

# A taxonomic revision of the genus *Lagenophora* Cass. (Asteraceae: *Astereae*) in New Guinea

Jian Wang & A.R. Bean

## Summary

Wang, J. & Bean, A.R. (2020). A taxonomic revision of the genus *Lagenophora* Cass. (Asteraceae: *Astereae*) in New Guinea. *Austrobaileya* **10(4)**: 576–582. The genus *Lagenophora* Cass. is taxonomically revised for New Guinea with two species recognised. One (*Lagenophora sporadica* Jian Wang ter & A.R.Bean sp. nov.) is endemic to New Guinea and the other (*L. sublyrata* (Cass.) A.R.Bean & Jian Wang ter) is widespread in Asia, Australia and Malesia. The species are described and illustrated. Notes are provided on the distribution (including a map), habitat and phenology. An identification key is provided.

Key Words: Asteraceae; *Astereae*; *Lagenophora sporadica*; *Lagenophora sublyrata*; New Guinea flora; new species; identification key; distribution map

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## Introduction

*Lagenophora* Cass. is a small genus of daisies in the Tribe *Astereae* and found mainly in the temperate parts of the southern hemisphere. Twelve species are found in Australia (Wang & Bean 2019), nine species occur in New Zealand (Breitwieser *et al.* 2012), three species in southern South America (Cabrera 1966) and two in New Guinea. The genus also extends to New Caledonia and Indonesia, and as far as Sri Lanka and southern Japan (Koidzumi 1928; Wang & Bean 2019).

The genus *Lagenophora* was first recorded for New Guinea by Mueller (1889), based on a specimen collected by William MacGregor from the summit of the Owen Stanley Range, earlier that same year. Cabrera (1966) cited New Guinea specimens for three species, *L. gracilis* Steetz, *L. lanata* A.Cunn. and *L. stipitata* (Labill.) Druce. Koster (1966) reduced this to two species, *L. stipitata* and *L. lanata*, and stated that *L. gracilis* and *L. lanata* could not be maintained as separate species, as the former differs only by the sparser tomentum.

The present authors concur with Koster (1966) that two species are present – one is *L. sublyrata* (Cass.) A.R.Bean & Jian Wang ter, of which *L. lanata* is a synonym and the other is *L. sporadica* Jian Wang ter & A.R.Bean, a new species closely related to *L. stipitata*.

## Materials and methods

This revision is based on morphological examination of *Lagenophora* material from the following herbaria: A, AK, BRI, CANB, GH, HO, L, MEL and NSW. Images of type specimens held at FI, G, HAL, K, M, NY, P and W have also been examined and are indicated as *i.d.v.* (*imago digitalis visa*). Most measurements are based on dried material, but the dimensions of florets are based on material reconstituted with boiling water. Dimensions in the descriptions are inclusive, *viz.* 1.0–1.7 is given as 1–1.7.

**Taxonomy****Key to the New Guinea species of *Lagenophora***

- Roots tuberous and fleshy, bunched; rhizomes short; stem very short (leaves in basal rosette); scape hairs appressed to antrorse; achene glands confined to the dorsal side of beak and adjacent upper dorsal edge; achenes usually with 1–3 hairs at base; achene 2.2–2.4 mm long excluding beak . . . . . **L. sublyrata**
- Roots fibrous and wiry, not bunched, rhizomes spreading; stem usually elongated (leaves alternate along stem), scape hirsute, hairs retrorse to patent; achene papillae extending all along ventral and dorsal edges from beak to carpopodium, and on the basal and distal portions of both faces; achenes without basal hairs; achene 2.9–3.4 mm long excluding beak . . . . . **L. sporadica**

**1. *Lagenophora sublyrata*** (Cass.) A.R.Bean & Jian Wang ter, *Austrobaileya* 10: 435–437 (2019); *Ixauchenus sublyratus* Cass., *Dict. Sci. Nat. ed. 2. [F. Cuvier]* 56: 176 (1828). **Type:** Australia. [New South Wales.] Port Jackson, November–December 1819, C. *Gaudichaud s.n.* (lecto: image of P 00742955† *i.d.v.*), *fide* Bean & Wang (2017: 168). **Epitype:** New South Wales. Hornsby, April 1914, *W.F. Blakely s.n.* (NSW 10275), *fide* Bean & Wang (2017: 168).

*Ixauchenus lyratus* Less., *Syn. Gen. Compos.* 193 (1832), *nomen nudum*.

*Lagenophora billardierei* var. *media* DC., *Prodr. [A. P. de Candolle]* 5: 307 (1836). **Type:** Nova Hollandia, [in 1823], *F.W. Sieber 505* (syn: G 00454010 *i.d.v.*; HAL *i.d.v.*; NY 00180436 *i.d.v.*).

*Lagenophora billardierei* var. *glabrata* DC., *Prodr. [A. P. de Candolle]* 5: 307 (1836). **Type:** Nouvelle Holland, in 1816, from Lambert's herbarium (syn: G 00454009 *i.d.v.*).

*Lagenophora lanata* A.Cunn., *Ann. Nat. Hist.* 2: 126 (1839). **Type:** New Zealand. Between the Waitangy and Keri-Keri Rivers, in 1834, *R. Cunningham s.n.* (lecto: K 000890104 *i.d.v.*), *fide* Allen (1961: 606).

Perennial rhizomatous herb; roots fleshy, bunched, 0.2–1 mm diameter; no stem or short stem to 10 mm long; leaves and scapes firmly attached to stem and/or rootstock. Leaves 4–9(–11), obovate, oblanceolate, elliptical, spatulate, 1–2 cm long by 0.4–0.8 cm wide

(*c.* 2.5 × longer than wide), sessile or with a winged petiole-like base to 1 cm long; leaf apex obtuse or rounded; leaf margins toothed, crenate to sinuate, with 5–7(–9) teeth, each tooth 0.2–0.4 mm long; upper leaf surface green, with 2–7 hairs per mm<sup>2</sup>, each 0.1–0.3 mm long; lower leaf surface pale green, with 3–7 hairs per mm<sup>2</sup>, each 0.1–0.4 mm long; leaf margins with 6–12 hairs per mm<sup>2</sup>, each 0.1–0.3 mm long; net veins usually obscure on dried material on both surfaces. Scapes channelled, 1–6 per tuft, each (2.5–)4–8 cm long at anthesis, 4–11 cm long at fruiting stage, 0.3–0.4 mm diameter, 0.3–0.5 mm thick from lowest to upmost section; scape bracts 2–4, upper ones *c.* 0.6 × 0.2 mm, lower ones *c.* 1.4 × 0.4 mm; scape indumentum *c.* 0.1 mm long, antrorse, more or less appressed; 2–6 hairs per mm at midpoint of scape, slightly denser towards apex. Capitula 2.5–3.5 mm long, 2.5–5 mm diameter; involucre bracts (20–)25 in 3 or 4 rows, lanceolate, oblong to obovate, apex obtuse, acute, ciliate or with fringed margin on distal part, glabrous, outer bracts 1.2–1.5 × 0.3–0.4 mm, inner bracts 2.2–2.8 × 0.5–0.6 mm. Receptacle convex, 0.6–0.8 mm diameter and 0.5–0.8 mm high. Ray florets 20–30 in 2–4 rows; tube *c.* 0.4 mm long, 0.1–0.2 mm wide, glandular hairy; style branches *c.* 0.4 mm long; ligules 1.8–2 mm long, 0.15–0.35 mm wide, with longitudinal veins obscure, creamy, yellow or purple, apex obtuse. Disc florets 10–15, corolla tubular, 1.5–1.8 mm long, light yellow, outer surface with sparse glandular hairs; corolla lobes 5, deltate, 0.2–0.3 mm long × 0.3–0.35 mm

wide; stamens 5, anthers *c.* 0.6 mm long; style branches *c.* 0.2 mm long; sterile ovary 0.6–0.7 mm long; pappus scales 1 or 2, *c.* 0.1 mm long. Achenes compressed, lanceolate, obliquely oblanceolate, 2.2–2.4 × 0.4–0.6 mm excluding beak, light brown to dark brown at maturity; achene edges more or less thickened; with 1–3 eglandular hairs present usually at base of achene; achene glands confined to dorsal side of beak and adjacent area of achene; achene beak 0.4–0.5 mm long, with a thickened white annular collar at its apex, 0.15–0.2 mm diameter. **Fig. 1.**

**Additional specimens examined: Indonesia. Papua.** Balim River, Dec 1938, *Brass 11782* (BRI, CANB, L); near Lake Gita, Angi, Arfak Mts, Apr 1940, *Kanehira 14115 & Hatustima* (L); Anggi Gita Lake, Bivouac Noordpool, Jan 1962, *Sleumer 14020 & Vink* (BRI, CANB, L). **Papua New Guinea.** WESTERN HIGHLANDS PROVINCE: Yobobos grassland area, Laiagam subdistrict, Aug 1960, *Hoogland 7505 & Schodde* (CANB, L). SOUTHERN HIGHLANDS PROVINCE: Between Kendatel and Yombi, *c.* 6 miles [10 km] N of Ialibu patrol post, Jul 1961, *Pullen 2735* (CANB). MOROBE PROVINCE: Mannasat, Cromwell Mountains, Huon Peninsula, Jul 1964, *Hoogland 9450* (CANB); *ibid*, Aug 1964, *Hoogland 9614* (BRI, L); Watama, Menyamy subdistrict, May 1968, *Streimann NGF35897 & Kairo* (L). CENTRAL PROVINCE: Boridi, Nov 1935, *Carr 13441* (CANB, L); Mafulu, Sep 1933, *Brass 5151* (BRI, L); Coastal scarp of Astrolabe Range, SW of Birribi, Aug 1970, *Schodde 5637* (L); Coast scarp of Astrolabe Range, Port Moresby subdistrict, Aug 1970, *Stevens LAE50342* (BRI, CANB, L). MILNE BAY PROVINCE: Maneau Peak, Mt Dayman, May 1953, *Brass 22255* (CANB, L); E slopes, Goodenough Island, Oct 1953, *Brass 24666* (CANB, L); Mt Wadimana ridge, NE from Mt Simpson, Jul 1969, *Pullen 7865* (CANB); Summit area of Mt Wadimana, eastern Mt Simpson Range, Jul 1969, *Schodde 5480* (CANB); Mt Suckling Complex, Mayu II, Raba Raba Subdistrict, Jun 1972, *Stevens LAE54980 & Veldkamp* (BRI, L); Goropu Mountains (Mt Suckling), Jun 1972, *Veldkamp 5536 & Stevens* (L).

**Distribution and habitat:** *Lagenophora sublyrata* is the most widespread species in the genus. It has been called by the misapplied name *L. gracilis* or the synonymous name *L. lanata* in south Asia (e.g. India, Sri Lanka), south-east Asia (e.g. Vietnam), China, Malesia (e.g. Java), New Caledonia, Australia and New Zealand. In New Guinea, it has a widespread distribution (**Map 1**). It mainly inhabits montane grassland near rainforest margins on sandy or fine gravel deposits in wet situations from 670 m to 2750 m above sea level. It has also been recorded on dry

sandy or rocky flats.

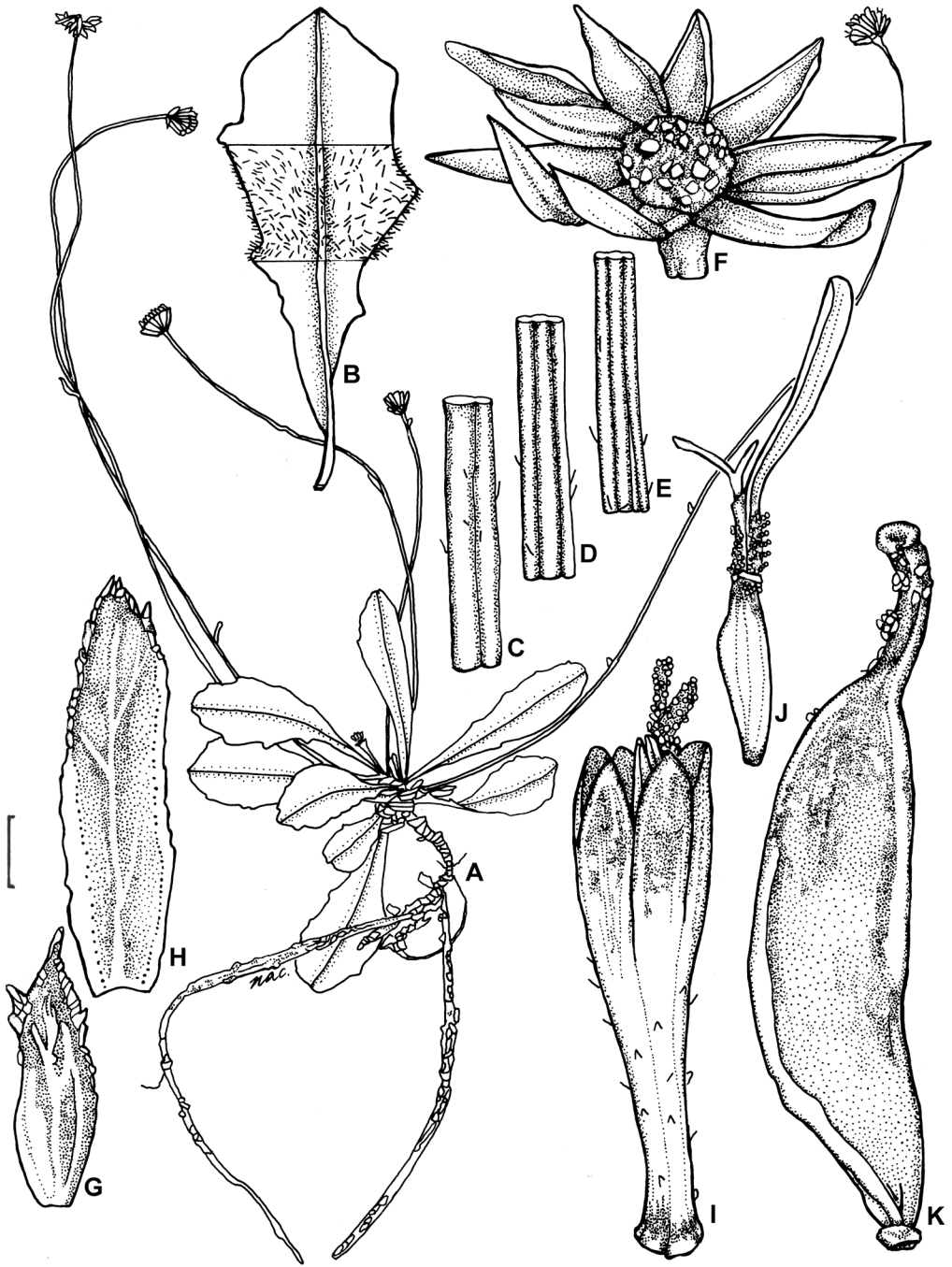
**Phenology:** Flowers and fruits have been recorded throughout the year except February and March.

**Note:** *Lagenophora sublyrata* is a widespread species with variable leaf shape, indumentum and plant size. New Guinea specimens are usually quite hairy and small in stature, as are specimens from New Zealand, but features of the roots, the achene, scape and involucre bracts are consistent with typical plants from eastern Australia.

**2. *Lagenophora sporadica*** Jian Wang ter & A.R.Bean, **sp. nov.** with affinities to *L. stipitata* (Labill.) Druce and *L. adensa* Jian Wang ter & A.R.Bean, but differing from *L. stipitata* by the sinuate to undulate leaf margins, the two types of scape indumentum, the shorter ligules of the ray florets, and differing gland and/or papillae distribution on the achene surfaces. It differs from *L. adensa* by the smaller sized ligules, and the gland distributional pattern on achene surfaces. **Typus:** Papua New Guinea. ORO (NORTHERN) PROVINCE: Mt Kenive (Nisbet), Kokoda Subdistrict, 30 July 1974, *J.R. Croft et al. LAE65116* (holo: BRI [AQ352188]; iso: A [2 sheets], CANB 559390, L 1815314).

[*Lagenophora stipitata*, *auct. non* (Labill.) Druce; Koster (1966: 590)].

Perennial rhizomatous herb; roots and rhizomes fibrous; stem usually elongated (leaves alternate along stem) or occasionally short (leaves in near basal rosette); leaves and scapes firmly attached to stem and/or rootstock. Leaves 5–10, obovate to long-spathulate, 1.5–4 cm long by 1–2.2 cm wide (1.5–1.8× longer than wide), with a winged petiole-like base 1–4 cm long; leaf apex obtuse; leaf margins sinuate to undulate, usually with 9–11(–17) shallow lobes, each lobe 0.5–2 mm long; upper leaf surface grey green; with eglandular hairs 0.3–0.6 mm long, 4–10 per mm<sup>2</sup>; lower leaf surface pale green; with eglandular hairs 0.2–0.6 mm long, 1–6 per mm<sup>2</sup>; both leaf surfaces have papillae to 0.01 mm long, more or less evenly distributed; leaf margins with 6–14 eglandular hairs per mm<sup>2</sup>, each 0.4–0.8 mm



**Fig. 1.** *Lagenophora subtyrata*. A. habit of whole plant with flowering inflorescences  $\times 1.5$ . B. leaf with a section in details  $\times 5$ . C–E. lower, mid and upper-sections of scape  $\times 20$ . F. capitulum with flowers and fruits removed, lateral view  $\times 20$ . G. outer involucre bract  $\times 20$ . H. inner involucre bract  $\times 20$ . I. disc floret  $\times 35$ . J. marginal floret  $\times 35$ . K. achene  $\times 35$ . A from Stevens LAE50342 (BRI), B, F from Brass 5151 (BRI), C–E from Stevens & Veldkamp LAE54980 (BRI), G–J from Hoogland 9614 (BRI), K from Brass 11782 (BRI). Scale bar = 10 mm at  $\times 1$  magnification. Del. N. Crosswell.

long; lateral veins obscure on upper leaf surfaces, but obvious on lower leaf surfaces. Scapes channelled, 1–3(–4) per tuft, each 2–7 cm long at anthesis, 6–14 cm long at fruiting stage, *c.* 0.6 mm diameter but expanding to *c.* 1.4 mm at apex; scape bracts 2–3, upper ones *c.* 4 × 0.5 mm, lower ones *c.* 8 × 1.8 mm; scape indumentum including eglandular hairs 0.2–0.5 mm long, appressed, patent or retrorse; 1–4 hairs per mm<sup>2</sup> at midpoint of scape, 4–8 hairs per mm<sup>2</sup> towards apex; and papillate to *c.* 0.01 mm long, 5–15 per mm<sup>2</sup> at midpoint of scape, but very densely distributed towards apex. Capitula 4–5(–6) mm long, 7–12 mm diameter; involucre bracts *c.* 54 in 3 or 4 rows, linear, lanceolate, apex acute to acuminate, with fringed margins on distal half, papillate with eglandular hairs occasionally along midrib on outer surface; outer bracts *c.* 2.5 × 0.5 mm, inner bracts 2.5–3.5 × 0.3–0.7 mm. Receptacle convex to hemispherical, 2.8–4.4 mm diameter and 1.4–2.5 mm high. Ray florets *c.* 83, in 3–4 rows; tube 0.5–0.9 mm long, *c.* 0.3 mm wide, with papillae; style branches *c.* 0.6 mm long; ligules 1.9–2.2 × 0.3–0.4 mm, longitudinal veins obscure, white or pink, apex obtuse and bidentate. Disc florets *c.* 11; corolla tubular, *c.* 1.8 mm long, greenish or yellow, outer surface covered with papillae; corolla lobes (4–)5, deltate, 0.3–0.4 × *c.* 0.3 mm; stamens (4–)5, filaments 1.1–1.5 mm long, anthers 0.6–0.8 mm long; style branches 0.4–0.7 mm long; sterile ovary 2.2–2.5 mm long, with a thickened white annular collar at its apex, collar *c.* 0.3 mm diameter. Achenes compressed, oblanceolate, straight or slightly curved, 2.9–3.4 mm long excluding beak, *c.* 1 mm wide, uniformly brown at maturity; achene edges slightly thickened; achene papillae extending all along ventral and dorsal edges from beak to carpodium, and on the basal and distal portions of both faces; achene beak 0.5–1.1 mm long, densely surrounded by papillae, and with a white annular collar at its apex, 0.2–0.25 mm diameter. **Fig. 2.**

**Additional selected specimens examined:** Papua New Guinea. EASTERN HIGHLANDS PROVINCE: Mt Aniata, Mar 1959, *Cruttwell 1057* (K, L); Mt Wilhelm, Nov 1960, *Borgmann 315* (L). CENTRAL PROVINCE: Mt Albert Edward, May/Jul 1933, *Brass 4226* (A, BRI, K, L); NW part of Mt Albert Edward, Jun 1974, *Craven 2750* (A, CANB, K, L). MOROBE PROVINCE: Samanizing

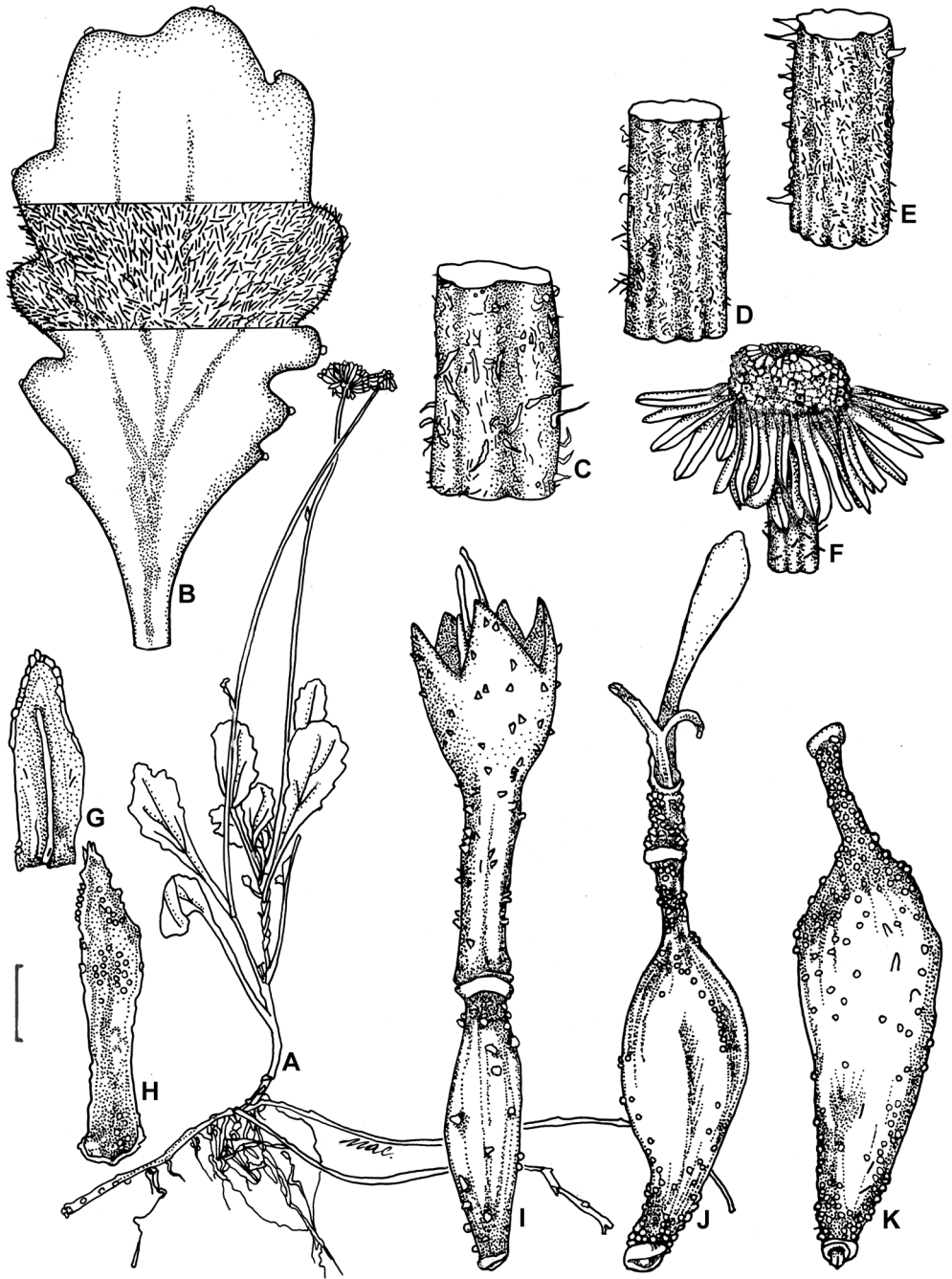
vicinity, Upper Camp, Feb 1939, *Clemens 9585* (L 1815313, L 1815327); *ibid.*, Feb 1939, *Clemens 9910A* (A, L); Mt Enggom, Sarawaket Range, Feb 1963, *van Royen NGF16204* (BRI, CANB, L). ORO (NORTHERN) PROVINCE: W slopes Mt Kenive (Nisbet), Kokoda Subdistrict, Aug 1974, *Croft LAE65155* (BRI, L). MILNE BAY PROVINCE: Mt Ganaina, Aug 1962, *Cruttwell 1280* (K, L); Goropu Mountains (Mt Suckling), Jun 1972, *Veldkamp & Stevens 5678* (CANB, L); S Spur of Goe Dendeniwa, Mt Suckling complex, Jun 1972, *Stevens & Veldkamp LAE54205* (A, BRI, CANB, K, L); Slopes of Goe Dendeniwa, Mt Suckling complex, Raba Raba Subdistrict, Jun 1972, *Stevens & Veldkamp LAE54279* (A, BRI, CANB, K, L); E slope of Manurep, Raba Raba Subdistrict, Jul 1972, *Stevens & Veldkamp LAE54497* (A, BRI, CANB, K, L).

**Distribution and habitat:** *Lagenophora sporadica* is endemic to Papua New Guinea where it is restricted to high altitudes from 2400 to 3800 m (**Map 1**). It grows in conifer dominated submontane rainforest and relictual forest that can be dominated by *Prunus*, *Podocarpus* or *Papuacedrus*. It is also recorded from the shade of subalpine shrubberies; subalpine grasslands in rocky places with low grass; and in the shelter of forest borders and logs. It can be a common species even in burnt forest areas.

**Phenology:** Both flowers and fruits were recorded in February, March, May to August, and November.

**Typification:** It is indicated on the label of the type specimen of *Lagenophora sporadica* that duplicates of *LAE65116* are also present at BISH, BM, BO, E, K, LAE, M, PNH, SING, SYD and US, but none of these have been seen by the present authors.

**Affinities:** *Lagenophora sporadica* is of similar appearance to *L. stipitata*, but differs by the sinuate to undulate leaf margins (obtusely serrate for *L. stipitata*), the two types of scape indumentum (usually one type only for *L. stipitata*), the ligules of the ray florets 1.9–2.2 mm long, (2.3–3.3 mm long for *L. stipitata*), and different gland and/or papillae distributional patterns on the achene surfaces. It also resembles *L. adenosa*, but differs from that species by the smaller sized ligules at 1.9–2.2 × 0.3–0.4 mm (3–3.4 × 0.4–0.6 mm for *L. adenosa*), and the distributional patterns of glands and/or papillae on achene surfaces.



**Fig. 2.** *Lagenophora sporadica*. A. habit of whole plant with flowering inflorescences  $\times 0.5$ . B. leaf with a section in details  $\times 5$ . C–E. lower, mid and upper-sections of scape  $\times 15$ . F. capitulum with flowers and fruits removed, lateral view  $\times 5$ . G. outer involucral bract  $\times 15$ . H. inner involucral bract  $\times 15$ . I. disc floret with immature achene  $\times 20$ . J. marginal floret with near mature achene  $\times 20$ . K. achene  $\times 20$ . A, C–K from *Croft LAE65116* (BRI), B from *Craven 2750* (CANB). Scale bar = 10 mm at  $\times 1$  magnification. Del. N. Crosswell.

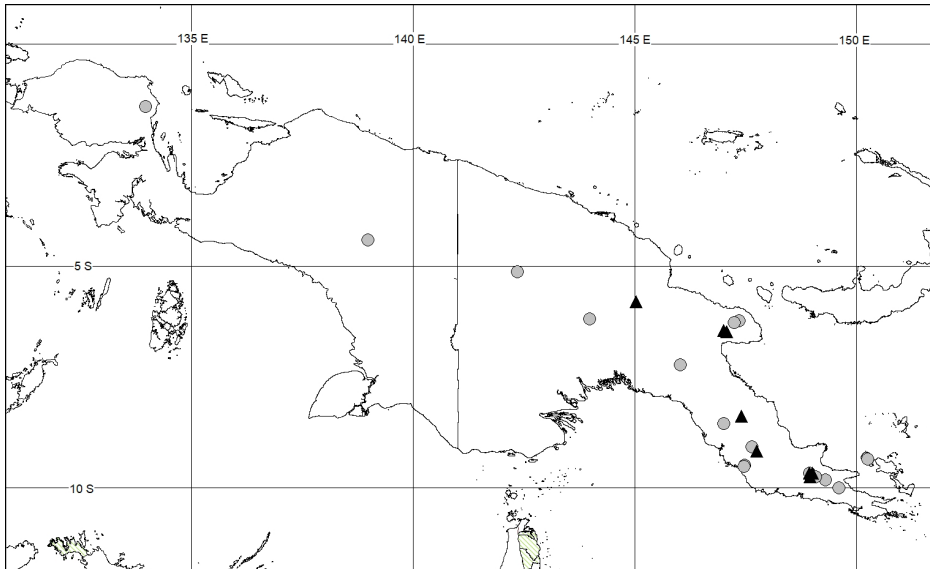
**Etymology:** From the Latin *sporadicus*, meaning ‘scattered’ or ‘widely dispersed’. This refers to the widely dispersed glands and/or papillae on the faces of the achenes, in comparison with *Lagenophora adenosa* and *L. stipitata*.

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### References

- ALLEN, H.H. (1961). *Flora of New Zealand*, Volume 1, *Indigenous Tracheophyta*. R.E. Owen, Government Printer: Wellington.
- BEAN, A.R. & WANG, J. (2017). The identity and typification of *Ixauchenus sublyratus* Cass. (Asteraceae). *Adansonia ser.* 3, 39: 1–4.
- BREITWIESER, I., BROWNSEY, P.J., GARNOCK-JONES, P.J., PERRIE, L.R. & WILTON A.D. (2012). Phylum Tracheophyta - vascular plants. In D.P. Gordon (ed.), *New Zealand Inventory of Biodiversity. Kingdoms Bacteria, Protozoa, Chromista, Plantae, Fungi*. 3: 411–459. University of Canterbury Press: Christchurch.
- CABRERA, A.L. (1966). The genus *Lagenophora* (Compositae). *Blumea* 14: 285–308.
- DE CANDOLLE, A.P. (1836). *Prodromus systematis naturalis regni vegetabilis* 5: 307–308. Treuttel & Wurtz: Paris.
- KOIZUMI, G. (1928). *Plantae Novae Amami-Ohsimensis nec non Insularum Adjacentium. 1. Phytogeographical notes on the flora of the Loochoo Archipelago; 2. Description of new species*, pp. 3–4. Kagoshima, Japan.
- KOSTER, J.T. (1966). The Compositae of New Guinea I. *Nova Guinea Botany* 24: 497–614.
- MUELLER, F. (1889). Records of observations on Sir William MacGregor’s highland plants from New Guinea. *Transactions of the Royal Society of Victoria* 1(2): 1–45.
- WANG, J. & BEAN, A.R. (2019). A taxonomic revision of *Lagenophora* Cass. (Asteraceae) in Australia. *Austrobaileya* 10: 405–442.



Map 1. Distribution of *Lagenophora sublyrata* ● and *L. sporadica* ▲ in New Guinea.