faintly veined rosette leaves and broader, moderately crowded to separated, paler green, faintly striped flowers, oblong to elliptic labellum with a narrower, blunt or pointed beak. *Hymenochilus calcicola*, which grows on limestone, is slightly taller growing (to 12 cm tall) than *H. anemophilus* with strongly



FIGURE 2. *Hymenochilus anemophilus* D.L.Jones. Bungaree, SA. Photo by R. Bates.

striped flowers and a narrow elliptic labellum lamina and labellum appendage with a broad, pointed beak. *Hymenochilus spissus* grows to about 12 cm tall and can be distinguished from *H. anemifolius* by its smaller, paler, faintly striped flowers, shallowly saccate lateral sepals and smaller oblong labellum. *Hymenochilus pratensis* grows to about 15 cm tall and can be distinguished from *H. anemifolius* by its broad, almost round, rosette leaves and smaller, boldly striped flowers.

CONSERVATION STATUS: Of restricted distribution but occurring in a conservation reserve. A preliminary extinction risk assessment, based known occurrences of these species, yields an estimated extent of occurrence of 240 km² and area of occupancy of 28 km². The species is at risk of continuing decline as a result of the impacts of feral animals and drought on its montane grassland habitat. This indicates that the species may be eligible for listing as Endangered (B1+2ab).

ETYMOLOGY: From the Greek *anemos*, wind, and *philos*, loving, in reference to the bleak windswept habitat where this species grows.

ILLUSTRATIONS: Page 549, Jones (2021); page 238, Niejalke (2022).

2. *Hymenochilus calcicola* D.L.Jones, *sp. nov.* (Fig. 3–4).

TYPE: Australia. South Australia: Belvedere, private property called Wombat Plains, 9 Sep. 1999, D.L.Jones 16800, M.Garratt & J.Eckert (holotype, CANB 606695; isotype, AD).

DIAGNOSIS: With affinity to *H. cycnocephalus* but it differs by its short habit (3–12 cm tall *cf.* 8–20 cm tall in *H. cycnocephalus*), crowded green flowers with prominent dark green stripes (moderately crowded to separated faintly striped flowers in *H. cycnocephalus*), ovate petals with a strongly developed basal flange on the anterior side (small basal flange in *H. cycnocephalus*) and narrow elliptic labellum lamina with a broad pointed beak on the labellum appendage (narrower blunt or pointed beak in *H. cycnocephalus*).

Leaves 5–12; *lamina* elliptical, 5–22 mm long, 3–12 mm wide, pale green to green, thick, fleshy, dull, veins raised, margins entire or slightly wavy, apex acute to acuminate. *Scape* 3–12 cm tall, 2–3 mm wide, 3–11-flowered. *Sterile bracts* 2–4, often in a crowded basal group, closely sheathing to spreading, elliptic when flattened, 5–12 mm long, 3–6 mm wide, thin-textured, acuminate. *Fertile bracts* similar, closely sheathing. *Pedicels* 3–5 mm long, straight, slender. *Ovaries* oblong to elliptic, 3–5 mm long, *ca.* 1.5 mm wide. *Flowers* porrect, crowded, 8–11 mm long, 3.0–4.5 mm wide, green with prominent darker green stripes. *Dorsal sepal* 7–9 mm long, 4–5 mm wide, very slightly gibbous at the base, shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* deflexed, deeply saccate, dorsally gibbous, when flattened 4–5 mm long, 4–5 mm wide, points subacute, 2–3 mm apart. *Petals* asymmetrical, more or less ovate, 6–7 mm long, 3.0–3.5 mm wide, translucent green with darker veins, dorsal margin strongly thickened, dark green, with a dorsal gibbosity above the middle, ventral margin smooth, with a prominent basal flange. *Labellum claw* irritable, ligulate, *ca.* 1.5 mm long, *ca.* 1.3 mm wide. *Labellum*

lamina elliptic, 2.0–2.3 mm long, 2.4–2.6 mm wide, whitish green with a dark green basal appendage, membranous, apex emarginate. *Basal appendage* recurved at right angles, oblong–tapered, *ca.* 1.5 mm long, *ca.* 1 mm wide, margins dark green, thickened, central ridge narrow, weakly raised above the margins, dark green, ending in a broad, pointed beak 1–1.3 mm long. *Callus* a thickened tapered medial ridge. *Column* obliquely erect, 6.5–7.5 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, *ca.* 2.3 mm long, *ca.* 1.3 mm wide, basal lobe deltate, inner margins strongly incurved, sparsely ciliate; barrier cilia *ca.* 0.4 mm long, clavate. *Anther* *ca.* 1 mm long, obtuse. *Pollinia* oblong–clavate, *ca.* 1 mm long, yellow, mealy. *Stigma* central, elliptical, *ca.* 3 mm long, *ca.* 1.3 mm wide, raised. *Capsules* 5–7 mm long, 3–4 mm wide, on pedicels to 6 mm long. Capsules not seen.

DISTRIBUTION AND ECOLOGY: Occurs in western Victoria and the Murray district of South Australia (where widespread and common), the Southern Lofty district and on Yorke Peninsula, between 30–180 m of elevation. Grows in mallee woodland, *Callitris* woodland, mallee–broombush association, shrubland, and bare open areas along with sparse tussocks of *Lomandra* Labill. and *Lepidosperma* Labill. The common factor seems to be limestone in the soil profile either subterranean or as outcrops and pavements, with the soils being sands and terra rossa.

FLOWERING: July to September.

RECOGNITION: *Hymenochilus calcicola* is characterised by short habit (to 12 cm tall); pale green to green, thick, fleshy, dull rosette leaves with raised veins; thickish scape; crowded green flowers with prominent dark green stripes; deeply saccate lateral sepals; ovate petals with a strongly developed basal flange on the anterior side; and narrow elliptical labellum lamina with a broad pointed beak on the basal appendage.

SIMILAR SPECIES: *Hymenochilus cynocephalus* is taller growing than *H. calcicola* (to 20 cm tall) with a thinner scape, less crowded paler green flowers with inconspicuous stripes, narrower petals without a prominent basal flange and an elliptical labellum with a narrower blunt or pointed beak on the basal appendage. *Hymenochilus anemifolius* is even shorter growing than *H. calcicola* (to 8 cm tall), and has dark green, fleshy,

strongly veined rosette leaves, crowded but less conspicuously striped flowers, an obovate labellum and labellum appendage with a broad blunt beak. *Hymenochilus spissus* grows to about 12 cm tall and can be distinguished from *H. calcicola* by its smaller, paler, faintly striped flowers, shallowly saccate lateral sepals and smaller oblong labellum. *Hymenochilus pratensis* grows to about 15 cm tall and can be distinguished from *H. calcicola* by its broad, almost round, rosette leaves and smaller, boldly striped flowers.

NOTES: The leaves of *Hymenochilus calcicola* are generally extant at flowering time. This species exhibits variation that may warrant further study. Some populations have a condensed inflorescence with the lowermost flowers opening while still partly enclosed by the sterile bracts and after anthesis the inflorescence ends up no more than 5–7 cm tall (for example *R. Bates 20422* from the Woodchester area [CANB 631710]). Most collections do not exhibit this extreme growth habit and this dwarfism may be an adaptation to highly exposed sites. Some specimens with a very thin scape (e.g. North Wolseley, D.Hunt s.n. (AD)) may warrant further investigation. A collection from Cherry Gardens (Herb. *R.S.Rogers 4044*) has unusually large foliose bracts.

CONSERVATION STATUS: This species has a widespread distribution, including within protected areas, with estimated extent of occurrence 65,000 km² and a population size of >10,000 individuals. There is no known evidence of continuing decline. A preliminary extinction risk assessment based on known occurrences of, and threats to, results in a classification of this species as least concern.

ETYMOLOGY: From the Latin *calci* for lime or limestone, and *cola* a dweller, in reference to the typical habitat of the species.

SPECIMENS EXAMINED: **VICTORIA:** Bats Ridges, Portland, Oct. 1948, *A.C.Beauglehole 4845* (MEL); Terrick Terrick State Park, 4 Sep. 1985, *A.C.Beauglehole 80022* (MEL); Kiata Flora Reserve, 14 Sep. 1986, *A.C.Beauglehole 84382* (MEL); reserve just S of old Kiata school, 19 Sep. 1990, *D.L.Jones 6567* & *C.H.Broers* (CANB). **SOUTH AUSTRALIA:** Monarto, 14 Sep. 1976, *C.R.Alcock 5422* (AD); Woodchester area, 3 Sep. 1989, *R.Bates 20422* (CANB); Chilton Scrub, Langhorne Creek, 6 Aug. 2000, *R.Bates 57151* (CANB); Melton South, 13 Aug. 2000, *R.Bates 57194*

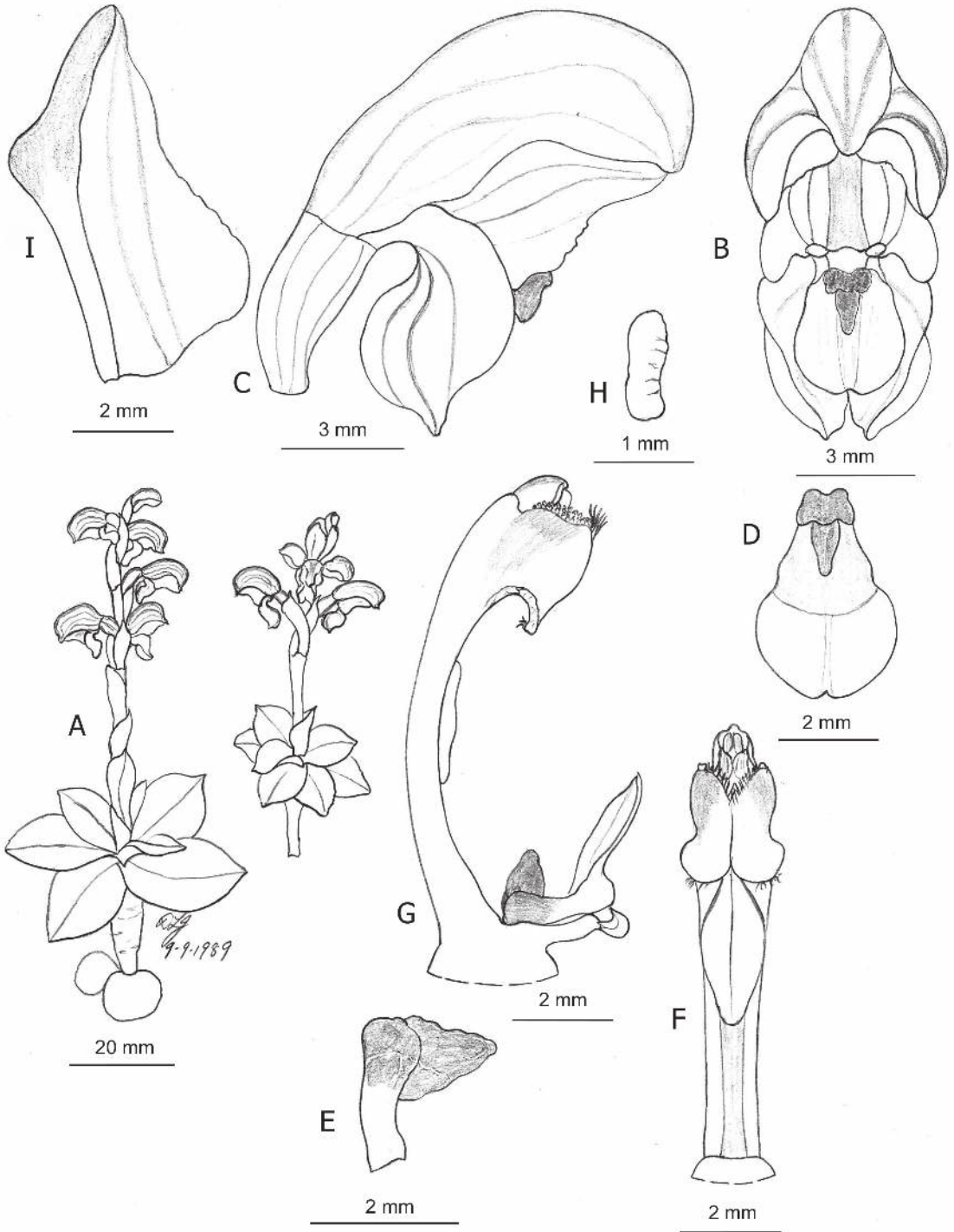


FIGURE 3. *Hymenochilus calcicola* D.L.Jones. A. Habit. B. Flower, front view. C. Flower, side view. D. Labellum flattened, from above. E. Labellum appendage, side view. F. Column, front view. G. Column and labellum, side view. H. Pollinium. I. Petal. Illustration by D. Jones. Woodchester SA, R. Bates 20422, 9 Sep. 1989.

(CANB); Monarto New Town area, 4 Sep. 1974, *J.Carrick* 3589 (AD); 15 km W of Murray Bridge, 1 Oct. 1974, *J.Carrick* 4713 (AD); Kinchina, 17 Sep. 1927, *J.B.Cleland* (AD); Middle Yorke Peninsula, 2 Oct. 1957, *Hj. Eichler* 14226 (AD); Mt Monster, 26 Aug. 1969, *D.Foster* (CANB); Brinkley Station, 22 Sep. 1967, *N.Gemmell* (AD); Murray Bridge, Oct. 1943, *H.Goldsack* (AD); Monarto South, Oct. 1950, *H.Goldsack* (AD); near Milang, 5 Sep. 1966, *D.Hunt* 2669 (AD); Monarto South, 28 Aug. 1919, *E.H.Ising* (AD); Taillem Bend Forest Reserve, 31 Aug. 1999, *D.L.Jones* 16563 & *M.Garratt* (CANB); Monarto Conservation Park, 31 Aug. 1999, *D.L.Jones* 16569 & *M.Garratt* (CANB); Hartley, 9 Sep. 1999, *D.L.Jones* 16805, *M.Garratt* & *J.Eckert* (CANB); Monarto, 1 Sep. 1897, *M.Menzel* (AD, NSW); 3 km S of Hartley on Langhorne Creek, 2 Sep. 1967, *R.C.A.Nash* (AD); Wolseley, Sep. 1943, *K.Ridgeway* 668 (AD); Monarto, Sep. 1906, *R.S.Rogers* (NSW); Monarto South, 3 Oct. 1906, *R.S.Rogers* (AD, NSW); Monarto, 15 Sep. 1917, *R.S.Rogers* (AD); Kinchina, 17 Sep. 1927, *R.S.Rogers* (AD); Cooke Plains, 18 Aug. 1960, *M.C.R.Sharrad* 720 (AD); Braendlers Scrub near Monarto South, 3 Sep. 1978, *P.Short* 730 (AD); Sanderston, 29 Sep. 1968, *T.J.Smith* 2275 (AD); near Taillem Bend, 1 Sep. 1967, *J.Warcup* (AD); Chaunceys Line, 4 km SE of Hartley, 6 Sep. 1958, *D.J.Whibley* 216 (AD).

ILLUSTRATIONS: Page 549, Jones (2021); page 239, Niejalke (2022); page 242, Backhouse (2023), where it is labelled *Pterostylis calcicola*.

3. *Hymenochilus cycnocephalus* (Fitzg.) D.L.Jones & M.A.Clem., Austral. Orch. Res. 4: 74 (2002); *Pterostylis cycnocephala* Fitzg., Austral. Orch. 1(2): t.7 (1876). (Fig. 5–6).

TYPE: Australia. New South Wales: Molong, *Dr. Ross* (lectotype, BM [BM000048410], specimen (a), *vide* Clements 1989, photo!). Residual syntype, Boorowa, *G.H.Sheaffe s.n.* (not seen).

Leaves 5–9; *lamina* ovate to elliptical, 5–25 mm long, 3–15 mm wide, green, fleshy, dull; margins entire or slightly wavy; apex acute to apiculate. *Scape* 8–20 cm tall, 2–3 mm across, 3–12-flowered. *Sterile bracts* 2–4, closely sheathing, ovate to elliptic, 5–12 mm long, 3–5 mm wide, thin-textured, acuminate. *Fertile bracts* similar, closely sheathing the pedicel. *Pedicels* 3–5 mm long, straight, slender, mostly hidden within the bract. *Ovaries* oblong to elliptic, 3–5 mm long, *ca.* 1.5 mm wide. *Flowers* porrect, moderately crowded to separated, 8–10 mm long, *ca.* 3–4 mm wide, translucent green with faint darker green stripes.



FIGURE 4. *Hymenochilus calcicola* D.L.Jones. Taillem Bend SA. Photo by J. Niejalke.

Dorsal sepal 7–9 mm long, 4–5 mm wide, very slightly gibbous at the base, shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* deflexed, deeply saccate, dorsally gibbous, when flattened 6–7 mm long, 5–6 mm wide, points subacute, 3–4 mm apart. *Petals* asymmetrical, more or less ovate, 5.5–7.0 mm long, 3.0–3.5 mm wide, translucent green with darker veins, dorsal margin strongly thickened, dark green, a dorsal gibbosity above the middle, ventral margin smooth. *Labellum claw* irritable, ligulate, *ca.* 1.2 mm long, *ca.* 1 mm wide. *Labellum lamina* oblong to elliptic, 2.0–2.3 mm long, 2.0–2.2 mm wide, whitish green with a dark green appendage, membranous, apex emarginate. *Basal appendage* recurved at an acute angle, oblong-tapered, *ca.* 1.5 mm long, *ca.* 0.8 mm wide, margins dark green, thickened; central ridge narrow, raised weakly above the margins, dark green, ending in a narrow, blunt or pointed beak *ca.* 1 mm long. *Callus* a shallowly thickened, tapered medial

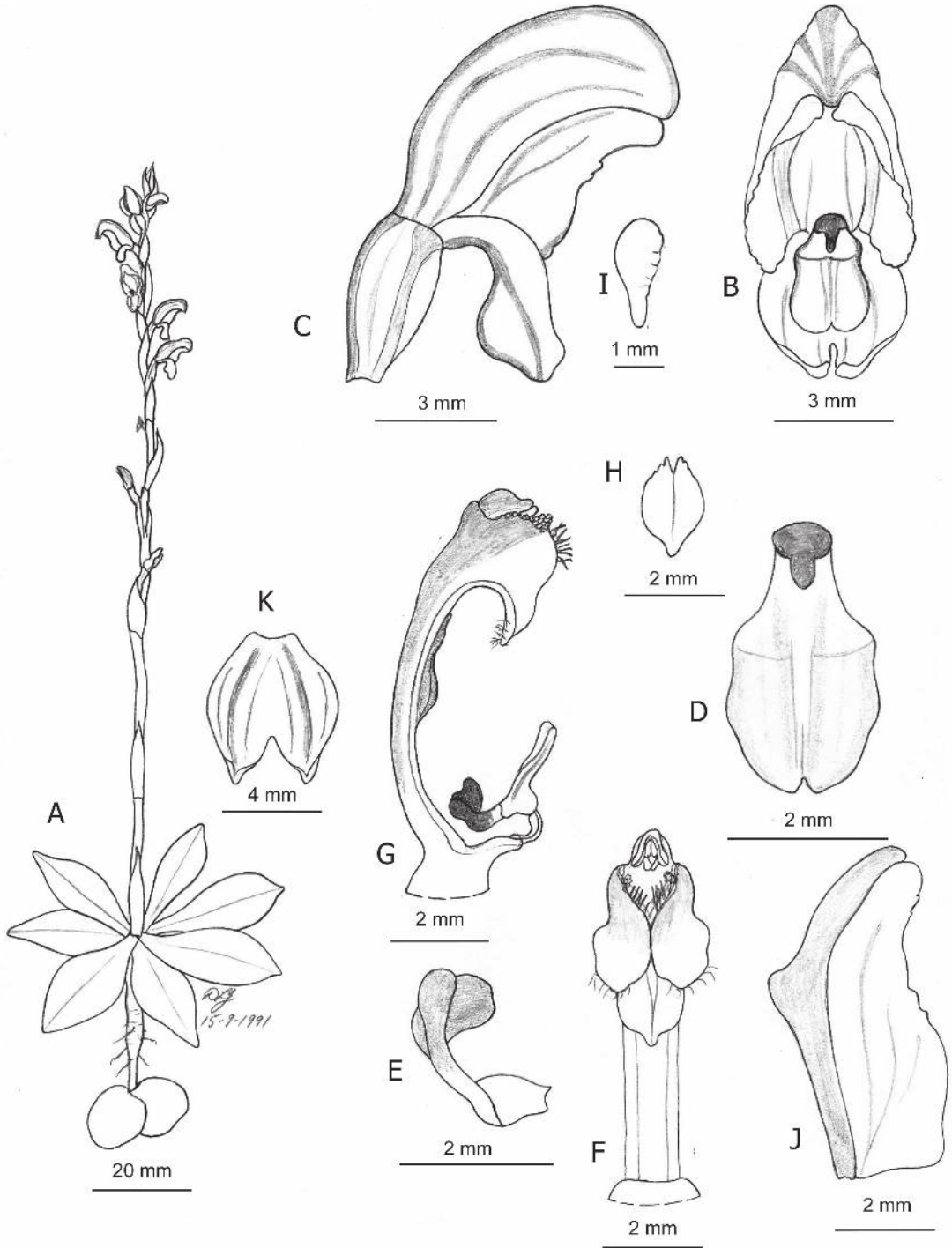


FIGURE 5. *Hymenochilus cyncocephalus* (Fitzg.) D.L.Jones & M.A.Clem. **A.** Habit. **B.** Flower, front view. **C.** Flower, side view. **D.** Labellum flattened, from above. **E.** Labellum appendage, side view. **F.** Column, front view. **G.** Column and labellum, side view. **H.** Stigma. **I.** Pollinium. **J.** Petal. **K.** Synsepal. Illustration by D. Jones. Kangaroo Bay NSW, cult H. Richards ex D.L. Jones collection, 15 Sep. 1991.

ridge on the labellum lamina. *Column* obliquely erect, 6–7 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, *ca.* 2.3 mm long, *ca.* 1.3 mm wide, basal lobe deltate, inner margins strongly incurved, sparsely ciliate; barrier cilia *ca.* 0.4 mm long, clavate. *Anther* *ca.* 1 mm long, obtuse. *Pollinia* clavate, *ca.* 1 mm long, yellow, mealy. *Stigma* central, elliptical, *ca.* 2 mm long, *ca.* 1.3 mm wide, raised. *Capsules* oblong elliptic, 5–8 mm long, 3–4 mm wide, on pedicels to 6 mm long.

DISTRIBUTION AND ECOLOGY: Occurs in New South Wales (from the Northern Tablelands to Wagga Wagga), Australian Capital Territory and Victoria (mainly north and central, from east to west), between 50–800 m of elevation. However, its exact range needs confirmation (see Notes). Although occurring in coastal districts, its main occurrence is to be found in ranges well inland from the coast, extending to the inland plains. Grows in open forest, woodland, shrubland and grassland in shallow, well-drained to moisture-retentive clay loam and sandy loam.

FLOWERING: September to November.

RECOGNITION: *Hymenochilus cycnocephalus* is characterised by relatively large, faintly veined rosette leaves (to 25 × 15 mm); moderately tall, slender scape (to 20 × 0.3 cm); relatively large, moderately crowded to separated translucent green flowers (to 10 × 4 mm) with faint darker green stripes; deeply saccate lateral sepals; relatively broad ovate petals without an obviously expanded basal area; and, an oblong to elliptic labellum with a narrow blunt or pointed beak.

SIMILAR SPECIES: The morphology of *Hymenochilus cycnocephalus* is similar to the following species described as new species in this paper: *Hymenochilus nemoralis*, which has larger rosette leaves (to 40 × 15 mm) and thicker scapes than *H. cycnocephalus* with more numerous relatively crowded to well-spaced flowers, deeply saccate lateral sepals and an oblong labellum lamina with a short labellum appendage and narrow beak; *Hymenochilus cymbellus*, differs from *H. cycnocephalus* by its smaller, sparse rosette leaves, thinner scapes, narrower striped flowers and shallowly saccate lateral sepals that narrow inwards to a distinctly pointed apex; *Hymenochilus pachylus*, which has larger crowded, fleshier rosette leaves than *H. cyc-*



FIGURE 6. *Hymenochilus cycnocephalus* (Fitzg.) D.L.Jones & M.A.Clem. Inglewood, Victoria. Photo by G. Backhouse

nocephalus, thicker scape, widely spaced darker green flowers with darker green veins and broadly obovate labellum with a short broad appendage with a thick beak; *Hymenochilus longipes*, which has larger rosette leaves than *H. cycnocephalus*, slender scape and broader, less prominently striped flowers with a longer stalk on the labellum appendage which can be seen protruding prominently from the flower in sideview.

Hymenochilus anemophilus and *H. calcicola*, both also described as new in this paper, *H. pratensis* (D.L.Jones) D.L.Jones & M.A.Clem. from the Central Highlands of Tasmania and *H. spissus* D.L.Jones from basalt outcrops in central-western Victoria can all be distinguished from *H. cycnocephalus* by shorter habit and densely crowded flowers. Also, *Hymenochilus crassicaulis* D.L.Jones & M.A.Clem. from subalpine areas in south-eastern New South Wales, Australian Capital Territory and north-eastern Victoria is more robust than *H. cycnocephalus* with greyish rosette leaves, thicker scapes and larger crowded

bluish-green and white flowers with a large beak on the labellum appendage.

NOTES: The exact range of *H. cycnocephalus* is uncertain, and the following observations are pertinent and may assist future research. Plants from the Northern Tablelands of New South Wales are very similar to typical *H. cycnocephalus* but tend to have an obovate labellum and a basal appendage with a shallow beak about 0.3 mm deep. Plants from rain shadow sites in high montane areas in the Australian Capital Territory, southern New South Wales, and north-eastern Victoria (Cravensville, Wulgulmerang) grow taller than *H. cycnocephalus* from lower sites, have relatively small flowers and a prominent flange-like extension on the petal base. The labellum beak, however, is a good match for that of typical *H. cycnocephalus*. Plants from western Victoria and south-eastern South Australia (e.g. Mt Boothby, R.Bates (AD)) have pale green flowers with fairly prominent darker green stripes and a relatively larger labellum appendage. These approach *H. nemoralis*, but in the absence of fresh material I am uncertain if they are conspecific.

CONSERVATION STATUS: This species has a widespread distribution, including in protected areas, with estimated extent of occurrence 326,000 km², area of occupancy of 980 km², a population size of >10,000. There is no known evidence of continuing decline. A preliminary extinction risk assessment based on known occurrences of, and threats to, this species places it in the least concern category.

SPECIMENS EXAMINED: **NEW SOUTH WALES:** Store Creek, between Orange and Wellington, Sep. 1950, *P.Althofer* (NSW); Warrumbungles, Nov. 1982, *R.Bates* 2808 (AD); Ungarie, 6 Oct. 1987, *R.Bates* 10459 (AD); Ebor, 22 Nov. 1987, *R.Bates* 12861 (AD); Cooma, 29 Nov. 1987, *R.Bates* (AD); Peak Hill, Oct. 1906, *J.L.Boorman* (NSW); Rylstone, 4 Nov. 1962, *W.Brinsley* (CANB); Tooloom, 9 Sep. 1911, *R.H.Cambage* (NSW); Bumberry, 2 Oct. 1916, *H.Cleland* (AD); 10 km S of Ardlethan, 29 Sep. 1985, *M.A.Clements* 3786 (CANB); Mt Jerrabomberra, 14 Oct. 1985, *M.A.Clements* 3874 (CANB); 200 m N of Moonbi Lookout, 9 Oct. 2004, *L.M.Copeland* 3807 (CANB); 1.25 km S of Mt Jerrabomberra, 24 Oct. 1997, *I.Crawford* 4511 (CANB); Moonbi Range, 1 Oct. 1984, *M.D.Crisp* 7399a & *I.R.Telford* (CANB); Abercrombie Caves, 2 Oct. 1955, *H.Curnow* & *A.W.Dockrill* (AD); Mudgee, Oct. 1881, *H.Deane* (NSW); 8 km E of Ardlethan, 10 Sep. 1988, *D.L.Jones* 2796 & *M.A.Clements* (CANB);

Narranderra Range, 10 Sep. 1988, *D.L.Jones* 2809 (CANB); Sims Gap, 20 Sep. 1990, *D.L.Jones* 6579 & *C.H.Broers* (CANB); 9.2 km E of Weethalle, 20 Sep. 1990, *D.L.Jones* 6584 & *C.H.Broers* (CANB); ca. 32.8 km W of West Wyalong, 22 Oct. 1992, *D.L.Jones* 10448 & *C.H.Broers* (CANB); Buckinbong State Forest, 26 Sep. 2000, *D.L.Jones* 17522 & *K.J.FitzGerald* (CANB); Quarry, 8 km N of Rankin Springs, 28 Sep. 2000, *D.L.Jones* 17560 & *K.J.FitzGerald* (CANB); 9.1 km E of Weethalle towards West Wyalong, 28 Sep. 2000, *D.L.Jones* 17570 & *K.J.FitzGerald* (CANB); Bookham, 16 Oct. 1992, *D.L.Jones* 17877 (CANB); Yarranjerry State Forest, 18 Sep. 2005, *D.L.Jones* 19248 & *B.E.Jones* (CANB); Wahgunyah State Forest, 29 Sep. 2005, *D.L.Jones* 19282 & *M.A.Clements* (CANB); Rifle Range, East Goulbourn, Oct. 1906, *J.Lumsden* (NSW); Thredbo River (in fruit), Jan. 1899, *J.H.Maiden* & *W.Forsyth* (NSW); Tea-tree Creek, Bundarra, Oct. 1968, *I.G.Matthias* (CANB); Ginninderra Falls, 15 Oct. 1960, *H.S.McKee* 7449 (CANB); 8 km SW of Dubbo, 13 Sep. 1973, *T.B.Muir* 5122 (CANB); Gulpa Forest, 25 km S of Deniliquin, 9 Oct. 1978, *W.E.Mulham* (NSW); Koorawatha Falls, 5 Oct. 2002, *R.W.Purdie* 5585 (CANB); Alum Mountain, Bulahdelah, July 1924, *H.M.R.Rupp* (NSW); Escort Rock, 5 Oct. 1963, *B.Whitehead* (CANB); Crackerjack Mountain, 26 Oct. 1963, *B.Whitehead* (CANB); Kangaroo-by, 26 Sep. 1964, *B.Whitehead* (CANB). **AUSTRALIAN CAPITAL TERRITORY:** Upper Orroral Valley, 4 Nov. 1960, *N.T.Burbidge* 6670 (CANB); Rendezvous Creek, Gudgenby Road, 1 Nov. 1961, *N.T.Burbidge* 7226 (CANB); Canberra Airport, 26 Oct. 1995, *I.Crawford* 3258 (CANB); Kambah, 20 Sep. 1983, *F.Davies* 69 & *I.R.Telford* (CANB); Black Mountain, 16 Oct. 1964, *M.Gray* 5556 (CANB); Gungahlin Hill Nature Reserve, 24 Oct. 1995, *D.L.Jones* 14559 & *B.E.Jones* (CANB); Majura Firing Range, 19 Oct. 1998, *D.L.Jones* 15887, *M.A.Clements* & *P.Downey* (CANB); track to Nursery Swamp, 8 Nov. 1999, *D.L.Jones* 17018 & *M.Garratt* (CANB); Naas River Valley Fire Trail, 8 Dec. 1998, *D.L.Jones* 16263 & *M.Garratt* (CANB, MEL, NSW); 6 km S of Tharwa, 8 Nov. 1999, *D.L.Jones* 17031 & *M.Garratt* (CANB); SW side of Black Mountain, 29 Oct. 2005, *D.L.Jones* 19334 (CANB); between O'Malley and Mt Mugga, 20 Oct. 1991, *D.Mallinson* 148 (CANB); 1 km E of Vanitys Crossing, 2 Nov. 1992, *D.Mallinson* 274 (CANB); W slope of Black Mountain, 28 Oct. 1962, *H.S.McKee* 9644 (CANB); Belconnen Naval Radio Station, Lawson, 15 Oct. 1998, *M.E.Nightingale* (ORG 1624) (CANB). **VICTORIA:** Mordialloc, 2 Aug. 1900, *W.R.Baker* (MEL); Barrabool Flora and Fauna Reserve, 17 Oct. 1986, *A.C.Beauglehole* 82717 (MEL); Boyeo Flora Reserve, 12 Sep. 1986, *A.C.Beauglehole* 84240 (MEL); West Wail Flora and Fauna Reserve, 15 Oct. 1986, *A.C.Beauglehole* 86187 (MEL); Dandenong Ranges, Nov. 1925, *A.B.Brairie* (CANB); near Corryong, 31 Oct. 2004, *P.G.Branwhite* 253 (CANB); Healesville, 28 Sep. 1921, *D.Coleman* (AD); Mt Piper, 6 Oct. 1912, *C.French jr.*

(AD); Lyndhurst South, Dec. 1920, *A.C.Gates* (MEL); Deddick, Oct. 1941, *W.Hunter* (NSW); Stawell Rifle Range Reserve, 18 Sep. 1990, *D.L.Jones* 6527 & *C.H.Broers* (CANB); Kanga, Sep. 1941, *J.Leppitt* 670 (AD); Greensborough, Sep. 1941, *J.Leppitt* 702 (AD); Greensborough, Sep. 1925, *W.H.Nicholls* (NSW); Ringwood, 9 Sep. 1915, *E.E.Pescott* (AD); Sale, Oct. 1899, no collector (NSW).

ILLUSTRATIONS: Page 550, Jones (2021); page 345, Copeland & Backhouse (2022); page 240, Backhouse (2023), both as *Pterostylis cycnocephala*.

4. *Hymenochilus cymbellus* D.L.Jones, *sp. nov.* (Fig. 7–8).

TYPE: Australia. South Australia: 1.4 km along track E of Mangalo-Cowell road towards “Pootitnee” property, 6 Sep. 2000, *D.L.Jones* 17348 & *M.Garratt* (holotype, CANB 622384; isotypes: AD, MEL–2371227A).

DIAGNOSIS: With an affinity to *H. cycnocephalus*, but it differs by its sparser basal rosette with narrower rosette leaves (to 10 mm wide *cf.* 15 mm wide in *H. cycnocephalus*), thinner scapes (0.5–1.5 mm wide *cf.* 2–3 mm wide in *H. cycnocephalus*), flowers with distinct darker green stripes (faintly striped flowers in *H. cycnocephalus*) and shallowly saccate lateral sepals that narrow inwards to a distinctly pointed apex (deeply saccate lateral sepals with subacute apex in *H. cycnocephalus*).

Leaves 3–10; *lamina* ovate to elliptical, 7–25 mm long, 4–10 mm wide, green, thin-textured, dull, margins entire, apex acute to acuminate or apiculate. *Scape* 2–12 cm tall, 0.5–1.5 mm across, 1–8-flowered. *Sterile bracts* 2–4, closely sheathing to spreading, elliptic when flattened, 3–8 mm long, 1.5–4 mm wide, thin-textured, acuminate. *Fertile bracts* similar, closely sheathing. *Pedicels* 2–4 mm long, straight, slender. *Ovaries* oblong to elliptic, 2–4 mm long, *ca.* 1.5 mm wide. *Flowers* porrect, relatively crowded to well-spaced, 6–9 mm long, 3–4 mm wide, green with conspicuous narrow darker green stripes. *Dorsal sepal* 7–8 mm long, 4–5 mm wide, slightly gibbous at the base, shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* deflexed, shallowly saccate, dorsally gibbous, the apex pointed, when flattened 4–5 mm long, 4–5 mm wide, points subacute, 2–3 mm apart. *Petals* asymmetrical, more or less ovate, 5.0–5.5 mm long, 3.0–3.5 mm wide, translucent green

with darker veins, dorsal margin strongly thickened, dark green, a dorsal gibbosity above the middle, ventral margin smooth or weakly irregular. *Labellum claw* irritable, ligulate, *ca.* 1.3 mm long, *ca.* 1 mm wide. *Labellum lamina* elliptic-obovate, 2.2–2.5 mm long, 1.8–2.2 mm wide, whitish green with a dark green basal appendage, membranous, apex emarginate. *Basal appendage* recurved at right angles, oblong, *ca.* 1.5 mm long, *ca.* 1 mm wide, margins dark green, thickened, central ridge narrow, raised above the margins, dark green, ending in a broad, blunt beak 0.8–1.0 mm long. *Callus* a thickened tapered medial ridge. *Column* obliquely erect, 7–8 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, *ca.* 2 mm long, *ca.* 1 mm wide, basal lobe deltate; inner margins strongly incurved, sparsely ciliate; barrier cilia *ca.* 0.4 mm long, clavate. *Anther* *ca.* 1 mm long, obtuse. *Pollinia* clavate, *ca.* 1 mm long, yellow, mealy. *Stigma* central, elliptical, *ca.* 2.5 mm long, *ca.* 1.3 mm wide, raised. *Capsules* 6–8 mm long, 3–4 mm wide, on pedicels to 10 mm long.

DISTRIBUTION AND ECOLOGY: Known from the Eyre Peninsula in South Australia, between 50–350 m elevation. However, its exact range is uncertain. It may also occur in the Gawler Ranges. Grows on and around the margins of acidic rock outcrops; also, in shrubland, especially with broombush, in red–brown loam developed on acid schistose rocks, and among *Triodia* R.Br. clumps in relatively open sites.

FLOWERING: July to September.

RECOGNITION: *Hymenochilus cymbellus* is characterised by small, sparse rosettes with narrow leaves, thin scapes, relatively crowded to well-spaced, narrow, conspicuously striped flowers, shallowly saccate lateral sepals that narrow inwards to a distinctly pointed apex, ovate petals, elliptic-obovate labellum, and labellum basal appendage with a broad, blunt beak.

SIMILAR SPECIES: *Hymenochilus cycnocephalus* has more numerous and generally larger rosette leaves than *H. cymbellus*, darker green flowers with inconspicuous stripes, deeply saccate lateral sepals ending in a broad, blunt apex and an elliptical labellum with a broader beak on the basal appendage. Compared to *H. cymbellus*, *H. nemoralis* has relatively large rosette leaves, thicker scapes with more numerous relatively crowded to well-

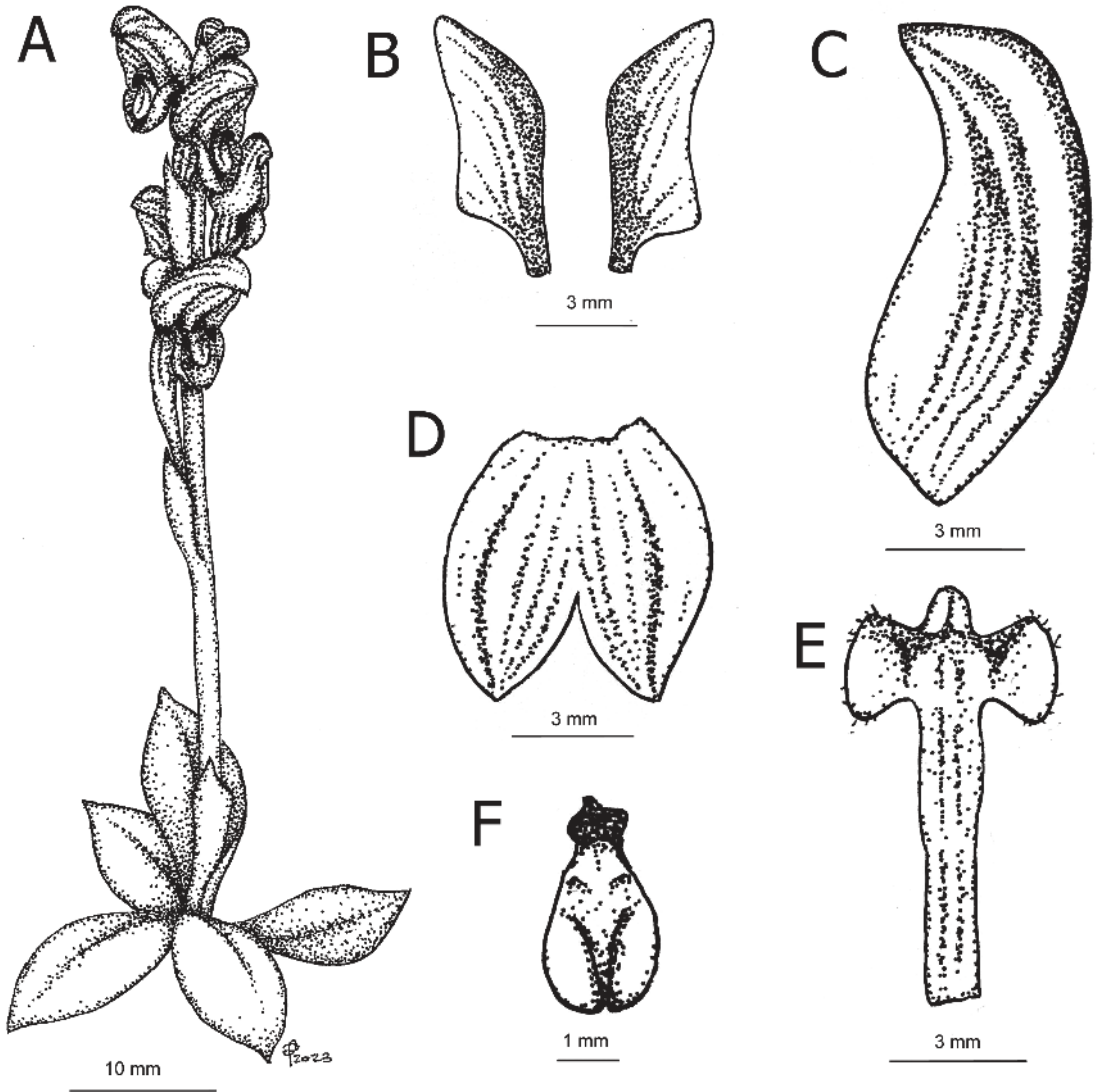


FIGURE 7. *Hymenochilus cymbellus* D.L.Jones. A. Habit. B. Petals. C. Flower from side. D. Synsepalum. E. Column from front. F. Labellum flattened, from above. Illustration by Z. Groeneveld. Carapee Rock SA, DLJ 17379, 6 Sep. 2000.

spaced flowers, deeply pouched blunt lateral sepals and an oblong labellum lamina with a short labellum appendage and narrow beak-like structure. *Hymenochilus pachylus* has larger crowded, fleshier rosette leaves than *H. cymbellus*, thicker scape, well-spaced flowers, and broadly obovate labellum with a short broad appendage. *Hymenochilus longipes* has larger rosette leaves than *H. cymbellus*, slender scape and broader,

less prominently striped flowers with a longer stalk on the labellum appendage. *Hymenochilus crassicaulis* is more robust than *H. cymbellus* with greyish rosette leaves, thicker scapes, and larger crowded bluish-green and white flowers with a large beak on the labellum appendage. *Hymenochilus anemophilus*, *H. calcicola*, *H. pratensis* and *H. spissus* can all be distinguished from *H. cymbellus* by their densely crowded flowers.

NOTES: The leaves of this species can either be extant or withered at flowering time.

CONSERVATION STATUS: A preliminary extinction risk assessment, based known occurrences of these species, yields an estimated extent of occurrence of 11,800 km². The species is at risk of continuing decline as a result of climate change, particularly the effect increased frequency and severity of drought, and increased temperatures on this species habitat. This indicates that the species may be eligible for listing as Vulnerable (B1+2ab).

ETYMOLOGY: From the Latin *cymbella*, small boat, in reference to the shape of the lateral sepals.

SPECIMENS EXAMINED: **SOUTH AUSTRALIA:** Curtinye Hill, NE of Kimba, 28 Aug. 1983, *R.Bates 3309* (AD); Stamford Hill, 18 July 1994, *R.Bates 37129* (CANB); E of Coolanie Hall, 5 Sep. 2000, *D.L.Jones 17329 & M.Garratt* (AD, CANB, MEL); Carrapee Hill, 6 Sep. 2000, *D.L.Jones 17379 & M.Garratt* (CANB); Carrapee Hill, 14 Sep. 1974, *F.A.Mason 296* (AD); Hincks Natl. Park, 7 Oct. 1968, *R.C.A.Nash* (AD); Hincks Natl. Park, 7 Oct. 1968, *J.R.Wheeler 776* (AD).

ILLUSTRATIONS: Page 550, Jones (2021); page 240, Niejalke (2022).

5. *Hymenochilus longipes* D.L.Jones, *sp. nov.* (Fig. 9–10).

TYPE: Australia. Queensland: “Nabwood”, Stanthorpe, Inglewood Road (private property), 18 Sep. 1996, *R.Crane 1624* (holotype, CBG-9708281).

DIAGNOSIS: With affinity to *H. cycnocephalus*, but it differs by its thin-textured rosette leaves (thicker and fleshier in *H. cycnocephalus*), widely spaced darker green flowers with darker green veins (flowers translucent with faint veins in *H. cycnocephalus*), elliptic to obovate labellum lamina (oblong to elliptic in *H. cycnocephalus*) and a longer labellum basal appendage which protrudes prominently from the flower in side view (labellum basal appendage does not protrude prominently in *H. cycnocephalus*).

Leaves 5–8; *lamina* elliptical, 10–25 mm long, 5–12 mm wide, green, thin-textured, margins entire, apex acute to apiculate. *Scape* 10–28 cm tall, 1.5–2.5 mm across, 5–12-flowered. *Sterile bracts* 4–6, closely sheathing, oblong to elliptic when flattened, 5–15 mm long, 4–6 mm wide, acuminate. *Fertile*



FIGURE 8. *Hymenochilus cymbellus* D.L.Jones. Eyre Peninsula, SA. Photo by J. Niejalke.

bracts similar, closely sheathing. *Pedicels* ca. 4 mm long, straight, slender. *Ovaries* oblong to elliptic, 3–4 mm long, ca. 1.5 mm wide. *Flowers* porrect, widely spaced, 8–9 mm long, ca. 3–4 mm wide, green with darker green veins. *Dorsal sepal* 7–9 mm long, 4–6 mm wide, slightly gibbous at the base, nearly straight or shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* deflexed, deeply saccate, dorsally gibbous, when flattened 4.0–5.5 mm long, 4.0–4.5 mm wide, points subacute, ca. 3 mm apart. *Petals* asymmetrical, more or less ovate-oblong, 6–7 mm long, 2.5–3.0 mm wide, green with darker green veins, dorsal margin strongly thickened, dark green, with a dorsal gibbosity just above the middle, ventral margin irregular. *Labellum claw* irritable, ligulate, ca. 1 mm long, ca. 0.6 mm wide. *Labellum lamina* elliptic to obovate, 2.0–2.3 mm long, 1.8–2.0 mm wide, whitish green with a dark green appendage, membranous, apex emarginate. *Basal*

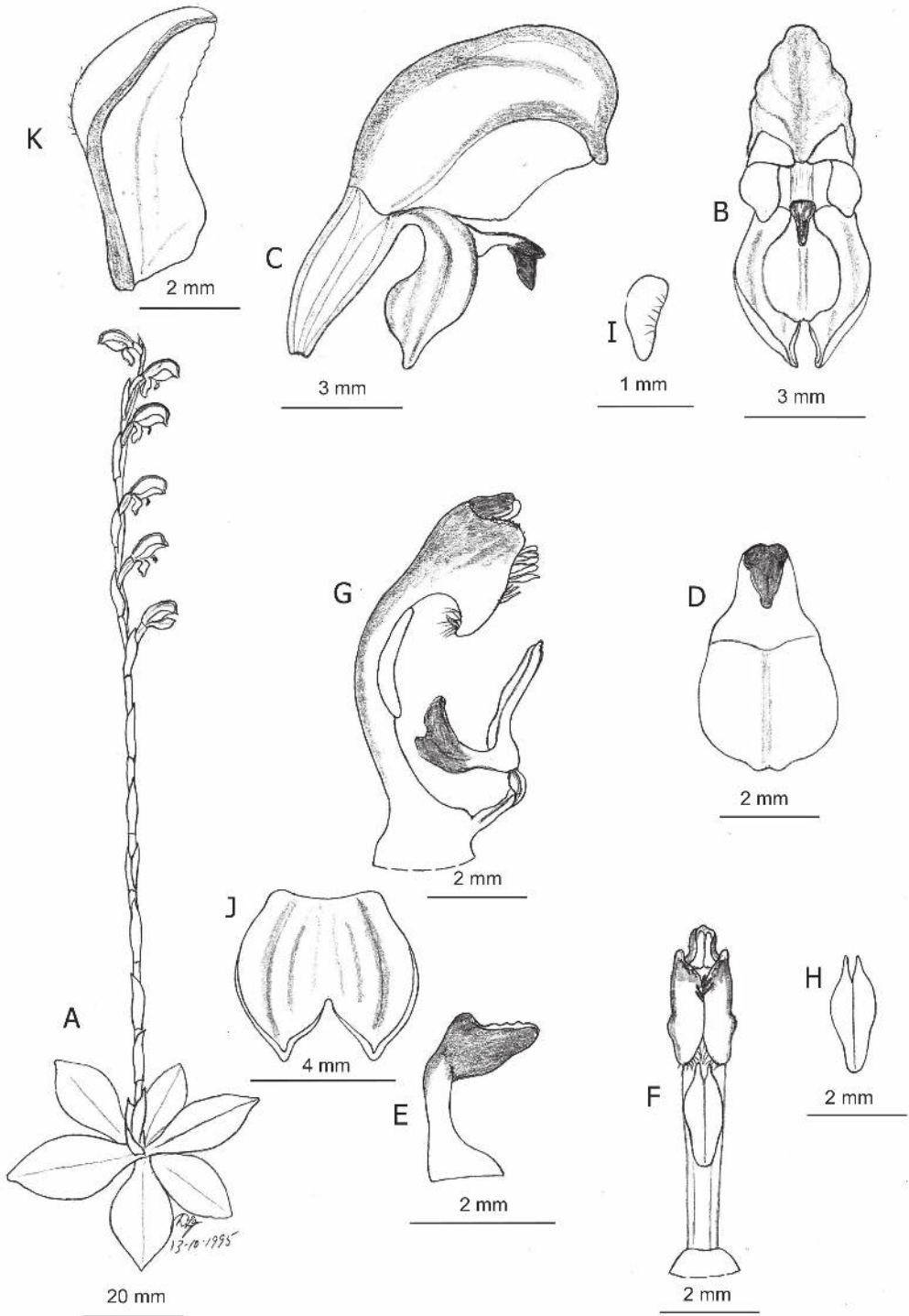


FIGURE 9. *Hymenochilus longipes* D.L.Jones. **A.** Habit. **B.** Flower from front. **C.** Flower from side. **D.** Labellum flattened, from above. **E.** Labellum appendage from side. **F.** Column from front. **G.** Column and labellum from side. **H.** Stigma. **I.** Pollinium. **J.** Synsepalum. **K.** Petal. Illustration by D. Jones. Texas Qld, R. Crane1439, 13 Oct. 1995.

appendage sharply recurved, on a long stalk and protruding from the flower in sideview, narrowly oblong, 1.5–2 mm long, *ca.* 0.8 mm wide, margins dark green, thickened, central ridge narrow, raised above the margins, dark green, ending in a broad, bluntish blunt beak 0.8–1 mm long. *Callus* a thickened, darker green, tapered medial ridge. *Column* obliquely erect, 6–8 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, *ca.* 2 mm long, *ca.* 1 mm wide, basal lobe deltate, inner margins sparsely ciliate; barrier cilia *ca.* 0.2 mm long, clavate. *Anther* *ca.* 1 mm long, obtuse. *Pollinia* clavate, *ca.* 1 mm long, yellow, mealy. *Stigma* central, scutiform, *ca.* 2 mm long, *ca.* 1.2 mm wide, raised. *Capsules* obovoid, 5–6 mm long, *ca.* 3 mm wide, green to brown, on pedicels to 5 mm long.

DISTRIBUTION AND ECOLOGY: Occurs in the Darling Downs district of southern Queensland and Northern Tablelands of New South Wales, between 200–400 m in elevation. Grows in open woodland among granite rocks and in *Callitris* Vent. woodland, in well-drained brown to yellowish sand.

FLOWERING: Late August to November.

RECOGNITION: *Hymenochilus longipes* is characterised by relatively small, green, thin-textured rosette leaves; thin scape; widely spaced, narrow green flowers with darker green veins; relatively small, deeply saccate lateral sepals; ovate-oblong petals; elliptic-obovate labellum lamina and, a long-stalked narrow labellum appendage protruding well out from the flower in sideview with a short, broad bluntish terminal beak.

SIMILAR SPECIES: *Hymenochilus cynocephalus* has larger fleshy rosette leaves, broader paler, faintly striped flowers than *H. longipes*, and a shortly stalked labellum appendage held all or mostly within the flower and with a longer, narrower pointed terminal beak. *Hymenochilus pachylus* has thicker-textured rosette leaves than *H. longipes*, broader flowers and a shorter stalk on the labellum appendage. *Hymenochilus nemoralis* has larger rosette leaves than *H. longipes* and larger, boldly striped flowers. *Hymenochilus cymbellus* has smaller, sparser rosette leaves than *H. longipes*, slender scape and narrower, prominently striped



FIGURE 10. *Hymenochilus longipes* D.L.Jones. Warrabah, NSW. Photo by L. Copeland.

flowers with a broad beak on the labellum appendage. *Hymenochilus crassicaulis* is more robust than *H. longipes* with greyish rosette leaves, thicker scapes and larger, crowded bluish-green and white flowers with a large beak on the labellum appendage. *Hymenochilus anemophilus*, *H. calcicola*, *H. pratensis* and *H. spissus* can all be distinguished from *H. longipes* by their densely crowded flowers.

NOTES: The leaves of this species are usually withered at flowering time.

CONSERVATION STATUS: This species has a widespread distribution, including within protected areas, with estimated extent of occurrence 46,000 km² a population size estimated to be >10,000. There is no known evidence of continuing decline. A preliminary extinction risk assessment based on known occurrences of, and threats to, results in a classification of this species as least concern.

ETYMOLOGY: From the Latin *longus*, long, *pes*, *pedis*, foot, in reference to the long appendage on the labellum that projects conspicuously out from the lateral sepals in the set position.

SPECIMENS EXAMINED: Hill 2 km E of Acland, 14 Sep. 1992, *R. Crane* 836 (CANB); “Nabwood”, Stanthorpe, Inglewood Road (private property), 22 Sep. 1995, *R. Crane* 1439 (CANB); *ibid*, 18 Sep. 1996, *R. Crane* 1622 (CANB); *ibid*, 18 Sep. 1996, *R. Crane* 1624 (CANB); Murphys Creek, Glen Aplin, 20 Oct. 1996, *R. Crane* 1743 (CANB); Girraween National Park, 11 Nov. 1996, *R. Crane* 1763 (CANB).

ILLUSTRATIONS: Page 551, Jones (2021).

6. *Hymenochilus muticus* (R.Br.) D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 74 (2002); *Pterostylis mutica* R.Br., *Prodr.* 328 (1810). (Fig. 11–12).

TYPE: Australia. New South Wales: Port Jackson, race-ground, Sep.–Oct. 1803, *R. Brown* s.n. (first-step lectotypification: BM, *fide* George (1971); second-step lectotypification: BM [BM000048248], specimen (a), *fide* Clements 1989, photo!; isolectotypes, BM [BM-000990303] specimen (a)!, K[K 00061957] specimen (c)!).

Leaves 5–12; *lamina* ovate to elliptical, 10–45 mm long, 5–18 mm wide, green, fleshy, dull, margins entire or slightly wavy, apex acute to apiculate. *Scape* 12–35 cm tall, 2–4 mm across, 3–22-flowered. *Sterile bracts* 3–5, closely sheathing, ovate to elliptic when flattened, 5–16 mm long, 3–6 mm wide, thin-textured, acuminate. *Fertile bracts* similar, closely sheathing. *Pedicels* 3–5 mm long, straight, slender. *Ovaries* oblong to elliptic, 3–5 mm long, ca. 1.5 mm wide. *Flowers* porrect, widely spaced, 10–14 mm long, 3–4.5 mm wide, translucent green with faint darker green stripes. *Dorsal sepal* 9–12 mm long, 5–7 mm wide, porrect from the ovary at the base, shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* obliquely deflexed to deflexed, deeply saccate, dorsally curved, when flattened 6–7 mm long, 7–9 mm wide, points sub-acute, 5–7 mm apart. *Petals* asymmetrical, more or less ovate-elliptic to rhomboid, 7.0–9.5 mm long, 3.5–4.5 mm wide, translucent green with darker veins, dorsal margin strongly thickened, dark green, a dorsal gibbosity above the middle, ventral margin with beaded siliceous cells. *Labellum claw* irritable, ligulate, ca. 2 mm long, ca. 1 mm wide. *Labellum lamina* oblong to elliptic, 2.5–3.0 mm long, 2.5–3 mm wide, whitish green with a

dark green basal appendage, membranous, apex emarginate. *Basal appendage* recurved nearly at right angles to lamina, oblong to oblong-tapered, ca. 2.2 mm long, ca. 1.3 mm wide, margins green, thickened, central ridge narrow, raised above the margins, dark green, ending below the apex of the appendage. *Callus* a thickened, tapered, channelled medial ridge. *Column* obliquely erect, 6.5–7.0 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, ca. 3 mm long, ca. 1.5 mm wide, basal lobe ovate to deltate, inner margins incurved, sparsely ciliate; barrier cilia ca. 0.4 mm long, linear-clavate. *Anther* ca. 1.2 mm long, obtuse. *Pollinia* clavate, ca. 1 mm long, yellow, mealy. *Stigma* central, elliptical, ca. 3.5 mm long, ca. 1.2 mm wide, raised. *Capsules* 5–8 mm long, 3–4 mm wide, on pedicels to 10 mm long.

DISTRIBUTION AND ECOLOGY: This species occurs in Queensland (Mt Moffat, Canarvon Range to Stanthorpe, coast near Noosa), New South Wales (widespread inland, Tenterfield to Narranderra, Albury, inland to Brewarrina) Australian Capital Territory, and Victoria (east to west, mainly inland areas), between 10–900 m in elevation. Although the type collection was made from Port Jackson, its main occurrence is in areas well inland from the coast. It grows in open forest, woodland, especially *Callitris* woodland, rocky slopes, rock outcrops and grassland in shallow well-drained to moisture-retentive clay loam and sandy loam.

FLOWERING: August to November.

RECOGNITION: *Hymenochilus muticus* is characterised by relatively large, fleshy rosette leaves (to 45 × 18 mm); tall, sturdy scape (to ca. 35 × 0.4 cm); widely spaced translucent green flowers, to 14.0 × 4.5 mm, with faint darker green stripes; deeply saccate lateral sepals; relatively broad ovate-elliptic to rhomboid petals; oblong to elliptical labellum lamina to 3 × 3 mm; and labellum basal appendage with a short, protruding central ridge ending well below the top of the appendage.

SIMILAR SPECIES: *Hymenochilus pagophilus* has a slightly thicker scape than *H. muticus*, moderately crowded to crowded, broader, shinier flowers, and a rectangular-obovate labellum. *Hymenochilus pisinnus* has fewer and smaller rosette leaves than *H. muticus*, thinner flower stem and smaller flowers with shallowly saccate lateral sepals and a smaller obovate labellum.

Hymenochilus confertus D.L.Jones, *H. rubenachii* (D.L.Jones) D.L.Jones & M.A.Clements and *H. wapstrarum* (D.L.Jones) D.L.Jones & M.A.Clements can all be distinguished from *H. muticus* by their densely crowded flowers.

NOTES: *Hymenochilus muticus* is commonest in inland localities and is generally uncommon to rare in coastal and near-coastal sites. The type collection was made from the raceground at Port Jackson (possibly the modern suburb of Randwick) which is not far from the coast. The type specimens are not as robust as plants from inland areas, but they are in the early stage of flowering and features of the labellum are consistent with those in other parts of New South Wales.

We are uncertain whether *H. muticus sens. strict.* extends to Tasmania. We have examined several collections from that state that may be this species, however they are all either in such poor condition and therefore difficult to identify with any accuracy, or are without specific locality, as in some of Gunn's collections. A number of specimens have crowded flowers atypical of *H. muticus* and may be better placed in *H. rubenachii* or *H. wapstrarum*, however, a few have widely spaced flowers. The presence of *H. muticus* in Tasmania can only be resolved by the examination of fresh specimens. Details of specimens examined to date from Tasmania are included in the specimen list.

CONSERVATION STATUS: This species has a widespread distribution, including in three national parks, with estimated extent of occurrence 1,155,000 km², and a population size estimated to be >10,000. There is no known evidence of continuing decline. A preliminary extinction risk assessment based on known occurrences of, and threats to, results in a classification of this species as least concern.

SPECIMENS EXAMINED: **QUEENSLAND:** Durong, Kingaroy Line, Aug. 1949, *W.W.Abell* (NSW); Brigooda, 12 Sep. 1949, *W.W.Abell* (NSW); Wandai, 27 July 1952, *W.W.Abell* (NSW); Texas, 22 Sep. 1992, *R.Crane* 842, 852 & 857 (CANB); Nabwood, off Stanthorpe-Inglewood Road, 18 Aug. 1997, *R.Crane* 1437 (CANB); Texas State Forest, 19 Sep. 1996, *R.Crane* 1629 (CANB); Proston, Aug. 1949, *W.Power* (NSW). **NEW SOUTH WALES:** Coonamble, Oct. 1987, *R.Bates* (AD); Girilambone, near Cobar, Oct. 1987, *R.Bates* (AD); Gulargambone, Oct. 1987, *R.Bates* 10636 (AD); Bobadah, Oct. 1987, *R.Bates* (AD); 15 km W of Mt Kaputar, 14 Oct. 1987, *R.Bates* 10649 (AD); Warrumbungles, 12 Oct. 1987, *R.Bates*

10714 (AD); 20 km SSW of Cowra, 20 Oct. 1987, *R.Bates* 11111 (AD); 10 km N of Parkes, 10 Oct. 1987, *R.Bates* 11292 (AD); Bingara, Sep. 1907, *J.L.Boorman* (NSW); Forked Mountain, Coonabarabran, Sep. 1908, *J.L.Boorman* (NSW); Warialda, Sep. 1914, *J.L.Boorman* (NSW); 20 km E of Goolgowi, 22 Sep. 1974, *B.G.Briggs* 5404 (NSW); Dubbo Arboretum, 1 Sep. 1961, *W.Brinley* (PERTH); Mullion Creek, 7 Deca. 1960, *N.T.Burbidge* 6895 (CANB); Eugowra, 2 Oct. 1978, *M.A.Clements* 1589 (CANB); Kangaroooby, 16 Oct. 1984, *M.A.Clements* 3514 (CANB); ca. 12 km W of Canowindra, 8 Sep. 1985, *M.A.Clements* 3724 (CANB); ca. 35 km S of Dubbo, 22 Sep. 1985, *M.A.Clements* 3747 (CANB); Coonabarabran, 7 Oct. 1985, *M.A.Clements* 3844 (CANB); Mt Jerrabomberra, 14 Oct. 1985, *D.L.Jones* 3873 (CANB); Narranderra Range, 30 Sep. 1989, *M.A.Clements* 5051 (CANB); Marayong, 3 Sep. 1966, *R.Coveny* (NSW); Howell, 5 Oct. 1969, *R.Coveny* 2285 (NSW); Warrumbungle Range, 11 Oct. 1978, *M.D.Crisp* 4381 (CANB); 32 km from Nymagee on Bobadah Road, 11 Aug. 1973, *G.Cunningham* & *P.Milthorpe* 878 (NSW); along gas pipeline, Kilparney, Mt Hope, 31 Aug. 1974, *G.Cunningham* & *P.Milthorpe* 3201 (NSW); 8 miles S of Nymagee, 5 Oct. 1974, *G.Cunningham* & *P.Milthorpe* 3204 (NSW); NE corner of Manna State Forest, Condobolin, 20 Sep. 1975, *G.Cunningham* & *P.Milthorpe* 3812 (NSW); Kingsdale, 17 Oct. 1967, *H.Doing* (CANB); West Wyalong, 3 Oct. 1969, *H.Goldsack* (AD); Greenbah Creek, Coonabarabran-Mendooran Road, 10 Oct. 1989, *K.M.Groeneveld* 115 (CANB); ca. 1.5 km SE of Gungal, 10 Sep. 2001, *W.Holzinger* 107 (CANB); Oxley Park, Tamworth, 11 Sep. 1993, *J.R.Hosking* 782a & *P.Syrett* (CANB, MEL, NSW); Carlisles Gully, New England Tableland, 17 Nov. 1953, *R.W.Jessup* & *M.Gray* 2277 (CANB); Rimbanda Road, New England Tableland, 17 Nov. 1953, *R.W.Jessup* & *M.Gray* 2287 (CANB); 1 km S of Coonabarabran, 13 Sep. 1985, *D.L.Jones* 1845 & *B.E.Jones* (CANB); 12 km S of Ardlethan, 10 Sep. 1988, *D.L.Jones* 2801 & *M.A.Clements* (CANB); Mt Caley, 11 Sep. 1988, *D.L.Jones* 2832 & *M.A.Clements* (CANB); 43.5 km from Forbes towards Grenfell, 29 Sep. 1989, *D.L.Jones* 5147 (CANB, NSW); Bullawa Sate Forest, 30 Sep. 1989, *D.L.Jones* 5169 (CANB); halfway up track to Mt Kaputar, 30 Sep. 1989, *D.L.Jones* 5179 (BRI, CANB, NSW); Deriah State Forest, 2 Sep. 1990, *D.L.Jones* 6364 & *B.E.Jones* (CANB); 9 km S of Narrabri, 2 Sep. 1990, *D.L.Jones* 6368 & *B.E.Jones* (CANB); Quarry Road, ca. 16 km N of Griffith, 20 Sep. 1990, *D.L.Jones* 6571 & *C.H.Broers* (CANB); ca. 1 km S of Peel, 24 Sep. 1990, *D.L.Jones* 6599 & *C.H.Broers* (CANB); Blue Biddy Mountain, 24 Sep. 1990, *D.L.Jones* 6613 & *C.H.Broers* (CANB); Tuckland State Forest, NW of Gulgong, 24 Sep. 1990, *D.L.Jones* 6629 & *C.H.Broers* (CANB); 22 km N of Grenfell towards Forbes, 25 Sep. 1990, *D.L.Jones* 6653 & *C.H.Broers* (CANB); 2.7 km W of Elong Elong, 25 Sep. 1990, *D.L.Jones* 6641 & *C.H.Broers* (CANB); 54 km W of Dubbo, 25 Sep.

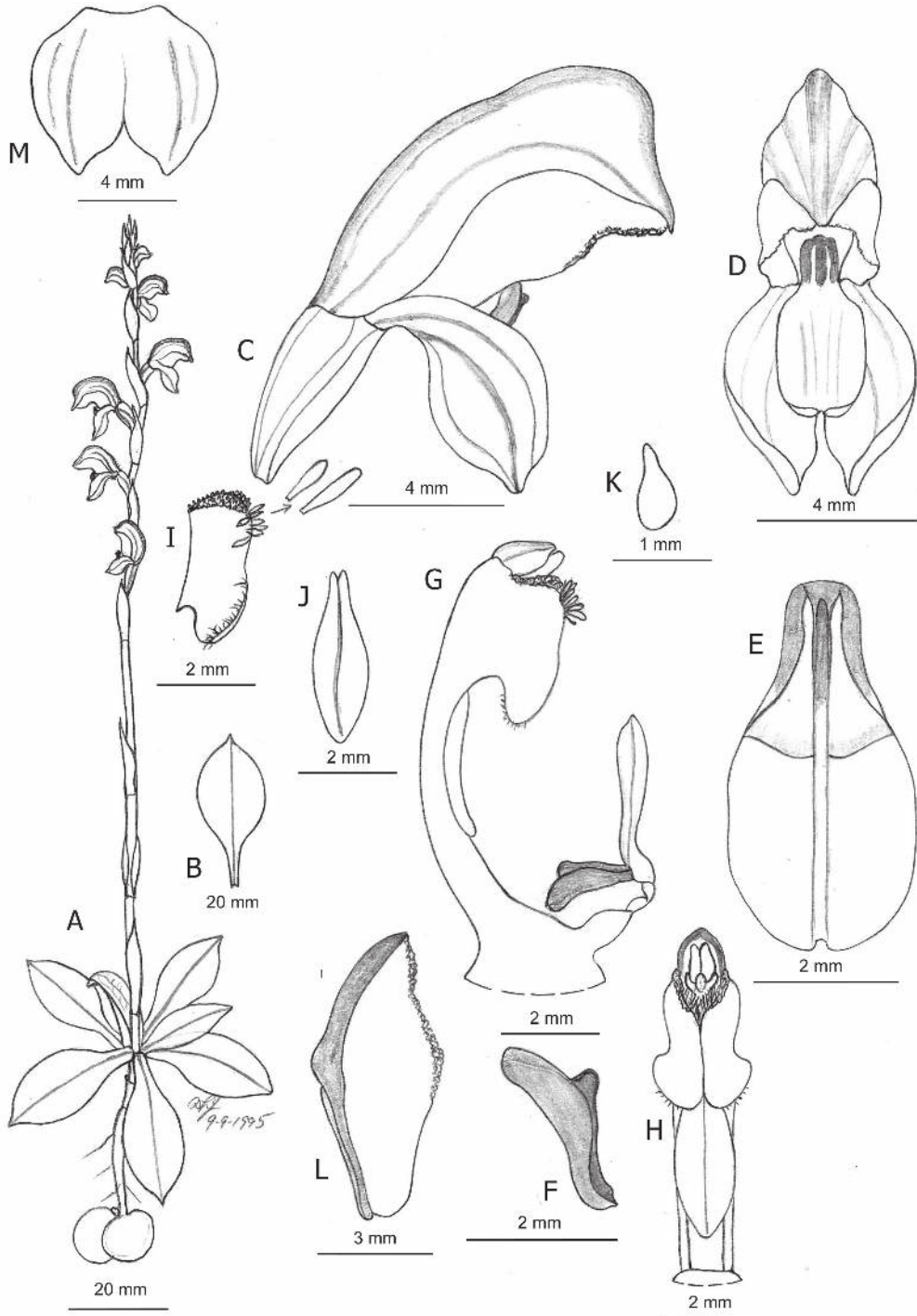


FIGURE 11. *Hymenochilus muticus* (R.Br.) D.L.Jones & M.A.Clem. A. Habit. B. Rosette leaf. C. Flower, side view. D. Flower, front view. E. Labellum flattened, from above. F. Labellum appendage, side view. G. Column and labellum, side view. H. Column, front view. I. Internal view of column wing and barrier trichomes. J. Stigma. K. Pollinium. L. Petal. M. Synsepal. Illustration by D. Jones. Mt Currumbenya NSW, D.L. Jones s.n., 9 Sep. 1995.

1990, *D.L.Jones* 6646 & *C.H.Broers* (CANB); Fairfield, near Broken Hill, Aug. 1923, *T.Harris* (AD); Reefton State Forest, 22 Oct. 1992, *D.L.Jones* 10441 & *C.H.Broers* (CANB); 31 km N of Griffith, 28 Sep. 2000, *D.L.Jones* 17552 (CANB); 9.1 km E of Weethalle, 28 Sep. 2000, *D.L.Jones* 17569 (CANB); 8 km W of Barmedman, 28 Sep. 2000, *D.L.Jones* 17574 (CANB); Sims Gap, 28 Sep. 2000, *D.L.Jones* 17557 (CANB); Yarranjerry State Forest, 18 Sep. 2005, *D.L.Jones* 19244 & *B.E.Jones* (CANB); Wahgunyah State Forest, 29 Sep. 2005, *D.L.Jones* 19281 & *M.A.Clements* (CANB); Tea-tree Creek, Bundarra Road, Oct. 1968, *I.G.Matthias* (CANB); Coonabarabran, 18 Sep. 1975, *P.Metcalf* (NSW); Waabalong, Hillston, 4 Aug. 1973, *P.Milthorpe* 1281 (NSW); 2 km S of Shepherds Hill, Euabalong West, 2 Sep. 1974, *P.Milthorpe* & *G.Cunningham* 2764 (NSW); Broken Range, Hyandra, Mt Hope, 31 Aug. 1974, *P.Milthorpe* & *G.Cunningham* 2998 (NSW); Bulga Range, 10 km E of Narromine, 6 Sep. 1973, *N.Perry* 10 (NSW); Cocoparra Natl. Park, 1 Sep. 1990, *J.Roberts* (CANB); Paterson, Sep. 1924, *H.M.R.Rupp* (NSW); Martins Creek, 29 Aug. 1926, *G.V.Scammell* (NSW); Griffith, 29 Aug. 1927, *G.V.Scammell* (NSW); Escort Rock, Eugowra, 5 Oct. 1963, *B.Whitehead* (CANB); Warraderry, 21 Sep. 1963, *B.Whitehead* (CANB); Gunning Gap, 17 Sep. 1966, *B.Whitehead* (CANB). **AUSTRALIAN CAPITAL TERRITORY:** Upper Cotter Road, 13 Oct. 1963, *L.Adams* 722 (CANB); Tidbinbilla Range, 27 Oct. 1963, *L.Adams* 752 (CANB); Bendora Dam Road, 30 Oct. 1963, *L.Adams* 758 (CANB); Molonglo Gorge, 6 Nov. 1966, *L.Adams* 1607 (CANB); Towards Bendora Dam, 5 Nov. 1964, *L.Adams* & *M.Gray* 5573 (CANB); Majura Firing Range, 3 Nov. 1994, *I.Crawford* 2785 (CANB); *ibid.*, 30 Oct. 1998, *P.Downey* 344 (CANB); Bruce Ridge, 20 Oct. 1999, *M.Garratt* (ORG 2776) (CANB); Gibraltar Falls, 14 Nov. 1962, *M.Gray* 5293 (CANB); Bulls Head to Bendora Dam Road, 13 Oct. 1963, *M.Gray* 5345 (CANB); Majura Firing Range, 19 Oct. 1998, *D.L.Jones* 15888, *M.A.Clements* & *P.Downey* (CANB); Gungahlin Hill Nature Reserve, 20 Oct. 1998, *D.L.Jones* 15895 (CANB); 3.6 km S of Glendale Crossing, Namadgi Natl. Park, 3 Dec. 1998, *D.L.Jones* 16234 & *M.Garratt* (CANB); ca. 300 m S of Birrigai Camp, Tidbinbilla Road, 21 Oct. 1991, *D.Mallinson* 156 (CANB); 1 km E of Vanities Crossing, 2 Nov. 1992, *D.Mallinson* 275 (CANB); Five Crossings, 8 Nov. 1962, *H.S.McKee* 9656 (CANB); Black Mountain, 17 Nov. 1969, *P.Macnicol* & *C.A.Appleby* (CANB). **VICTORIA:** Diamond Creek, 30 Sep. 1904, *W.R.Baker* (CANB); Yea, Oct. 1904, *W.R.Baker* (MEL); Bendigo, 14–16 Sep. 1905–1907, *W.R.Baker* (MEL); Mt Meg Flora and Fauna Reserve, 13 Sep. 1985, *A.C.Beaglehole* 80407 (CANB); Warby Ranges State Park, 23 Sep. 1985, *A.C.Beaglehole* 80796 (CANB); Wallaby Hill Education Area, 24 Sep. 1985, *A.C.Beaglehole* 80859 (MEL); Knock-er Track near Omeo, 17 Nov. 1989, *P.Branwhite* (*D.L.Jones* 5390) (CANB); 17.7 km from Wangaratta towards Thoona,



FIGURE 12. *Hymenochilus muticus* (R.Br.) D.L.Jones & M.A.Clem. Sandy Hollow, NSW. Photo by L. Copeland.

26 Oct. 1967, *E.Canning* (CANB); Havelock–Timor State Forest, 3 Oct. 1981, *E.Courtney* (MEL); Chiltern Forest, Oct. 1964, *M.R.Pocock* (AD); (?)TASMANIA. Penstock, Dec. 1929, *A.V.Giblin* (CANB); Glen Leith, New Norfolk, 24 Oct. 1840, *R.Gunn* (CANB); “Wetmore”, Midlands, Nov. 2005, *K.Johnson* & *M.Appleby* (CANB); Knocklofty–Mt Stewart, 22 Oct. 1951, *Scott* (HO 87743).

ILLUSTRATIONS: Page 546, Jones (2021), as *H. muticus*; page 343, Copeland & Backhouse (2022); page 236, Backhouse (2023), both as *Pterostylis mutica*.

7. *Hymenochilus nemoralis* D.L.Jones, *sp. nov.* (Fig. 13–14).

TYPE: Australia. South Australia: Alligator Gorge National Park, Circle Track, 5.9 km from Ranger Station, 5 Sep. 1999, *D.L.Jones* 16701 & *M.Garratt* (holotype, CANB-607292).

DIAGNOSIS: With affinity to *H. cynocephalus* but it dif-

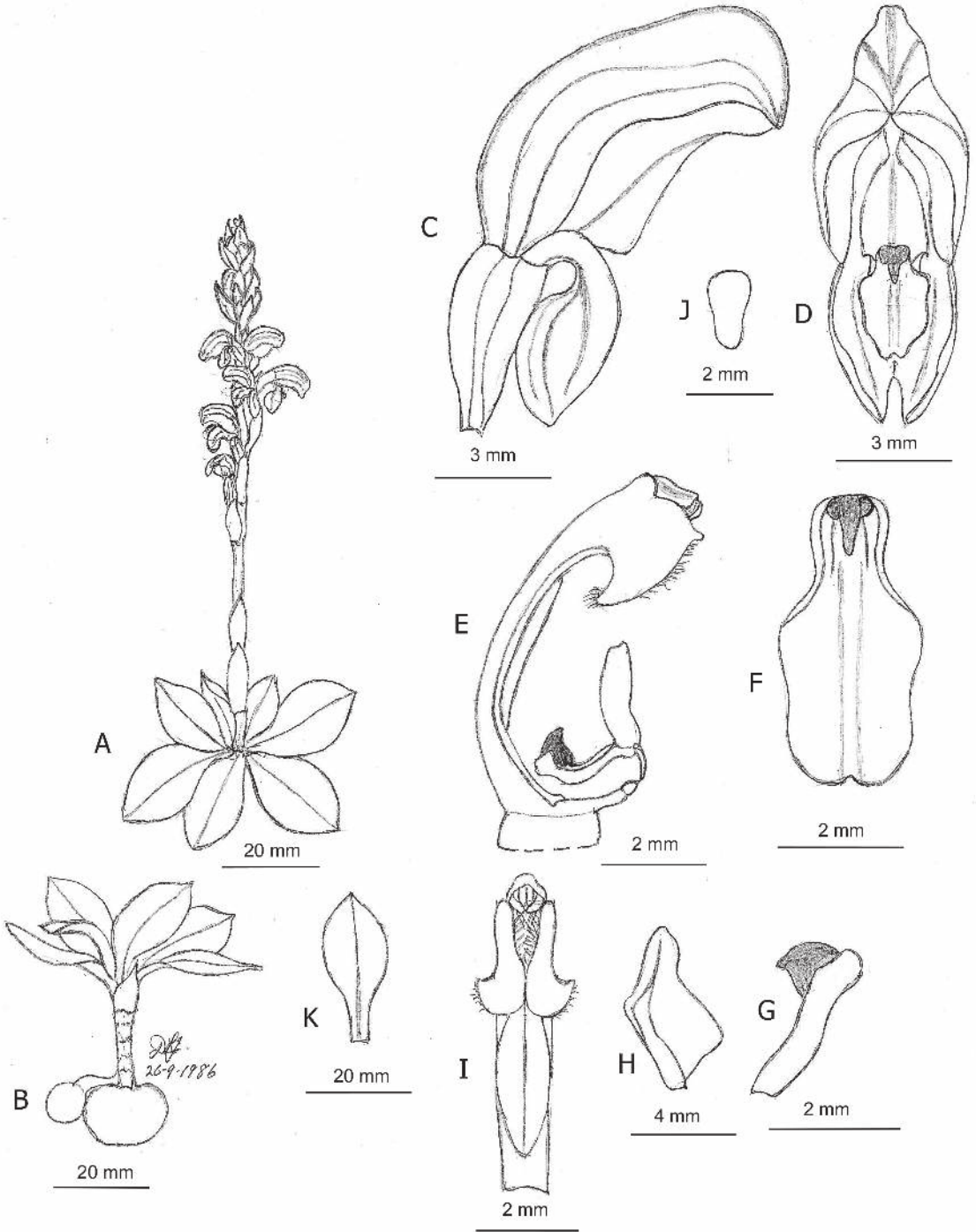


FIGURE 13. *Hymenochilus nemoralis* D.L.Jones. A. Habit. B. Rosette. C. Flower, side view. D. Flower, front view. E. Column and labellum, side view. F. Labellum flattened, from above. G. Labellum appendage, side view. H. Petal. I. Column, front view. J. Pollinium. K. Rosette leaf. Illustration by D. Jones. Taillem Bend SA, M.A. Clements s.n., 26 Sep. 1986.

fers by its longer rosette leaves (to 40 mm long *cf.* to 25 mm long in *H. cycnocephalus*), thicker scape (3–4 mm wide *cf.* 2–3 mm in *H. cycnocephalus*) and darker green flowers with prominent narrow dark green stripes (translucent green, faintly striped flowers in *H. cycnocephalus*).

Leaves 5–11; *lamina* thickish, ovate to elliptical, 10–40 mm long, 5–15 mm wide, green to greyish-green, thin-textured, dull, margins entire, apex acute to acuminate. *Scape* 5–25 cm tall, 3–4 mm across, 5–18-flowered. *Sterile bracts* 3–6, closely sheathing to spreading, elliptic when flattened, 5–16 mm long, 4–8 mm wide, thin-textured, acuminate. *Fertile bracts* similar, closely sheathing. *Pedicels* 3–5 mm long, straight, slender. *Ovaries* oblong to elliptic, 3–5 mm long, *ca.* 1.5 mm wide. *Flowers* porrect, relatively crowded to well-spaced, 10–12 mm long, 3–4 mm wide, light green with narrow darker green stripes. *Dorsal sepal* 8–9.5 mm long, 4–5 mm wide, slightly gibbous at the base, shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* deflexed, deeply saccate, dorsally gibbous, when flattened 4–5 mm long, 4–5 mm wide, points subacute, 2–3 mm apart. *Petals* asymmetrical, more or less ovate, 6–7 mm long, 3–3.5 mm wide, translucent green with darker veins, dorsal margin strongly thickened, dark green, a dorsal gibbosity above the middle, ventral margin smooth or irregular. *Labellum claw* irritable, ligulate, *ca.* 1.6 mm long, *ca.* 1.3 mm wide. *Labellum lamina* oblong, 2.2–2.5 mm long, 1.8–2 mm wide, whitish green with a dark green appendage, membranous, apex emarginate. *Basal appendage* recurved at right angles, oblong, *ca.* 1.5 mm long, *ca.* 1 mm wide, *ca.* 0.5 mm thick, margins dark green, thickened, central ridge narrow, raised above the margins, dark green, ending in a narrow, pointed beak 0.8–1 mm long. *Callus* a thickened tapered medial ridge. *Column* obliquely erect, 7–8 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, *ca.* 2.5 mm long, *ca.* 1.5 mm wide, basal lobe deltate, inner margins strongly incurved, sparsely ciliate; barrier cilia *ca.* 0.4 mm long, clavate. *Anther* *ca.* 1 mm long, obtuse. *Pollinia* clavate, *ca.* 0.8 mm long, yellow, mealy. *Stigma* central, elliptical, *ca.* 3 mm long, *ca.* 1.3 mm wide, raised. *Capsules* 6–8 mm long, 3–4 mm wide, on pedicels to 9 mm long.



FIGURE 14. *Hymenochilus nemoralis* D.L.Jones. Kangaroo Flat, SA. Photo by J. Niejalke.

DISTRIBUTION AND ECOLOGY: Widespread in South Australia extending at least from the Mount Lofty Ranges north to the Flinders Ranges and possibly also in the Gawler Ranges and upper parts of the South-eastern District, between 50–800 m in elevation. It apparently also occurs in western Victoria, where known from the vicinity of Tallageira and Rocklands (text and illustration on page 241 Backhouse 2023). I did not see any specimens from that region. It often grows in treed habitats such as open forest and woodland, but is also found in shrubland, mallee-broombush association and on rock outcrops in well-drained loamy soils developed on acidic rocks such as schists, granite, and porphyry.

FLOWERING: August to October.

RECOGNITION: Compared to *Hymenochilus cycnocephalus*, *H. nemoralis* is characterised by large thickish rosette leaves; thick scape; relatively crowded to widely spaced green flowers with prominent narrow

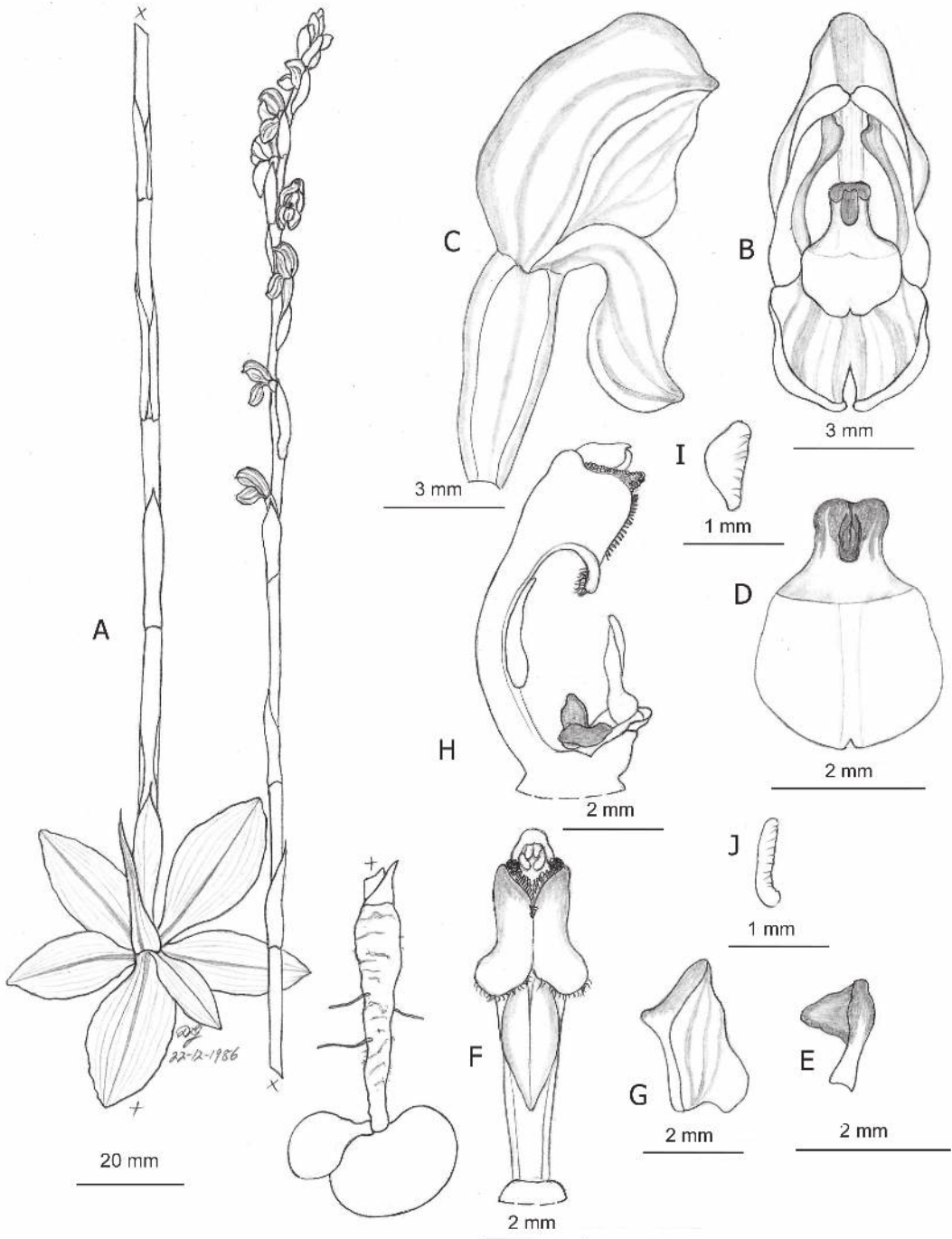


FIGURE 15. *Hymenochilus pachylus* D.L.Jones. **A.** Habit. **B.** Flower, front view. **C.** Flower, side view. **D.** Labellum flattened, from above. **E.** Labellum appendage, side view. **F.** Column, front view. **G.** Petal. **H.** Column and labellum, side view. **I–J.** Pollinia from different anther cells. Illustration by D. Jones. Barrington Tops NSW, R.G. Tunstall s.n., 22 Dec. 1986.

dark green stripes; deeply saccate lateral sepals; ovate petals; oblong labellum lamina and, a short labellum appendage with a narrow, pointed beak.

SIMILAR SPECIES: *Hymenochilus cycnocephalus* has smaller thinner rosette leaves, paler green flowers with inconspicuous stripes and an oblong to elliptical labellum with a broader beak on the labellum appendage. *Hymenochilus cymbellus*, which may occur in areas close to where *H. nemoralis* grows, has smaller, sparse rosette leaves, thin scapes, narrower flowers and shallowly saccate lateral sepals that narrow inwards to a distinctly pointed apex. *Hymenochilus longipes* also has thinner-textured rosette leaves than *H. nemoralis*, narrower flowers and a longer stalk on the labellum appendage. *Hymenochilus pachylus* has large, fleshy rosette leaves similar to *H. nemoralis*, but with widely spaced flowers and an obovate labellum with a thick blunt beak on the basal appendage. *Hymenochilus crassicaulis* is more robust than *H. nemoralis* with greyish rosette leaves, thicker scapes, and larger crowded bluish-green and white flowers with a large beak on the labellum appendage. *Hymenochilus anemophilus*, *H. calcicola*, *H. pratensis* and *H. spissus* can all be distinguished from *H. nemoralis* by their densely crowded flowers.

NOTES: The leaves of this species are generally extant at flowering time. It is the most robust South Australian species within the *H. cycnocephalus* group.

CONSERVATION STATUS: This species has a widespread distribution, including in protected areas, with estimated extent of occurrence 119,000 km² and a population size of >10,000. There is no known evidence of continuing decline. A preliminary extinction risk assessment based on known occurrences of, and threats to, results in a classification of this species as least concern.

ETYMOLOGY: From the Latin *nemoralis*, pertaining to forests, woods and groves, in reference to the forested habitats that this species prefers.

SPECIMENS EXAMINED: **SOUTH AUSTRALIA:** near Tarlee, July 1979, *R. Bates* 487 (AD); Alligator Gorge, 16 Sep. 1974, *R. Bates* 774 (AD); Mt Lofty Ranges, Oct. 1943, *M.R. Hone* 7372 (AD); 3 km S along Wirrabarra Forest Road towards Wirrabarra Forest, 4 Sep. 1999, *D.L. Jones* 16684 & *M. Garratt* (CANB).



FIGURE 16. *Hymenochilus pachylus* D.L.Jones. Barrington Tops, NSW. Photo by L. Copeland.

ILLUSTRATIONS: Page 551, Jones (2021); page 241, Niejalke (2022); page 241, Backhouse (2023), as *Pterostylis nemoralis*.

8. *Hymenochilus pachylus* D.L.Jones, *sp. nov.* (Fig. 15–16).

TYPE: Australia. New South Wales: Barrington Tops, Pol Blue Creek, 19 Jan. 1985, *D.L. Jones* 1766 (holotype, CBG-8506250; isotype, BRI).

DIAGNOSIS: With affinity to *H. cycnocephalus* but it differs by its thicker rosette leaves, taller, thicker scape (to 28 mm tall, 3–4 mm wide cf. to 20 mm tall, 2–3 mm wide in *H. cycnocephalus*), flowers prominently striped (faintly striped in *H. cycnocephalus*), elliptic to obovate labellum lamina (oblong to elliptic in *H. cycnocephalus*) and labellum appendage with a short thick beak (narrow in *H. cycnocephalus*).

Leaves 5–8; *lamina* elliptical, 10–25 mm long, 5–12 mm wide, green, fleshy, margins entire, apex acute to apiculate. *Scape* 10–28 cm tall, 3–4 mm

across, 5–12-flowered. *Sterile bracts* 4–6, closely sheathing, oblong to elliptic when flattened, 5–15 mm long, 4–6 mm wide, acuminate. *Fertile bracts* similar, closely sheathing. *Pedicels* ca. 4 mm long, straight, slender. *Ovaries* oblong to elliptic, 3–4 mm long, ca. 1.5 mm wide. *Flowers* porrect, well-spaced, 8–9 mm long, 3–4 mm wide, translucent green with darker green veins. *Dorsal sepal* 7–9 mm long, 4–6 mm wide, slightly gibbous at the base, nearly straight or shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* deflexed, deeply saccate, dorsally gibbous, when flattened 4.0–5.5 mm long, 4.0–4.5 mm wide, points subacute, ca. 3 mm apart. *Petals* asymmetrical, more or less ovate-oblong, 6–7 mm long, 2.5–3.0 mm wide, translucent green with darker veins, dorsal margin strongly thickened, dark green, with a dorsal gibbosity just above the middle, ventral margin irregular. *Labellum claw* irritable, ligulate, ca. 1 mm long, c. 0.6 mm wide. *Labellum lamina* elliptic to obovate, 2.0–2.3 mm long, 1.8–2.0 mm wide, whitish green with a dark green appendage, membranous, apex emarginate. *Basal appendage* sharply recurved, narrowly oblong, 1.5–2.0 mm long, ca. 0.8 mm wide, margins dark green, thickened, central ridge narrow, raised above the margins, dark green, ending in a blunt beak 0.8–1.0 mm long. *Callus* a thickened, darker green, tapered medial ridge. *Column* obliquely erect, 6–8 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, ca. 2 mm long, ca. 1 mm wide, basal lobe deltate, inner margins sparsely ciliate; barrier cilia ca. 0.2 mm long, clavate. *Anther* ca. 1 mm long, obtuse. *Pollinia* clavate, ca. 1 mm long, yellow, mealy. *Stigma* central, scutiform, ca. 2 mm long, ca. 1.2 mm wide, raised. *Capsules* ob-ovoid, 5–6 mm long, ca. 3 mm wide, green to brown, on pedicels to 5 mm long.

DISTRIBUTION AND ECOLOGY: Relatively common on Barrington Tops in northern New South Wales; also occurring on the New England Tableland (Thungutti area of New England National Park, Tamworth) and in Mt Kaputar National Park, between 200–400 m in elevation. Grows in moist grassy areas on slopes above streams and on flats near swamps in dark brown to blackish well-structured loam.

FLOWERING PERIOD: Late November to February.

RECOGNITION: *Hymenochilus pachylus* is characterised by relatively large, green, fleshy rosette leaves; tall, thickish scape; well-spaced green flowers with darker green veins; deeply saccate lateral sepals; ovate-oblong petals; broadly obovate labellum lamina and, a short, broad labellum appendage with a thick beak.

SIMILAR SPECIES: *Hymenochilus cynocephalus* has thinner-textured rosette leaves than *H. pachylus*, thinner scapes and a narrower oblong to elliptic labellum with a narrower labellum appendage and narrower terminal beak. *Hymenochilus longipes* also has thinner-textured rosette leaves than *H. pachylus*, narrower flowers and a longer stalk on the labellum appendage. *Hymenochilus nemoralis* has larger rosette leaves than *H. pachylus*, thicker scapes, and larger flowers that are more boldly striped. *Hymenochilus cymbellus* has smaller sparser rosette leaves than *H. pachylus*, slender scape and narrower, prominently striped flowers with a broad beak on the labellum appendage. *Hymenochilus crassicaulis* is more robust than *H. pachylus* with greyish rosette leaves, thicker scapes and larger crowded bluish-green and white flowers with a large beak on the labellum appendage. *Hymenochilus anemophilus*, *H. calcicola*, *H. pratensis* and *H. spissus* can all be distinguished from *H. pagophilus* by their densely crowded flowers.

NOTES: The rosette leaves are usually withered at flowering time.

CONSERVATION STATUS: This species has a widespread distribution, including in three national parks, with estimated extent of occurrence as 21,000 km² and a population size estimated to be >10,000. There is no known evidence of continuing decline. A preliminary extinction risk assessment based on known occurrences of, and threats to, results in a classification of this species as least concern.

ETYMOLOGY: From the Greek *pachylos*, thickish, in reference to the relatively thick peduncle, leaves and labellum appendage when compared with *H. cynocephalus*.

SPECIMENS EXAMINED: **NEW SOUTH WALES:** Pol Blue Creek, Barrington Tops, 8 Jan. 1989, *P. Branwhite* (*D.L. Jones* 5617) (CANB); Barrington Tops, Pol Blue, 5 Jan. 1985, *M.A. Clements* 3624 (CANB); Euglah Spring Fire Trail, Mt Kaputar Natl. Park, 20 Sep. 1976, *R. Coveny* 8866 & *S.K. Roy* (NSW); Barrington Tops, 26 Nov. 1983, *G. D'Aubert* (*ORG* 3475) (CANB); Barrington Tops, 3 Jan.

1984, *G. D'Aubert* (ORG 3480) (CANB); Barrington Tops, 26 Feb. 1953, *A.W.Dockrill* (NSW); private property near Stewarts Brook State Forest, 3 Deca. 1998, *W.M.Dowling* (ORG 2002) (CANB); Noland's Swamp, Barrington Tops, 3 Feb. 2000, *W.M.Dowling* 121 (CANB); *ibid*, 7 Jan. 1934, *L.Fraser & J.Vickery* (NSW); Barrington Tops, Jan. 1993, *D.Herd, G.Hillman, J.Riley & R.G.Tunstall* (CANB); Barrington Tops, Mt Royal Range, 28 Dec. 1947, *M.W.Nichols* (NSW); Pol Blue Creek, Barrington Tops, 27 Jan. 1990, *J.Riley* (*D.L.Jones* 5634) (CANB); Barrington Tops, Jan. 1928, *H.M.R.Rupp* (AD, NSW); Little Murray Creek, 11 Feb. 1971, *I.R.Telford* 2701 (CANB).

ILLUSTRATIONS: Page 551, Jones (2021); page 346, Copeland & Backhouse (2022), as *Pterostylis pachyla* ms.

9. *Hymenochilus pagophilus* D.L.Jones, *sp. nov.* (Fig. 17–18).

TYPE: Australia. South Australia: Near camping ground, Wilpena Pound, 31 July 1995, *D.L.Jones* 14091 & *B.E.Jones* (holotype, CANB-664129; isotype, AD).

DIAGNOSIS: With affinity to *H. muticus* but it differs by its moderately crowded to crowded flowers (widely spaced in *H. muticus*), broader, shinier flowers (to 6 mm wide in *H. pagophilus* cf. to 4.5 mm wide in *H. muticus* and rectangular-ovate labellum (oblong to elliptic in *H. muticus*).

Leaves 5–12; *lamina* elliptical to ovate, 15–40 mm long, 5–14 mm wide, green, dull, margins entire, apex acute, acuminate or apiculate. *Scape* 5–35 cm tall, 3–4 mm wide, 3–30-flowered. *Sterile bracts* 3–5, closely sheathing, ovate to elliptic when flattened, 5–18 mm long, 4–6 mm wide, thin-textured, acuminate. *Fertile bracts* similar, closely sheathing. *Pedicels* 3–10 mm long, straight, very slender. *Ovaries* oblong to elliptic, 3–5 mm long, 1–1.5 mm wide. *Flowers* porrect, shiny, moderately crowded to crowded, 8.5–12.0 mm long, 4–6 mm wide, green with faint darker green stripes. *Dorsal sepal* 8–10 mm long, 4–5 mm wide, porrect from the ovary at the base, shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* obliquely deflexed to deflexed, deeply saccate, dorsally curved, when flattened 6.5–8 mm long, 7–9 mm wide, points subacute, 4–6 mm apart. *Petals* asymmetrical, rhomboid, 8–9 mm long, 3.5–4.0 mm wide, translucent green with darker veins, dorsal margin strongly thickened, dark green, a dorsal gibbosity

above the middle, ventral margin with beaded siliceous cells. *Labellum claw* irritable, ligulate, ca. 1.8 mm long, ca. 1.3 mm wide. *Labellum lamina* rectangular-ovate, 2.5–3.0 mm long, 2.5–3.0 mm wide, pale green with a light green to dark green basal appendage, membranous, apex truncate, emarginate. *Basal appendage* recurved at right angles or less, oblong, ca. 2 mm long, ca. 1.3 mm wide, margins light green to dark green, thickened, central ridge narrow, slightly raised above the margins, green, ending below the apex of the appendage in a very short blunt beak. *Callus* a thickened, tapered, channelled medial ridge. *Column* obliquely erect, 7–8 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, ca. 2.5 mm long, ca. 1.4 mm wide, basal lobe ovate-deltate, inner margins incurved, sparsely ciliate; barrier cilia ca. 0.4 mm long, linear-clavate. *Anther* ca. 1 mm long, obtuse. *Pollinia* clavate to deltate, ca. 1 mm long, yellow, mealy. *Stigma* central, elliptical, ca. 3 mm long, ca. 1 mm wide, raised. *Capsules* obovoid, 7–9 mm long, 3–4 mm wide, on pedicels to 14 mm long.

DISTRIBUTION AND ECOLOGY: Endemic in South Australia, where it occurs between 500 and 1000 m in elevation. The species is frequent in the northern Lofty Ranges and Flinders Ranges, extending to the northern parts of these ranges and into the Gammon Ranges (one record) and Emu Bluff in the Gairdner-Torrens Basin (one record); also in the Mongalata Hills in the Murray District and a single record from North Corunna Hill on the Eyre Peninsula. Grows in the wetter parts of the state on slopes and ridges under trees and shrubs, often among rocks or tussocks in shallow skeletal soils over acidic rocks such as quartzite and granite; also occasional on inland ranges and hills growing on the upper slopes and sheltered cliffs and bluffs where rainfall is concentrated.

FLOWERING: July to September.

RECOGNITION: *Hymenochilus pagophilus* is characterised by large rosette leaves (to 40 × 14 mm); short to tall, thick scape (to 35 × 0.4 cm); moderately crowded to crowded, shiny flowers to 12 × 6 mm; deeply saccate lateral sepals; ovate petals with beaded siliceous marginal cells; rectangular-ovate labellum to 3.0 × 2.8 mm; and, recurved oblong appendage with a narrow central ridge slightly raised above the margins.

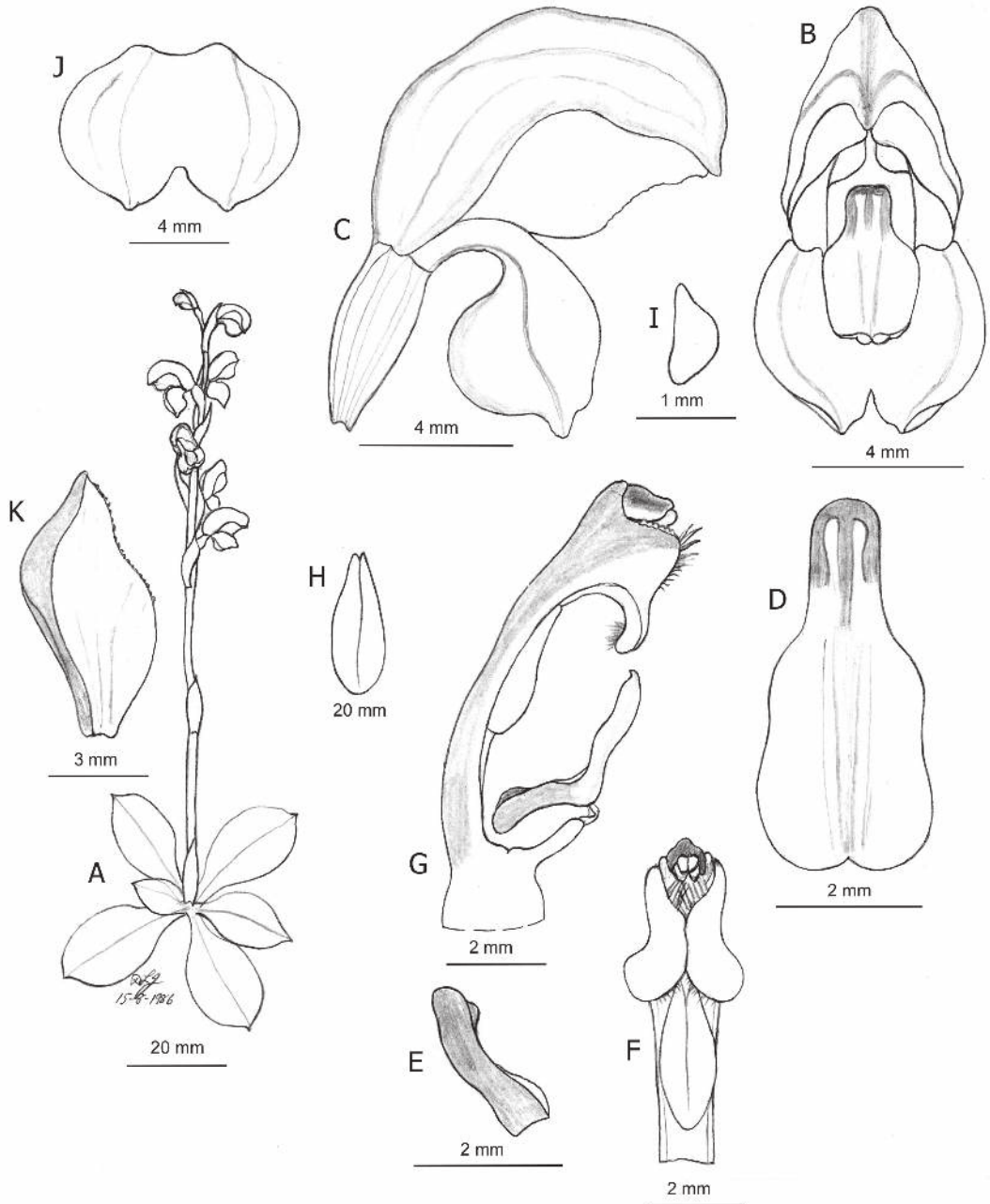


FIGURE 17. *Hymenochilus pagophilus* D.L.Jones. A. Habit. B. Flower, front view. C. Flower, side view. D. Labellum flattened, from above. E. Labellum appendage, side view. F. Column, front view. G. Column and labellum, side view. H. Stigma. I. Pollinium. J. Synsepal. K. Petal. Illustration by D. Jones. Flinders Ra. SA, cult H. Richards, 15 Aug. 1996.

SIMILAR SPECIES: *Hymenochilus muticus* has a slightly thinner scape than *H. pagophilus*, well-spaced narrower flowers, and an oblong to elliptic labellum with a broader recurved appendage in which the central ridge

ends in a short, slightly protruding, blunt beak situated well below the top of the appendage. *Hymenochilus pisinnus* has fewer and smaller rosette leaves than *H. pagophilus*, thinner flower stem and smaller flowers

with shallowly saccate lateral sepals and an obovate labellum. *Hymenochilus confertus*, *H. rubenachii* and *H. wapstrarum* can all be distinguished from *H. pagophilus* by their densely crowded flowers.

NOTES: The rosette leaves are usually green at anthesis.

CONSERVATION STATUS: This species has a widespread distribution, including in three national parks, with estimated extent of occurrence 116,000 km² and a population size of estimated to be >10,000. There is no known evidence of continuing decline. A preliminary extinction risk assessment based on known occurrences of, and threats to, results in a classification of this species as least concern.

ETYMOLOGY: From the Greek *pagos*, hill and *philos*, loving, in reference to its habit of growing in mountainous and hilly districts.

SPECIMENS EXAMINED: **SOUTH AUSTRALIA:** Emu Bluff, E of Lake Everard, 30 Aug. 1978, *R.Bates* (AD); Bibliando, 6 Aug. 2000, *R.Bates* 57150 (CANB); Mongalata Hills, 25 Aug. 2000, *R.Bates* 57249 (AD, CANB); Wilpena Pound, Flinders Ranges, Oct. 1924, *B.Beck* (AD); North Corunna Hill, Eyre Peninsula, 7 Sep. 1974, *R.J.Chinnock* 1928 & *B.Copley* (AD); Gammon Ranges, Arcoona Bluff Range, N of Arcoona Pound, 15 Sep. 1956, *Hj. Eichler* 12606 (AD); 7.3 km SW of Blinman, towards Parachlina, 2 Aug. 1995, *D.L.Jones* 14097A (CANB); Aroona Valley, 5 Aug. 1995, *D.L.Jones* 14099 & *B.E.Jones* (CANB); Dutchmans Stern Conservation Park, 7 Sep. 1999, *D.L.Jones* 16732 & *M.Garratt* (CANB); 6 km along Heysen Trail from Dutchmans Stern entry gate, 10 Sep. 2000, *D.L.Jones* 17473 & *M.Garratt* (CANB); near Chalet, Wilpena Pound, 26 Aug. 1974, *T.B.Muir* 5303 (CANB, MEL); Yourambulla Range, 7 km NW of Hawker, 31 Aug. 2003, *D.E.Murfet* 4404 (CANB); near track to St Marys Peak, Wilpena Pound, 19 Oct. 2003, *D.E.Murfet* 4456 (CANB); Wilpena Pound, 17 Sep. 1973, *P.Ollerenshaw* 187 (CANB); Yarra Vale Gorge, 16 km NE of Quorn, 21 Sep. 1973, *A.J.Sikkens* 608 & *P.Ollerenshaw* (CANB); 1 km SW of St Marys Peak, Wilpena Pound, 22 Sep. 1973, *A.J.Sikkens* 752 & *P.Ollerenshaw* (CANB); lower slopes, Mt John, Wilpena, 4 Sep. 1961, *D.E.Symon* (AD); upper slopes, Mt John, 14 Sep. 1960, *D.E.Symon* 594 (AD, CANB); Wilpena Pound, Flinders Ranges, 1 Sep. 1967, *J.Warcup* 167a (AD).

ILLUSTRATIONS: Page 546, Jones (2021); page 242, Niejalke (2022).

10. *Hymenochilus pisinnus* D.L.Jones, *sp. nov.* (Fig. 19–20).



FIGURE 18. *Hymenochilus pagophilus* D.L.Jones. Flinders Ra. SA. Photo by J. Niejalke.

TYPE: Australia. Western Australia: About 8 miles [ca. 12.8 km] S of Salmon Gums, 12 Sep. 1971, *A.S.George* 11022 (holotype, PERTH-7535422).

DIAGNOSIS: With affinity to *H. muticus* but it differs by its smaller rosette (3–7 leaves *cf.* 5–12 in *H. muticus*) with smaller, narrower leaves (to 35 × 12 mm *cf.* to 45 × 18 mm in *H. muticus*), thinner scape (0.5–1.5 mm *cf.* 2–4 mm wide in *H. muticus*), smaller flowers (to 9 × 4 mm *cf.* to 14.0 × 4.5 mm in *H. muticus*) that are often on long pedicels (to 20 mm long *cf.* to 5 mm long in *H. muticus*), shorter, shallowly saccate lateral sepals (deeply saccate in *H. muticus*), smaller rhomboid petals and, smaller obovate labellum (to 2.5 × 2.0 mm *cf.* oblong to elliptic labellum to 3 × 3 mm in *H. muticus*).

Leaves 3–7; *lamina* narrowly elliptical to narrowly ovate, 10–35 mm long, 3–12 mm wide, green, dull, margins entire, apex acute, acuminate or apiculate. *Scape* 5–18 cm tall, 0.5–1.5 mm wide, 1–16-flowered. *Sterile bracts* 3–5, closely sheathing, ovate to elliptic when

flattened, 5–10 mm long, 2–4 mm wide, thin-textured, acuminate. *Fertile bracts* similar, closely sheathing. *Pedicels* 3–20 mm long (longest on lower flowers), straight, very slender. *Ovaries* oblong to elliptic, 3–5 mm long, 1.0–1.5 mm wide. *Flowers* porrect, widely spaced, 7.5–9 mm long, 3–4 mm wide, translucent green with faint darker green stripes. *Dorsal sepal* 7–9 mm long, 4–5 mm wide, porrect from the ovary at the base, shallowly curved for most of its length, abruptly decurved near the apex. *Lateral sepals* obliquely deflexed to deflexed, shallowly saccate, dorsally curved, when flattened 4.5–6.0 mm long, 6–7 mm wide, points subacute, 3–4 mm apart. *Petals* asymmetrical, rhomboid, 4.5–6.5 mm long, 3–4 mm wide, translucent green with darker veins, dorsal margin strongly thickened, dark green, a dorsal gibbosity above the middle, ventral margin with beaded siliceous cells. *Labellum claw* irritable, ligulate, *ca.* 1.4 mm long, *ca.* 1 mm wide. *Labellum lamina* obovate, often widening evenly from the base, 2.0–2.5 mm long, 1.5–2.0 mm wide, whitish green with a light green to dark green basal appendage, membranous, apex emarginate. *Basal appendage* recurved at right angles or more, oblong, *ca.* 1.6 mm long, *ca.* 1 mm wide, margins light green to dark green, thickened, central ridge narrow, hardly raised above the margins, dark green, ending below the apex of the appendage in a very short blunt beak. *Callus* a thickened, tapered, channelled medial ridge. *Column* obliquely erect, 6–7 mm long, shallowly curved, green with darker areas on the wings. *Column wings* more or less rectangular, *ca.* 2.3 mm long, *ca.* 1 mm wide; basal lobe ovate to deltate, inner margins incurved, sparsely ciliate; barrier cilia *ca.* 0.3 mm long, linear to clavate. *Anther* *ca.* 0.8 mm long, obtuse. *Pollinia* oblong–clavate, *ca.* 1 mm long, yellow, mealy. *Stigma* central, elliptical, *ca.* 2.5 mm long, *ca.* 1 mm wide, raised. *Capsules* 5–8 mm long, 3–4 mm wide, on pedicels to 10 mm long. (Fig. 8).

DISTRIBUTION AND ECOLOGY: Widely distributed in Western Australia (Wongan Hills to Eyre) and South Australia, including the Nullarbor region, also in parts of north-western Victoria. The species has an elevational range of 10–350 m. It grows in a wide range of habitats but is most prominent in vegetation with a short sparse understorey such as shrubland, mallee communities, *Callitris* woodland, mallee-broombush association and saltbush. It is frequently, but not always, found in

areas with limestone in the soil profile, either as subterranean pavements or as outcrops, concretions, and rubble. The soils are mostly infertile sands, crustose loams and terra rossa.

FLOWERING: July to October.

RECOGNITION: *Hymenochilus pisinnus* is characterised by relatively small and often narrow rosette leaves (to 25 × 15 mm); thin scape (to *ca.* 18 cm tall but only 0.5–1.5 mm wide); small widely spaced flowers (to 9 × 4 mm) that are often on long pedicels (to 20 mm long on lower flowers); short, shallowly saccate lateral sepals; small, rhomboid petals; obovate labellum to 2.5 × 2.0 mm; labellum appendage recurved, with the central ridge immersed or slightly protruding and ending well below the apex.

SIMILAR SPECIES: *Hymenochilus muticus* shares the elongated scape and well-spaced flowers with *H. pisinnus* but is much more robust with more, larger, fleshier rosette leaves, taller, thicker scape, larger, broader flowers, larger ovate–elliptic to rhomboid petals, deeply saccate lateral sepals and a larger oblong to elliptical labellum with a broad labellum appendage in which the central ridge, although short and blunt, protrudes noticeably. In large populations of *H. muticus* it is often possible to find plants with the slender stature of *H. pisinnus*, however, these can be distinguished by the larger flowers and oblong to elliptic labellum with a broad appendage. Even robust plants of *H. pisinnus* never attain the dimensions of large specimens of *H. muticus*. *Hymenochilus pagophilus* is also more robust than *H. pisinnus* with larger rosette leaves, thicker flower stems and larger flowers with deeply saccate lateral sepals and a more or less rectangular labellum. *Hymenochilus confertus*, *H. rubenachii* and *H. wapstrarum* can all be distinguished from *H. pisinnus* by their densely crowded flowers.

NOTES: This orchid, the only member of the *H. muticus* group to occur in Western Australia, is quite probably Australia's most drought-tolerant orchid.

ETYMOLOGY: From the Latin *pisinnus*, small, little, in reference to the usual puny nature of the plants, especially relative to *H. muticus*.

CONSERVATION STATUS: This species has a widespread distribution, including in three national parks, with es-

timated extent of occurrence 788,000 km² and a population size estimated to be >10,000. There is no known evidence of continuing decline. A preliminary extinction risk assessment based on known occurrences of, and threats to, results in a classification of this species as least concern.

SPECIMENS EXAMINED: **VICTORIA:** Murrawong North Roadside Reserve, 8 Sep. 1986, *A.C.Beauglehole* 83936 (MEL); Ellam Flora Reserve, 18 Sep. 1986, *A.C.Beauglehole* 84700 (MEL); ca. 32 km S of Bambill, 6 Sep. 1986, *J.H.Browne* 361 (MEL); Red Bluff Wildlife Reserve, 7 Sep. 1986, *R.Fomes* (MEL); Sea Lake district, Sep. 1912, *J.C.A.Goudie* (AD); ca. 20.4 km W of Ouyen towards Walpeup, 29 Aug. 1999, *D.L.Jones* 16529 & *M.Garratt* (CANB); Broken Bucket, 12 Sep. 2000, *D.L.Jones* 17488 & *M.Garratt* (CANB). **SOUTH AUSTRALIA:** Chaunceys Line, Sep. 1939, *A.Ashby* (AD); Nullarbor Region, 50 km E of WA border, 4 Sep. 1981, *R.Bates* 989b (AD); Alford Town Reserve, 14 Sep. 1987, *R.Bates* 10480 (AD); Woodchester area, 3 Sep. 1989, *R.Bates* 20421 (CANB); S of Telowie Gorge, 10 Sep. 1989, *R.Bates* 20452 (CANB); Owen Common, 10 Sep. 1989, *R.Bates* 20480 (CANB); Clements Gap Conservation Park, 27 Aug. 1996, *R.Bates* 43726 (CANB); Brinkley, 6 Aug. 2000, *R.Bates* 57149 (CANB); Kulpara, 4 Sep. 1966, *B.J.Blalock* 132 (AD); Curramulka, 27 Aug. 1967, *B.J.Blalock* 565 (AD); 6 km SSE of Moonta, 30 Sep. 1967, *B.J.Blalock* (AD); Ferries MacDonald Conservation Park, 8 Aug. 1990, *P.Branwhite* (*D.L.Jones* 6192) (CANB); Mt Sturt, 31 Sep. 1986, *K.Brewer* (AD); 800 m from Pygery towards Port Kenny, 2 Sep. 1983, *J.D.Briggs* 1113 (CANB); ca. 34 miles from Kimba towards Whyalla, 29 Aug. 1968, *E.Canning* (CANB); ca. 21 km S of Kimba, 25 Sep. 1986, *M.A.Clements* 4185 (AD); Mona Railway Yard, ca. 5 km W of Bute, 11 Aug. 1966, *B.Copley* 484 (AD); Wauraultee Scrub, SW of Maitland, 22 Aug. 1978, *B.Copley* 5254 (AD); Voigts Road, W of Stansbury, 19 Sep. 1973, *B.Copley* 4119 (AD); Clinton North, Aug. 1912, *A.Edguist* (AD); Poochera, 26 Aug. 1955, *F.M.Hilton* (AD); Glenhill Station, Tintinara, 9 Oct. 1979, *P.Hornsby* (AD); Hundred of Senior, 8 Sep. 1962, *D.Hunt* 1113 (AD); near Coonalpyn, 26 Aug. 1966, *D.Hunt* 2684 (AD); 1.8 km W of Parilla towards Tailern Bend, 30 Aug. 1999, *D.L.Jones* 16537 & *M.Garratt* (CANB); 9.1 km W of Lameroo towards Peake, 30 Aug. 1999, *D.L.Jones* 16540 & *M.Garratt* (CANB); 3.5 km W of Peake towards Sherlock, 30 Aug. 1999, *D.L.Jones* 16545 & *M.Garratt* (CANB); Sherlock, 30 Aug. 1999, *D.L.Jones* 16549 & *M.Garratt* (CANB); Ferries McDonald Conservation Park, 30 Aug. 1999, *D.L.Jones* 16556 & *M.Garratt* (CANB); Moonta Town Reserve, 1 Sep. 1999, *D.L.Jones* 16602 & *M.Garratt* (CANB); Muloowurtie Conservation Reserve, 2 Sep. 1999, *D.L.Jones* 16610 & *M.Garratt* (CANB); Curramulka Scrubs, 2 Sep. 1999, *D.L.Jones* 16624 & *M.Garratt* (CANB); 8.8 km E of Minlaton towards Stans-

bury, 2 Sep. 1999, *D.L.Jones* 16653 & *M.Garratt* (CANB); 4 km SW of Muloowurtie Point towards Minlaton, 3 Sep. 2000, *D.L.Jones* 17268 & *M.Garratt* (CANB); 64 km S of Whyalla towards Cowell, 5 Sep. 2000, *D.L.Jones* 17297 & *M.Garratt* (CANB); 7.7 km SW along road to Mt Geharty from Whyalla-Cowell road, 6 Sep. 2000, *D.L.Jones* 17299 & *M.Garratt* (CANB); Mt Geharty, 6 Sep. 2000, *D.L.Jones* 17305 & *M.Garratt* (CANB); S end of Mt Olympus, 5 Sep. 2000, *D.L.Jones* 17332 & *M.Garratt* (CANB); 21 km from Cleve towards Rudall, 6 Sep. 2000, *D.L.Jones* 17364 & *M.Garratt* (CANB); lower NE slope of Darke Peak, 6 Sep. 2000, *D.L.Jones* 17371 & *M.Garratt* (CANB); Mt Granite, 9 Sep. 2000, *D.L.Jones* 17458 & *M.Garratt* (CANB); Dublin Scrub, 27 Aug. 1962, *D.Kraehenbuehl* 601 (AD); Sevenhill, 8 Oct. 1957, *B.B.Lowery* (NSW); Mt Bosanquet, 16 Sep. 1972, *F.A.Mason* 1 (AD); W of Gawler, Aug. 1954, *R.Nash* (CANB); Monarto South, 9 Sep. 1967, *M.R.Pocock* 16 (AD); Ardrossan, 1901-06, *R.S.Rogers* (AD); Maitland, 19 Aug. 1905, *R.S.Rogers* (AD); Monarto South, 5 Sep. 1912, *R.S.Rogers* (AD); *ibid*, 20 Sep. 1913, *R.S.Rogers* (NSW); Dingo Ranges, 32 km NW of Pinnaroo, 31 Aug. 1961, *M.C.A.Sharrad* 1149 (AD); 65 km N of Bordertown, 29 Aug. 1961, *P.G.Wilson* 2087 (AD). **WESTERN AUSTRALIA:** Border Village, 4 Sep. 1981, *R.Bates* 989d (AD); Eucla, Sep. 1981, *R.Bates* 990a (AD); 10 km E of Madura, Sep. 1981, *R.Bates* 990c (AD); 20 km E of Balladonia, Sep. 1981, *R.Bates* 990d (AD); Twilight Cove, near Cockle-biddy, 2 Sep. 1981, *R.Bates* 990e (AD); 20 km NW of Wongan Hills, 4 Sep. 1984, *R.Bates* 4218 (AD); Ravensthorpe, 9 Sep. 1967, *V.M.Bennett* (PERTH); 5 km SW of Mt Beaumont, 9 Aug. 1980, *A.Brown* (PERTH); 39.5 km SSE of Peak Eleanora, 25 Sep. 1984, *M.A.Burgman* 3571b (PERTH); Junana Rock, 10 Aug. 1980, *M.A.Clements* 2025 (CANB); Bremer Range, 29 Aug. 1999, *K.J.Fitzgerald* 127 (CANB); 20.9 km S of Caigna, 24 Aug. 1983, *M.J.Fitzgerald* (PERTH); Lake King, 24 Aug. 1957, *A.S.George* (PERTH); 17.8 miles E of Newdegate, 12 Sep. 1959, *A.S.George* 285 (PERTH); 18 miles E of Newdegate, 30 Aug. 1963, *A.S.George* 5686 (PERTH); 0.5 miles N of Hopetoun, 31 Aug. 1963, *A.S.George* 5751 (PERTH); Parker Range, 30 July 1969, *A.S.George* 9432 (PERTH); 10 miles ESE of Tambellup, 30 Sep. 1971, *A.S.George* 11077 (PERTH); 26 km E of Madura, 10 July 1974, *A.S.George* 11823 (PERTH); Twilight Cove, 11 July 1974, *A.S.George* 11867 (PERTH); Painted Cliffs, 50 km E of Lake Cronin, 5 Aug. 1980, *A.S.George* 15824 (PERTH); 2 km NW of Mt Heywood, 8 Aug. 1980, *A.S.George* 15886 (PERTH); SW of Mt Ney, 9 Aug. 1980, *A.S.George* 15902 (PERTH); NW of Mt Ney, 11 Aug. 1980, *A.S.George* 15962 (PERTH); 5 km E of Grass Patch, 12 Aug. 1980, *A.S.George* 15975 (PERTH); Israelite Bay, 14 Aug. 1980, *A.S.George* 16004 (PERTH); 7 km W of Israelite Bay, 14 Aug. 1980, *A.S.George* 16019 (PERTH); Sheoak Hill, SE of Mt Ragged, 14 Aug. 1980, *A.S.George* 16038 (PERTH); below S side of Mt Ragged, 15 Aug. 1980,

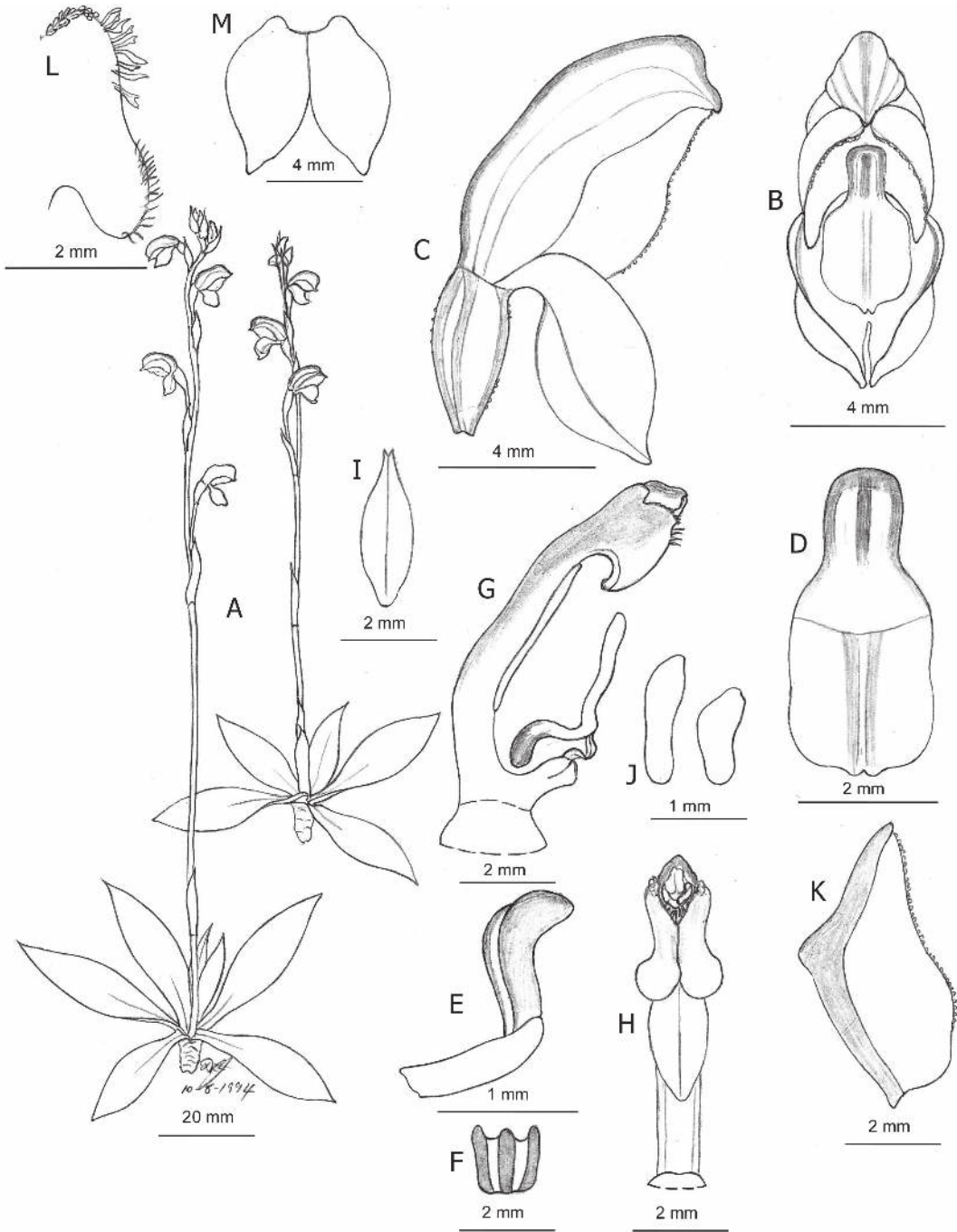


FIGURE 19. *Hymenochilus pisinnus* D.L.Jones. A. Habit. B. Flower, front view. C. Flower, side view. D. Labellum flattened, from above. E. Labellum appendage, side view. F. Labellum appendage grooves. G. Column and labellum, side view. H. Column, front view. I. Stigma. J. Pollinia from different anther cells. K. Petal. L. Internal view of column wing. M. Synsepal. Illustration by D. Jones. Lake Grace WA, C.J. French, 10 Aug. 1994.

A.S.George 16080 (PERTH); S side of Junara Rocks, 16 Aug. 1980, *A.S.George 16080* (PERTH); Pine Hill, 16 Aug. 1980, *A.S.George 16101* (PERTH); Juranda Rock Hole, 16 Aug. 1980, *A.S.George 16113* (PERTH); SW of Mt Ragged, 17 Aug. 1980, *A.S.George 16144* (PERTH); 17 km NE of Boyatup Hill, 17 Aug. 1980, *A.S.George 16153* (PERTH); near Salmon Gums, 24 Aug. 1937, *Mrs Horbury* (AD); Kurnar, Sep. 1937, *L.A.Horbury* (NSW, PERTH); 2.4 km S of Hyden-Norseman Road, N of Middle Ironcap, 14 Oct. 1993, *D.L.Jones 12354* (CANB); E edge of Wongan Hills, 31 Aug. 1980, *K.F.Kenneally 7422* (PERTH); 5 miles W of Dowak, 12 Aug. 1978, *F.Magagannoti* (PERTH); 11 miles E of Southern Cross, 12 Aug. 1961, *A.R.Main* (PERTH); E of Hyden, 7 Sep. 1973, *C.A.Nelson* (CANB); 5 km NW of Ongerup, 29 Aug. 1973, *K.Newbey 3733* (PERTH); 4 km SE of Hatters Hill, 10 Aug. 1979, *K.Newbey 5499* (PERTH); Boingaring Rock, 11 Sep. 1980, *K.Newbey 7281* (PERTH); 5 miles N of Norseman, 8 Aug. 1951, *R.D.Royce 499* (PERTH); Kondinin, 6 Sep. 1945, *R.D.Royce 511* (PERTH); Lake King district, Sep. 1930, *Mr Steedman* (PERTH); Dowak, July–Aug., *D.Voigt 15* (PERTH); 3 km N of old Eucla, 14 Sep. 1960, *D.J.Whibley 631* (AD); 100 km S of Balladonia, 10 Sep. 1964, *P.Wilson 2882* (AD); Salmon Gums, 12 Sep. 1964, *P.Wilson 3064* (AD); ca. 20 km S of Lake King, 10 Aug. 1968, *P.Wilson 6978* (PERTH).

ILLUSTRATIONS: Page 547, Jones (2021); page 243, Niejalke (2022); page 407, Hoffman *et al.* (2019), as *Pterostylis mutica*; page 141, Brown (2022), as *Pterostylis mutica*; page 237, Backhouse (2023), as *Pterostylis pisinna*.

ACKNOWLEDGEMENTS. We thank Emma Toms, Marion Garratt, and Karina Richards for technical assistance. Many people helped with specimens and information including Gary Backhouse, Robert Bates, Garry Brockman, Lachlan Copeland, Christopher French, Helen Richards, Hans and Annie Wapstra. We thank Zoe Groeneveld for the illustrations of *H. anemophilus* and *H. cymbellus*. For permission to use their photos we thank Gary Backhouse, Lachlan Copeland, June Niejalke and Robert Bates. Thanks also to the directors of AD, BRI, CANB, HO, MEL, NSW, QVM for providing access to specimens. Special thanks to Barbara Jones for support at home and in the field. Plant material collected with permission of the Australian Capital Territory Government, PL201543 and PL201573; Government of South Australia's Department of Environment, Water and Natural Resources, Y26092-1, K14673, W14679; the New South Wales National Parks and Wildlife Service, Scientific Licence, SL 100750; New South Wales State Forests, XX51121, HC 53443; Tasmanian Department of



FIGURE 20. *Hymenochilus pisinnus* D.L.Jones. Ngarkat Conservation Park, SA. Photo by J. Niejalke.

Parks, Wildlife and Heritage, 91/7, FL95073; Tasmanian Department of Primary Industry, Water and Environment, FL03121; the Victorian Government's Department of Conservation Forests and Lands, 1/70/89/0021, 4154 878/47; Victorian Government's Department of Environment, Land, Water and Planning, Flora and Fauna Guarantee Act 1988 and National Parks Act 1975, 10006307; Government of Western Australia Department of Environment and Conservation (previously the Department of Conservation and Land Management), CE000160, CE000418, NE000515, NE000890, NE001714, NE002573, NE002538, , SW001959, SW001960, SW001963, SW004596, and SW015074; the Queensland Government's Queensland Parks and Wildlife Service, 996, 1333, 1427, 1678, 1696, FO/000878/96/SAA, F1/000056/97/SAA, FO/000889/96/SAA, F1/00232/99/SAA, 1685 and F1/000172/01/SAA; and Queensland Government's Department of Environment and Heritage Protection WITK11258712 and WISP11258812.

LITERATURE CITED

- Backhouse, G.N. (2023). *Guide to native orchids of Victoria*. Melbourne: CSIRO Publishing.
- Brown, R. (1810). *Prodromus floræ Novæ Hollandiæ et Insulæ Van-Diemen*. London: J. Johnson and Co.
- Brown, A. (2022). *The complete orchids of Western Australia*. Perth WA: self-published.
- Copeland, L. M. & Backhouse, G. N. (2022). *Guide to native orchids of NSW and ACT*. Melbourne: CSIRO Publishing.
- Fitzgerald, R.D. (1876). *Australian Orchids*. Sydney, Australia: Richards.
- George, A. S. (1971). A check list of the Orchidaceae of Western Australia. *Nuytsia*, 1(2), 190.
- Hoffman, N., Brown A. & Brown, J. (2019). *Orchids of south-west Australia, Fourth Ed.* Nedlands, WA: University of Western Australia Press.
- IUCN Standards and Petitions Committee (2022). Guidelines for Using the IUCN Red List Categories and Criteria. Version 15.1. Prepared by the Standards and Petitions Committee. Retrieved from <https://www.iucnredlist.org/documents/RedListGuidelines.pdf>.
- Jones, D. L. (2008). Two new species of *Hymenochilus* (Orchidaceae) from south-eastern Australia. *The Orchadian*, 15(11), 492–497.
- Jones, D. L. (2009). Five threatened new species of *Hymenochilus* (Orchidaceae) from southern Australia. *The Orchadian*, 16(4), 176–187.
- Jones, D. L. (2021). *A complete guide to the native orchids of Australia*, Third edition. Sydney: Reed New Holland.
- Jones, D. L. & Clements, M. A. (2002). A review of *Pterostylis* (Orchidaceae). *Australian Orchid Research*, 4, 3–152.
- Niejalke, J. (2022). *Native Orchids of South Australia a Field Guide*. Pinnaroo SA: self-published.