

A Revision of *Centipeda* (Asteraceae)

Neville G. Walsh

National Herbarium of Victoria, Birdwood Avenue, South Yarra, Victoria 3141, Australia.

Abstract

The taxonomy of the genus is revised to comprise 12 taxa in 10 species, 7 of these taxa described here as new. The currently accepted taxa are *C. cunninghamii* (DC) A. Braun & Asch., *C. elatinooides* (Less.) Benth. & Hook. ex O. Hoffm., *C. minima* (L.) A. Braun & Asch., *C. racemosa* (Hook.) F. Muell., and *C. thespidioides* F. Muell. The new taxa are *C. aotearoana* N.G. Walsh, *C. borealis* N.G. Walsh, *C. crateriformis* N.G. Walsh subsp. *crateriformis*, *C. crateriformis* subsp. *compacta* N.G. Walsh, *C. minima* subsp. *macrocephala* N.G. Walsh, *C. nidiformis* N.G. Walsh and *C. pleiocephala* N.G. Walsh. All species except the New Zealand endemic *C. aotearoana* occur in Australia. *Centipeda elatinooides* occurs also in New Zealand and South America. *Centipeda minima* subsp. *minima* is found through the South Pacific area to Southeast Asia and India, and *C. borealis* extends to Papua New Guinea. A key, descriptions, illustrations and distribution maps are included.

Introduction

Centipeda Lour., to date, has been accepted as consisting of five species with the centre of diversity in Australia where 4 species are represented (*C. minima*, *C. cunninghamii*, *C. racemosa* and *C. thespidioides*). The most widespread species, *C. minima*, extends beyond Australia through the western Pacific and south-east Asia to Taiwan and as far west as India. *Centipeda cunninghamii* has been known to occur in New Zealand at least since 1930, but is possibly adventive there as treated by Webb *et al.* (1988). A fifth species, *C. elatinooides*, in recent times was believed to be confined to Chile and neighbouring areas in Argentina. Examination of specimens of *Centipeda* at MEL has indicated not only that *C. elatinooides* is common in Australia and New Zealand, but also that many other specimens are inadequately accounted for by the prevailing taxonomy.

Consequently, specimens have been examined from herbaria within and beyond Australia to cover the geographic extent of the genus. A total of 12 taxa has been distinguished amongst these specimens, with the new taxa largely confined to Australia, but one apparently endemic to New Zealand and one extending from northern Australia to Papua New Guinea.

TRIBAL PLACEMENT OF THE GENUS

Centipeda has traditionally been placed in the tribe Anthemideae (e.g. Bentham 1867, Willis 1973, Heywood & Humphries 1977), but more recent evidence, from floral and cypselae morphology, chemistry, pollen anatomy and chromosome number (e.g. Sorenson 1977, Skvarla *et al.* 1977, Gadek *et al.* 1989, Bruhl & Quinn 1990, 1991, Nesom 1994) has variously suggested its placement in the Inuleae (Skvarla *et al.* 1977), Gnaphalieae (Gadek *et al.* 1989) or Astereae (Bremer, 1987, Nesom 1994 — subtribe Grangeinae). Nesom cited the hairs on the cypselae ribs of *C. cunninghamii* as being one of the characters confirming the genus' placement in the Grangeinae, and pointed out that the similarity of these hairs to those on cypselas of many members of the Brachycominae may indicate a close affinity between the subtribes. Nesom described these hairs as 'glochidiate'. I find the hairs of *C. cunninghamii* and several other species to be apically inrolled (eg. *C. pleiocephala*, Fig. 1), not barbed as 'glochidiate' might imply, but this characteristic is not invariable within species. Bremer (1994) included *Centipeda* in subfamily Asteroideae, but excluded it (along with 7 other genera) from any currently recognised tribe.

The following account does not attempt to address the question of the position of *Centipeda*, but the increased number of species suggests even more strongly than before a

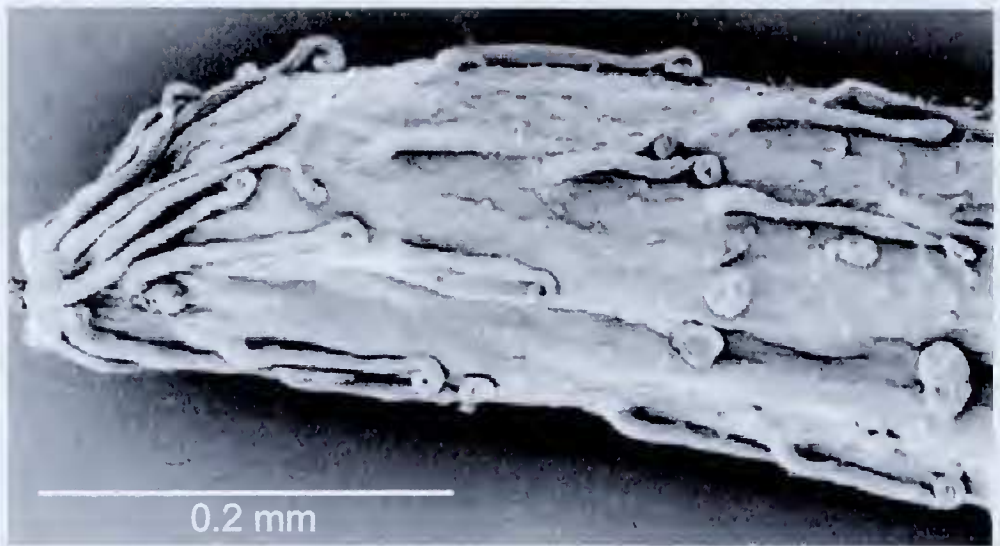


Figure 1. Apically inrolled hairs on cypselas of *Centipeda pleiocephala* (Walsh 4949, MEL)

Gondwanan origin for the group. This distribution adds support for its exclusion from the Anthemideae — a principally Northern Hemisphere tribe — and perhaps, for the same reason, adds further weight for closer association to the Astereae or the Gnaphalieae.

MEDICINAL USES AND TOXICITY

Centipeda has been used in traditional medicines in India, China and Australia. In India, powdered parts of *C. minima* (vern. *Nakk-chikni* (Hindi) or *Shikani*) are used as a treatment for ozaena (nostril ulcers), headaches, and head-cold, a paste made from boiled leaves used for toothache, and both powdered herbage and the seeds used as a sternutatory (sneeze inducer — hence *Artemisia sternutatoria* Roxb. — see synonymy for *C. minima*) and vermifuge. It is also used to treat epididymitis, epilepsy and hydrocoele (Dymock 1885, Duke & Ayensu 1985). In Chinese medicine the same species (vern. *Shih-Hu-Sui*, *O-pu-shih-tsaio*) is used to reduce swelling and to treat various symptoms associated with colds as well as haemorrhoids, malaria, conjunctivitis, ophthalmia and skin rashes (Hooper 1929, Duke & Ayensu 1985, Hsu *et al.* 1986). Latz (1995) reported the use of *C. minima*, *C. cunninghamii* and *C. thespidioides* by Central Australian aborigines (vern. *Iteug-iteug*, *Karengkal*, *Kata-palkalpa*, *Mmyu-paruti-paruti*) for the treatment of colds, and as a pituri substitute when wild tobacco is unavailable. *Centipeda crateriformis* and perhaps *C. pleiocephala* (both described below, previously included within the three species noted above) are probably used in similar ways. In south-eastern Australia, an infusion of *C. cunninghamii* (vern. *Gukwonderuk*, *Old man weed*) is still used in aboriginal medicine as a general tonic and for the treatment of colds and other chest complaints, including tuberculosis, and for skin complaints (Zola & Gott 1992). Commercial preparations using *C. cunninghamii* are claimed to be effective in the treatment of various skin disorders including the relief of itching and dry skin from psoriasis.

Chemical constituents have been noted to include myriogenenic acid, taraxasterol, taraxerol, amidiol, stigmasterol, ?-sitosterol, triterpenoid saponins and terpenes (Hooper 1929, Duke & Ayensu 1985, Hsu *et al.* 1986, Gupta & Singh 1989, P. Neville-Smith pers. comm.).

There are several references on herbarium specimens to plants of various species either being avoided by stock, or if eaten, causing sickness or death. Bailey (1906) and Hurst (1942) provided anecdotal information of stock being poisoned by species of *Centipeda*, but Everist (1974) did not include it amongst known poisonous Australian plants.

MORPHOLOGY

Perenniality

Despite conventional descriptions of an annual life cycle in floras etc., many species of *Centipeda* are facultative perennials given conditions of fairly even moisture (e.g. glasshouse conditions, seepage areas), but the favoured habitats of most of the species, around lakes, dams, beside watercourses, on floodplains etc., militates against their persistence beyond a single growing season. *Centipeda pleiocephala*, *C. nidiformis* and *C. thespidioides* however appear to be genuine annuals (i.e. plants do not persist beyond fruiting even under benign nursery conditions). In permanently damp shaded sites, *C. minima* may persist for several seasons but is otherwise an annual. In temperate areas *C. elatinooides*, *C. cunninghamii* and *C. crateriformis*, and in the tropics *C. borealis*, are commonly perennial. *Centipeda racemosa* appears to be perennial throughout its range. Both it and *C. borealis* persist through the dry season or through prolonged dry spells by a perennating rootstock, with above-ground parts usually fully drying off.

Inflorescence

Capitula are initiated terminally and new vegetative growth is produced immediately below. The rate of development of the inflorescence and/or the subtending vegetative shoot(s) differs between species. In some species such as *C. borealis*, *C. nidiformis*, and to a lesser extent, *C. minima*, the capitula often mature before extension of the subtending vegetative shoot. Capitula then appear terminal. In other species (e.g. *C. aotearoana*, *C. crateriformis*, *C. cunninghamii*, *C. thespidioides*) the capitula mature more slowly relative to the subtending shoot and then, at maturity, the capitula appear axillary or, if there is no immediately subtending leaf, borne directly on the branch.

In most cases the capitula are sessile. In *C. racemosa*, *C. pleiocephala* and, to a lesser extent, *C. elatinooides* the capitula are shortly pedunculate.

Fruiting and seed dispersal

There appears to be a marked difference in dissemination strategy among species of *Centipeda*. One group of species (*C. minima*, *C. pleiocephala*, *C. nidiformis*, *C. borealis*, *C. racemosa*, *C. elatinooides*) have capitula that disintegrate virtually as soon as cypselas are mature. Another group have capitula that persist intact until long after the flowering stems or entire plants have withered (e.g. *C. thespidioides*, *C. crateriformis* subsp. *crateriformis*). *Centipeda cunninghamii*, *C. crateriformis* subsp. *compacta* and *C. aotearoana* are somewhat intermediate in having capitula that, although persisting for a significant period after cypselas maturity, usually dissociate within the same growing season. The seeds of all species are buoyant (due at least partly to the spongy apical process of most of the species) and I have observed 'rafts' of seed of *C. minima* and *C. pleiocephala* floating in backwaters and eddies of waterbodies where the level has recently risen to cover mature plants. The cypselas are subsequently deposited on sand or silt at or near the floodmark, giving rise to the characteristic zonality of populations of *Centipeda* around water-bodies. The presence of short, often apically inrolled hairs, and droplets of viscid resin from the vesicular trichomes, provide a means for long-distance dispersal via attachment to fur or feathers. This might explain the shared occurrence of some species between land masses separated by substantial tracts of ocean, e.g. *C. cunninghamii* (Australia, New Zealand) and *C. minima* (Australia, New Zealand, South Pacific islands, southern Asia), *C. elatinooides* (Australia, New Zealand, Chile). The bracts of the fruiting capitula of *C. thespidioides* and *C. crateriformis* subsp. *crateriformis* have strongly thickened, spongy bases, and this feature, along with the persistent nature of the capitula possibly represents a means by which the entire capitulum might act as the disseminule.

Taxonomy

Centipeda Lour., *Fl. Cochinch.* 492 (1790). *Typical species*: *C. minima* (L.) A. Braun & Asch.

Annual or facultatively perennial *herbs*, glandular and aromatic. *Leaves* alternate, cauline, sessile, toothed to entire, glandular-punctate, glabrous to densely cottony. *Inflorescences* mostly terminal and solitary, but appearing axillary by sympodial growth of subtending shoots, rarely racemose or truly axillary. *Capitula* heterogamous, sessile to shortly pedunculate, globular, biconvex, hemispherical, cup-shaped or campanulate; involucre bracts in c. 2 rows, herbaceous, scarious-margined; receptacle slightly concave to distinctly convex, glabrous, epaleate, with pithy tissue present to some degree below surface; outer florets female, corolla tubular, narrowed above and minutely 3-lobed, lobes very short relative to tube, acute to rounded, style branches linear, glabrous; inner florets bisexual, corolla funnellform, 4-lobed, lobes triangular, from half to almost as long as tube; both corolla types with scattered short vesicular trichomes (appearing as glistening sessile resin droplets); anthers shortly tailed, lacking apical appendages, or with short ovate apical appendages, anther collar not strongly differentiated, tapering evenly from filament to anther base, c. 0.05 mm long, style branches oblong, broadly rounded and papillose apically. *Cypselas* of female and bisexual florets similar, clavate to cylindrical, 4–6(–16)-ribbed, mostly with a swollen, pithy or spongy apical portion; glandular trichomes generally present between ribs, eglandular hairs usually present along ribs, acute and straight or tightly inrolled at the apex; pappus absent. *Carpopodium* absent. $x = 10$ (Hair 1963; Bruhl 1990; Nishikawa 1985; Gupta & Gill 1989; de Lange pers. comm.).

RELATIONSHIPS WITHIN THE GENUS

Species have been ordered in the following account in an attempt to reflect their relationship, using evidence of gross morphology, and more particularly, capitulum and cypselas morphology. All species are similarly aromatic (but the odours are subtly different) and are bitter to taste. *Centipeda elatinooides* appears to have no close relatives within the genus. It is set apart by its relatively loose, few-flowered capitula and obovoid, flattened cypselas that lack conspicuous pithy thickening toward the apex. The group of *C. minima*, *C. nidifloris*, *C. borealis* and *C. racemosa* are united by their more or less spherical flowering and fruiting capitula that readily disintegrate, their strongly convex receptacles, small, more or less obconoid cypselas that are apically thickened by pithy tissue and lack apically inrolled hairs. *Centipeda pleiocephala* differs from this group in having more cylindrical cypselas with apically inrolled hairs. *Centipeda craterifloris*, *C. thespidioides* and *C. cunninghamii* share characters of (to a greater or lesser extent) persistent fruiting capitula and more or less linear cypselas with conspicuous pithy apical processes, and the hairs of the cypselas often minutely inrolled at the apices. *Centipeda aotearoana* appears to be somewhat intermediate between the *C. craterifloris* and *C. minima* groups, sharing with the former (and particularly with *C. cunninghamii*) moderately firm fruiting capitula and cypselas morphology, but like the *C. minima* group, lacking apically inrolled hairs on the cypselas.

Key to taxa

1. Cypselas \pm narrowly obovate in outline, usually somewhat flattened, rounded to obtuse at apex, the ribs not terminating in a thickened, spongy or corky apical process; plants creeping, often rooting at lower nodes, wholly glabrous or with short arachnoid hairs near the growing tip; capitula distinctly (but shortly) pedunculate; southern Australia, New Zealand, Chile **1. *C. elatinooides***

1. Cypselas linear or narrowly obcuneate in outline, more or less isodiametric, truncate or nearly so at apex, the ribs terminating in a somewhat thickened, spongy or corky apical process; plants erect to prostrate, but not or rarely rooting at lower nodes, subglabrous to distinctly hairy; capitula often sessile; Asia, Russia, Australasia.....2
2. Cypselas \leq 1.1 mm long (rarely to 1.3 mm in *C. pleiocephala* which has a shortly racemose axillary inflorescence); capitula solitary or in short racemes.....3
- 2 Cypselas $>$ 1.1 mm long; capitula always solitary8
3. Cypselas broadly cuneiform, \pm half as wide as long, prominently 4- or 5-angled, often narrowly winged at the angles, the intervening faces concave; corolla of female florets 0.35–0.5 mm long; plants usually distinctly cottony; mainland Australia only**4. *C. nidiformis***
3. Cypselas at least 3 times as long as wide, ribbed but not winged, with intervening faces flat or convex; corolla of female florets 0.1–0.3 mm long (except in *C. crateriformis* subsp. *compacta* which has firm, somewhat persistent fruiting capitula); plants glabrescent to cottony4
4. Inflorescence a single terminal, axillary or leaf-opposed capitulum5
4. Inflorescence (sometimes very shortly) racemose, of 2–7 capitula (rarely the lowermost inflorescences a single capitulum).....7
5. Fruiting capitula firm, not readily breaking up, fruiting involucre bowl- or cup-shaped; receptacle \pm flat to slightly domed; cypselas with pericarp thickish, often obscuring the brown testa of the underlying seed; southern mainland Australia**9b. *C. crateriformis* subsp. *compacta***
5. Fruiting capitula soft, readily disintegrating, involucre bracts at fruiting widely spreading or reflexed; receptacle distinctly convex; cypselas with pericarp thin between ribs, the brown testa of the underlying seed clearly apparent.....6
6. Plants annual (rarely perennial in permanently moist sites), tufted (rarely producing adventitious roots near base), glabrescent to cottony; leaves generally under 10 mm long, mostly less than 3 times as long as wide; capitula hemispherical to subglobular; receptacle \pm hemispherical; widespread in Australia (where rare north of latitude 20°S), also Asia, southern Russia, New Zealand, Pacific Islands**2a. *C. minima* subsp. *minima***
6. Plants mostly perennial, rhizomatous, densely white-cottony on at least young growth; leaves generally longer than 10 mm long, mostly more than 3 (usually 4) times as long as wide; capitula \pm globular; receptacle \pm matchhead-shaped, mostly higher than wide; northern Australia, Papua New Guinea**3. *C. borealis***
7. Perennial (but dying down annually to perennating rootstock; inflorescences terminal (sometimes also in upper axils then sometimes appearing sub-paniculate), 0.5–1.2(–2) cm long, of 2–7 capitula; capitula subglobular to globular; leaf margins recurved; mainland Australia.....**5. *C. racemosa***
7. Short-lived annual; inflorescences axillary, to c. 0.5 cm long, of 2–4 capitula, the lowest capitulum usually sessile or subsessile; capitula hemispherical to biconvex; leaf margins (except sometimes of immature leaves) plane; inland Australia.....**6. *C. pleiocephala***
8. Fruiting involucre cup-shaped to campanulate; cypselas with hairs confined to a basal ring and a subapical band; plants strictly annual, usually erect; inland areas of mainland Australia.....**10. *C. thespidioides***
8. Fruiting involucre bowl-shaped, or involucre bracts widely spreading or deflexed; cypselas with hairs scattered along ribs (and sometimes on faces); plants annual or perennial; Australia and New Zealand.....9

9. Receptacle prominently raised (\pm hemispherical); involucre bracts at fruiting widely spreading or deflexed.....10
9. Receptacle slightly concave to slightly convex; fruiting involucre \pm bowl-shaped ..12
10. Cypselas truncate, less than 3 times as long as wide; corollas of female florets under 0.3 mm long; plants overall cottony-pubescent; fruiting capitula readily breaking up before stems senesce; northern Australia**9b. *C. minima*** subsp. *macrocephala*
10. Cypselas rounded or truncate at apex, at least 3 times as long as wide; corollas of female florets 0.3 mm long or more; plants usually glabrescent (rarely cottony); fruiting capitula usually remaining intact until after stems senesce; southern Australia, New Zealand11
11. Plants prostrate or weakly ascending; leaves 4–8(–12) mm long; bisexual florets fewer than 17; New Zealand only**7. *C. aotearoana***
11. Plants more or less erect; leaves mostly longer than 1 cm; bisexual florets c. 20 or more; Australia and New Zealand**8. *C. cunninghamii***
12. Decumbent to erect annuals, never producing adventitious roots; ripe fruiting capitula 3.5–7 mm diam., very hard, not readily disintegrating; cypselas \pm linear (at least 5 times longer than wide). (1.5–)1.8–2.5 mm long, the pericarp thin and translucent between the ribs in the lower half; inland areas of Australia
.....**9a. *C. crateriformis*** subsp. *crateriformis*
12. Prostrate to decumbent annuals or perennials, often producing adventitious roots, or sometimes rhizomatous; ripe fruiting capitula 2.5–5 mm diam., usually readily disintegrating; cypselas narrowly obcuneoid (less than 5 times longer than wide) 1–1.7 mm long, the pericarp often thickish and opaque between the ribs (or the ribs rather wide and obscuring the intervening pericarp), obscuring the testa of the enclosed seed; southern Australia (but not Tasmania)
.....**9b. *C. crateriformis*** subsp. *compacta*

1. *Centipeda elatinoidea* (Less.) Benth. & Hook. ex O. Hoffm. in Engl. & Prantl, *Nat. Pflanzenfam.* 4(5): 280 (1892). *Myriogyne elatinoidea* Less., *Linnaea* 6: 219 (1831). *Type*: 'Chili, ad Talcaguano cel., de Chamisso, ad Conception', *Dombey (herb. kunth.)*; '(Australia, New South Wales) in montibus coerulcis Novae Hollandiae', *Lesson (herb. kunth.)*; Lectotype (*hic designatus*) Chile, ad Conception, 1782, *Dombey*: P!; isoelectype P!, G-DC. (photo seen). An unnumbered *Dombey* collection at L (*L 0069571*) is an exciccata specimen from P. It is probably a duplicate of the lectotype, but without *Dombey*'s collecting number or detailed provenance information, the specimen can only tentatively be regarded as an isoelectotype.

Comla foetida Poepp. ex DC., *Prodr.* 6: 139 (1838), *non. ind.* (cited in synonymy only)
Type: 'in paludos. exsiccata. ad Talcahuana', *Poeppig pl. exs. n. 453*, G-DC. (photo seen).

Centipeda minima sens. auctt., *p.p.*, *non* (L.) A. Braun & Asch. (1867).

?*Centipeda orbicularis* var. *stermtatoria* (Roxb.) Bailey, *Qld Fl.* 860 (1900).
Centipeda sp. 1, *sensu* Walsh in Walsh & Entwisle (eds), *Fl. Victoria* 4: 721 (1999).

Prostrate *annual* or *perennial*; branches to c. 30 cm long, sometimes rooting from lower nodes, essentially glabrous, but sometimes with short arachnoid hairs near the growing tip. *Leaves* mostly alternate, obovate or narrowly obovate, (6–)10–20 mm long, 2.5–8 mm wide, entire or shallowly serrate, glabrous, resin-dotted on both surfaces, concolorous or slightly paler beneath. *Inflorescence* a single shortly pedunculate capitulum, usually leaf-opposed; peduncle 0.5–3 mm long. Capitula at anthesis biconvex to hemispherical, 3–5 mm diam.; involucre bracts 1–2-seriate, obovate with ruminant membranous margins, 1–1.5 mm long; receptacle convex; female (outer) florets 40–80, in 2–4 rows, corollas narrowly cylindrical, 0.2–0.4 mm long (including lobes less than 0.1 mm long), green or yellow-

green; bisexual (inner) florets 4–14, corollas broadly obconical. 0.5–0.7 mm long (including lobes 0.2–0.3 mm long and wide) often purplish. *Fruiting heads* breaking up before stems senesce, involucre bracts at fruiting widely spreading to slightly deflexed; fruiting receptacle 1.5–2 mm diam., with a pith layer entirely contained within the dome of the receptacle; *cypselas* of female and bisexual florets similar, narrowly obovate, 1.2–2.0 mm long, 0.5–0.8 mm wide, obtuse at apex, usually somewhat flattened, 3- or 4-angled in section, each angle with a thickened longitudinal rib, each intervening face membranous with a less prominent rib (sometimes 1 or 2 faces lacking a rib), at least the larger ribs with short ascending to appressed hairs, intervening faces with scattered glandular trichomes; pericarp slightly thickened at and shortly below the apex. (Figs 2, 4a, 6a)

Representative specimens: **AUSTRALIA**: **SOUTH AUSTRALIA**: Glenshera, 25.i.1988, *D.E. Murfet 644* (AD); Square Waterhole, 20.xi.1882, *R. Tate* (AD 97623443 *p.p.*). **QUEENSLAND**: Stanthorpe, xii.1875, *F.M. Bailey s.n.* (BR1). **NEW SOUTH WALES**: North-West Slopes, Tingha, iii.1917, *J.L. Boorman s.n.* (NSW); Central Tablelands, Mt Wiggdon, 25 km N of Bathurst, 31.iii.1960, *E.F. Constable s.n.* (NSW); South West Slopes, Basin Ck, Dora Dora State Forest, 17.iv.1988, *J.M. Dalby 88/44 & R.G. Coveny* (MEL, NSW, PRE); Southern Tablelands, Kosciuszko National Park, Cave Creek, 20.ii.1991, *R.E. Davies 1584* (AD, CBG, HO, MEL, PERTH); Northern Tablelands, Dumaresq Dam, W of Armidale, 12.ii.1989, *G.J. White & D.A. Saladine s.n.* (NE, MEL). **VICTORIA**: East Gippsland, Lind National Park, 14.xii.1969, *A.C. Beauglehole 32394* (MEL); Riverina, Murray River near Tocumwal, 4.vi.1979, *A.C. Beauglehole 63980* (MEL); Victorian Volcanic Plain, Mt Mercer, 1894 *J. Farrell s.n.* (MEL); Gippsland Plain, Dromana, 17.iv.1914, *J.H. Findlay s.n.* (MEL); Snowfields, 3.7 km E of Mt Cobberas no 1, 19.iv.1980, *S.J. Forbes 339* (MEL); Midlands, Avoca, ?1853, *F. Mueller s.n.* (MEL); Eastern Highlands, South of Eildon Reservoir, 9.iii.1964, *T.B. Muir 3344* (MEL); Wannon, Coboboonee Forest, 28.ii.1985, *C.E. Woolcock 2021* (MEL). **TASMANIA**: Greens Beach Rd, 19.iii.1998, *A.M. Buchanan 15164* (HO); Tasman Peninsula, 1894, *Rev. J. Bufton s.n.* (MEL); Elderslie Rd, Broadmarsh, 2.iv.1979, *D.I. Morris 79119* (HO); South Esk River, 28.xii.1937, *A.M. Olsen s.n.* (HO); Waterworks, 23.ii.1913,

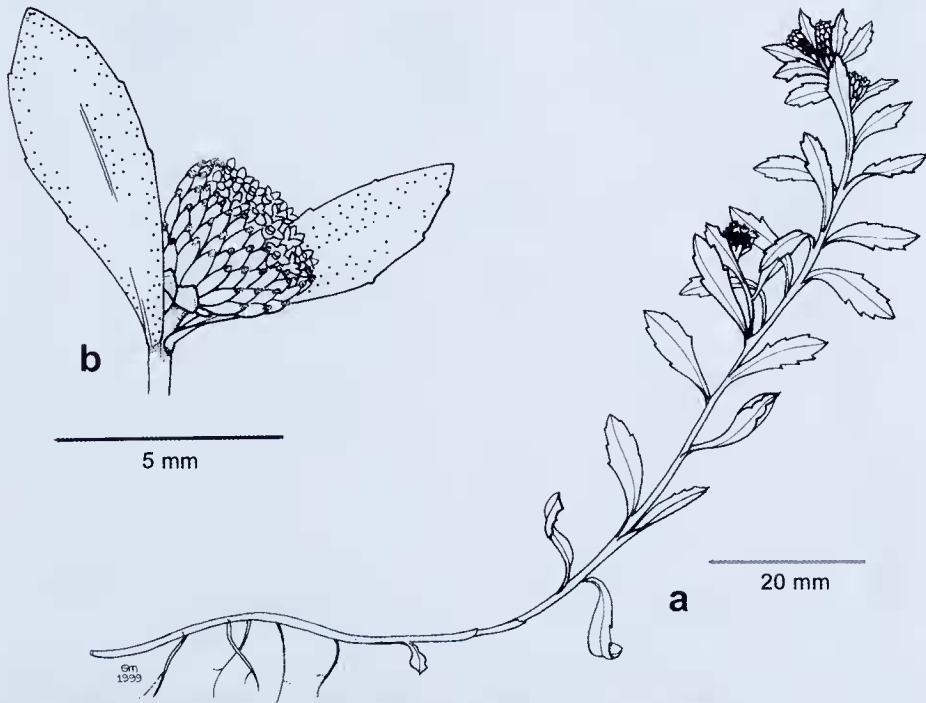


Figure 2. *Centipeda elatinoides*. **a** habit (*Piesse 832*, MEL); **b** capitulum and subtending leaves (*Albrecht 1602*, MEL).

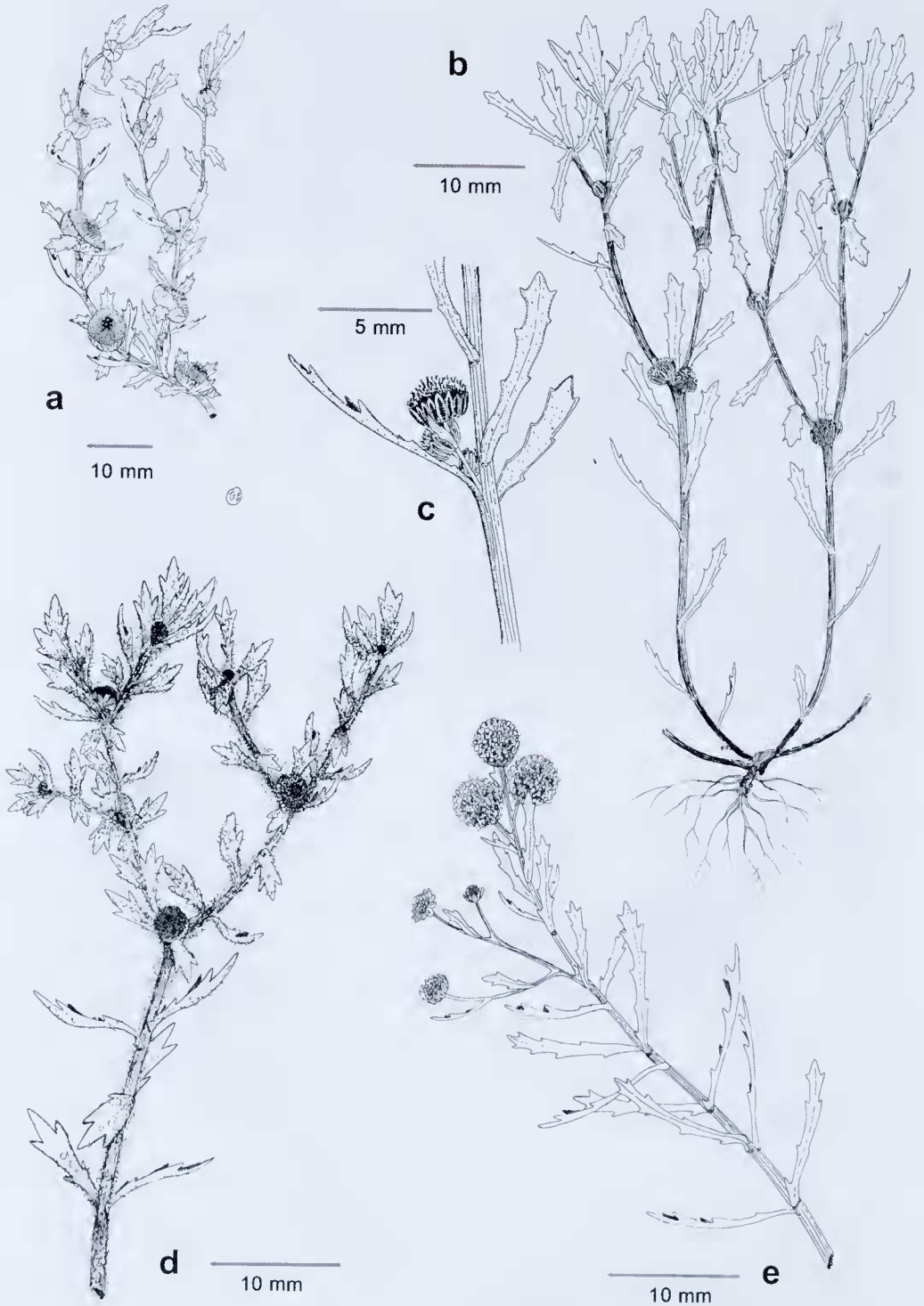


Figure 3. *Centipeda* habits. **a** *C. crateriformis* subsp. *crateriformis* (Symon 4076, AD); **b, c** *C. pleiocephala* (Walsh 4967, MEL); **d** *C. borealis* (Clarkson 4873, MEL); **e** *C. racemosa* (Willis s.n. MEL 2057177).

L. Rodway s.n. (HO). **NEW ZEALAND: NORTH ISLAND:** Auckland, Te Atatu North coast, 25.ii.1996, *R.O. Gardner 7315* (AK, MEL); Waikato River, near Hamilton, 14 Dec. 1961, *A.J. Healy 61/358* (CHR); Whangamarino, 21 Mar. 1962, *J.R. Murray s.n.* (CHR); Wainui Station, Paekakariki, Wellington, 15 Mar. 1980, *C.C. Ogle 552* (CHR). **SOUTH ISLAND:** Between Arahura & Stafford, Westland, 15.ii.1958, *R. Mason & N.T. Moar 5244* (CHR). **CHILE:** Lago Panguipulli, 15.i.1976, *C. Marticorena, M. Quezada & R. RodrPguez 391* (CONC); Callaqui, 23.i.1985, *C. Marticorena & M. Quezada 9646* (CONC).

Distribution and Conservation Status: Occurs through cool-temperate areas of south-eastern Australia from south-eastern Queensland (Stanthorpe area) to Tasmania (Hobart area) and as far west as Adelaide area (latitude c. 28° to 43° S). Also in New Zealand (North Island, Auckland to Wellington areas, latitude c. 37° to 40° S), and Chile (Concepcion to Valdivia areas, latitude c. 37° to 40° S). Not considered rare or threatened in Australia, and well represented in conservation reserves. The possibility exists that *C. elatinooides* is naturalized across part of its range (see notes below). (Fig. 8)

Habitat: Typically growing on seasonally inundated sites, such as creek-beds, margins of rivers, lakes and billabongs, usually on silty to clayey soils, sometimes on wet gravels. Occurs from near sea-level to c. 1200 m altitude.

Notes: Most Australian and New Zealand herbarium specimens of this species have in the past been identified as *C. minima* from which it is readily distinguished by the larger cypselas of quite different morphology. Cypselas of *C. minima* are up to 1 mm long, truncate or depressed at the apex, and lack the facial ribs of *C. elatinooides*. The female corollas of *C. minima* are 0.1–0.25 mm long, and the bisexual florets 0.3–0.4 mm long. Plants of *C. elatinooides* are generally more robust than those of *C. minima*, and are typically quite prostrate and freely rooting from the lower nodes. The leaves are generally longer (rarely exceeding 10 mm in *C. minima*). *Centipeda elatinooides* is commonly perennial whereas *C. minima* appears to be a strictly annual species, at least through the southern part of its range where the two species are sometimes sympatric. In the field, *C. elatinooides* commonly occurs with *C. cunninghamii*, but apparently only rarely with *C. minima*. This is probably the taxon referred to as the larger-fruited form of *C. minima* by Brown (1992).

Most Australian and New Zealand plants of *C. elatinooides* tend to have larger fruits and leaves than those from Chile, but specimens from higher altitudes, at least in Australia (e.g. *R.E. Davies 1584*) are virtually indistinguishable from Chilean plants. Similarly, larger-leaved specimens from Chile could not be separated from the form more common in Australia and New Zealand.

Lessing's original description refers to three collections, two from Chile ('ad Talcaguanho', *Chamisso*; 'ad Concepcion', *Dombey*), and one from the Sydney region in Australia ('in montibus coeruleis', *Lesson*). The Lesson collection would have been made between 1827 and 1829 (Maiden 1910). The next earliest Australian specimens appear to be 1839 (*Gunn*, Tasmania, NSW 426060), probably 1853 (*Mueller*, Avoca and Murray Lagoons – MEL 608026 and 1517624 respectively, specimens undated, but Mueller is known to have collected in these areas during 1853); 1882 (*Tate*, Square Lake, SA, AD 97623443 p.p.) and 1889 (*Betche*, Blue Mountains, NSW 469263). There is a possibility that *C. elatinooides* is a long-naturalised species in Australia (originally from seed inadvertently shipped from Chile), but there is nothing about the species' ecology or present-day distribution to support such a claim. It is here regarded as being native to Chile, New Zealand and Australia.

Of the collections cited by Lessing, only the Dombey collection (P) could be located. This is here chosen as the lectotype.

A specimen at BRI (358892) from Stanthorpe, south-east Queensland, is labelled in Bailey's hand as *Centipeda orbicularis* var. *sternutatoria*, but it is unknown if Bailey's concept of the variety is restricted to plants represented by this specimen. No other specimens labelled as this taxon by Bailey have been seen.

This is not the same taxon as *Artemisia sternutatoria* Roxb., which is a synonym of *C. minima*.

2. *Centipeda minima* (L.) A. Braun & Asch., *Iud. Sem. Hort. Berol.* app. 6 (1867). *Artemisia minima* L., *Sp. Pl.* 849 (1753). *Type*: provenance and collector unknown, LINN (photo seen).

Myriogyne minima (G. Forst.) Less., *Linnaea* 6: 219 (1831). *Cowula minima* G. Forst., *Fl. Ins. Austral. Prodr.* 57 (1786). *Type*: Noua Caledonia, not found.

Centipeda orbicularis Lour., *Fl. Coch.* 2: 602 (1790). *Type*: 'inculta in agris Cochinchinae', BM!

Myriogyne minima var. *lauginosa* DC., *Prodr.* 6: 139 (1838). *Syutypes*: 'in India ori-

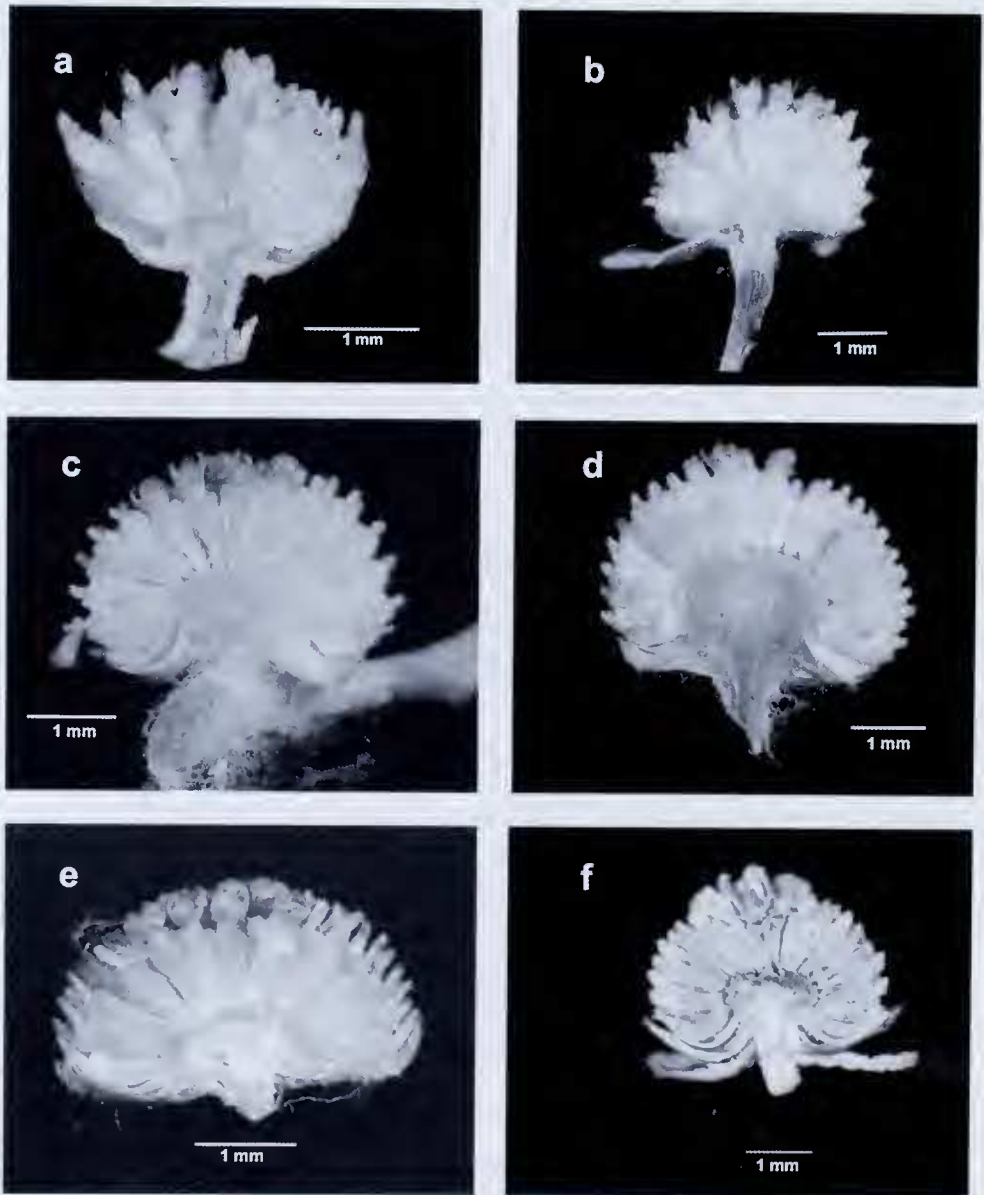


Figure 4. *Centipeda* capitula, longitudinal sections. **a** *C. elatinooides* (Walsh 5145, MEL); **b** *C. minima* subsp. *minima* (Walsh 4950, MEL); **c** *C. minima* subsp. *macrocephala* (Walsh 4984, MEL); **d** *C. borealis* (Walsh 4992, MEL); **e** *C. nidiformis* (Walsh 4982, MEL); **f** *C. racemosa* (Doherty s.n., BRI).

entali, Wallich'; 'in Java, Blume', G-DC. (photos seen); *Centipeda minima* var. *lanuginosa* (DC.) Domin, *Bibl. Bot.* Heft 89: 683 (1930); *Centipeda orbicularis* var. *lanuginosa* (DC.) Bailey, *Qld. Fl.* 3: 869 (1900).

Artemisia sternutatoria Roxb., *Hort. Berg.* 61 (1814) *nou. nud.*; *Fl. Ind.* 3: 423 (1832). Lectotype (*hic designatus*): provenance and date not given, Roxburgh, Wallich herbarium, K *p.p.*; *Cotula sternutatoria* (Roxb.) Wall. *ex DC. Prodr.* 6: 139 (1838). The type sheet consists of at least two collections, marked by Wallich 'a' and 'b' corresponding to the first of five entities marked on the label on the upper left of the sheet. The two

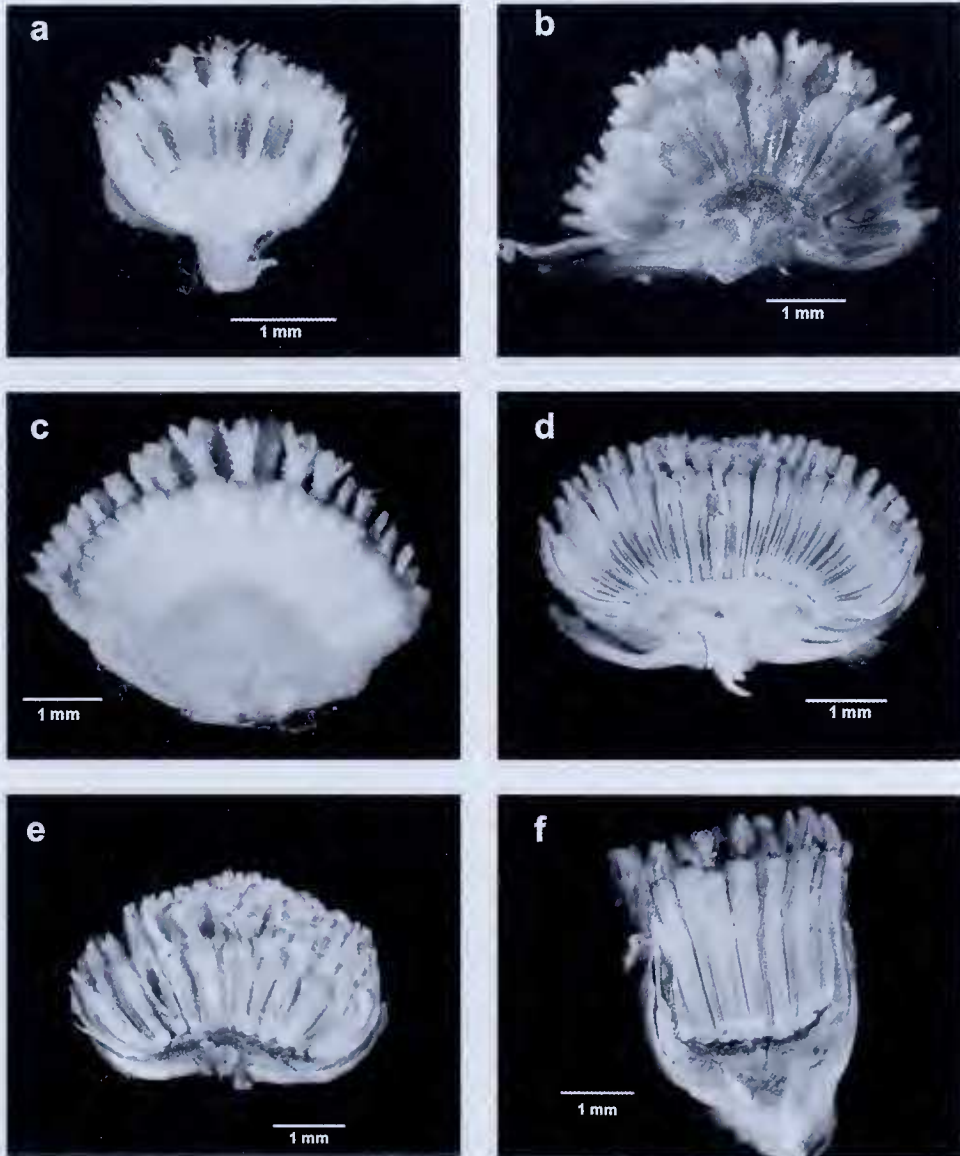


Figure 5. *Centipeda* capitula, longitudinal sections. **a** *C. pleiocephala* (Walsh 4949, MEL); **b** *C. aotearoana* (Healy 96/8, CHR); **c** *C. cmminghamii* (cult. RBGM); **d** *C. crateriformis* subsp. *crateriformis* (Moore 5565, CANB); **e** *C. crateriformis* subsp. *compacta* (Alcock 3514, AD); **f** *C. thespidioides* (Keighery 551 & Gibson,

fragments marked 'a' on the upper part of the sheet are those attributed to Roxburgh. One is a nearly complete plant, with roots and several branches (but one branch clearly broken off), the other is a flowering branch (which may be the missing piece of the larger specimen). The larger, rooted plant is here chosen as the lectotype. A coloured plate of *A. sternuatoria*, agreeing with the Roxburgh collection, exists in the *Icones Roxburghianae* at K, a transparency of which is now at MEL.

Sphaeromorphaea russelliana DC. var. *glabrata* DC., *Prodr.* 6: 140 (1838); Type: India, 'in Ind. orient. prov. bor. occid. Royle'; K!.

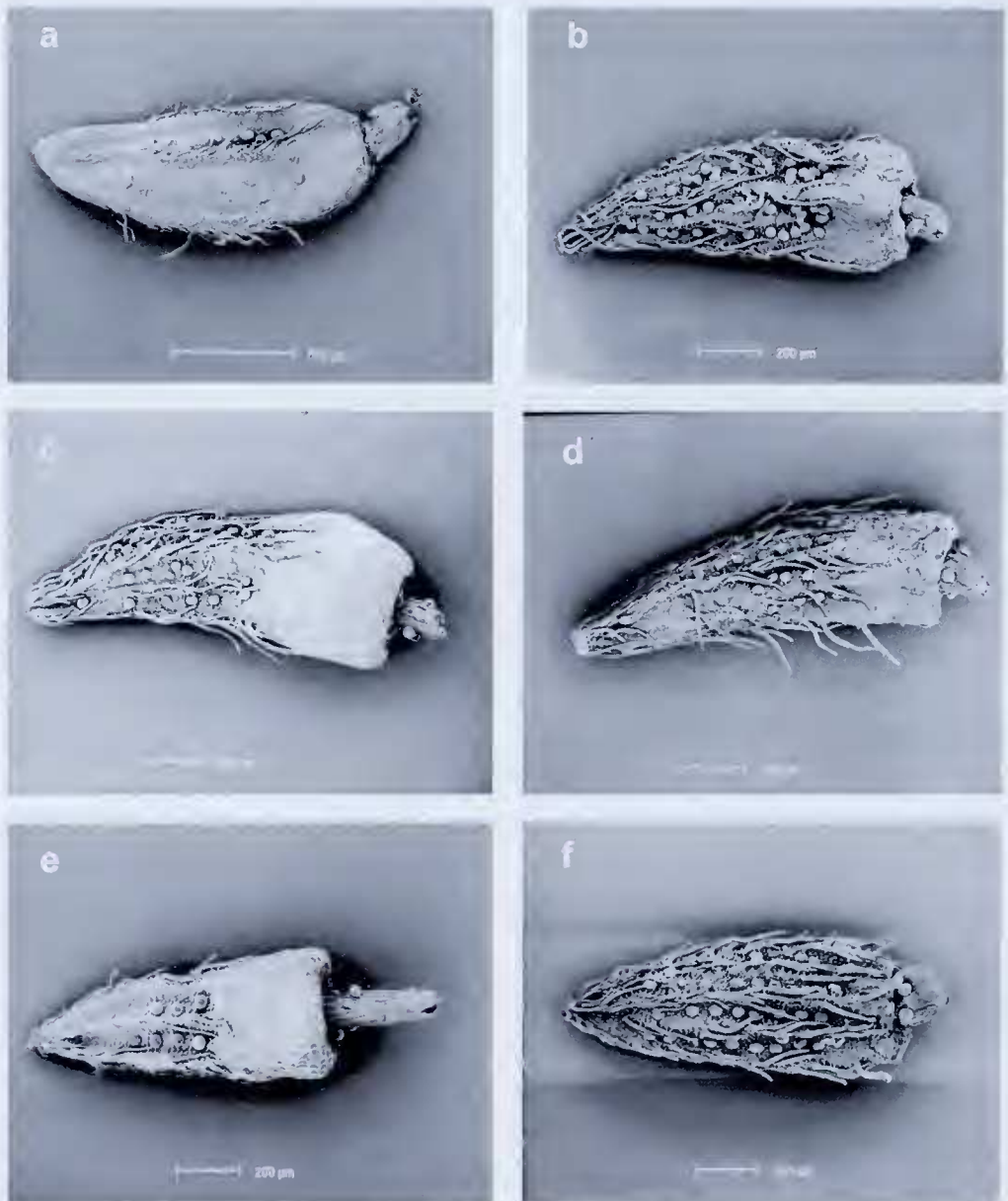


Figure 6. *Centipeda cypselas*. **a** *C. elatinoides* (Walsh 5145, MEL); **b** *C. minima* subsp. *minima* (Walsh 4975, MEL); **c** *C. minima* subsp. *macrocephala* (Walsh 4984, MEL); **d** *C. borealis* (Russel-Smith 4074, DNA); **e** *C. nidiformis* (Leach 793 MEL); **f** *C. racemosa* (McKey 328, BR1).

Prostrate to (rarely) erect *annual* or facultative *perennial*, spreading to c. 25 cm diam. and/or 20 cm high; adventitious roots sometimes produced from lower nodes; branches glabrescent to moderately (rarely densely) cottony, if glabrescent then axils and young growing tips usually with some cottony hairs. *Leaves* obovulate to spatulate, 3–12(–27) mm long, 1.5–6(–11) mm wide, variably serrate to shallowly incised; surfaces glabrescent to densely cottony, with scattered resin droplets. *Inflorescence* a solitary sessile or subsessile capitulum, (peduncles to c. 1 mm long), appearing axillary or leaf opposed. *Capitula* at anthesis hemispherical to subglobular, 1.5–5 mm diam.; involucre bracts

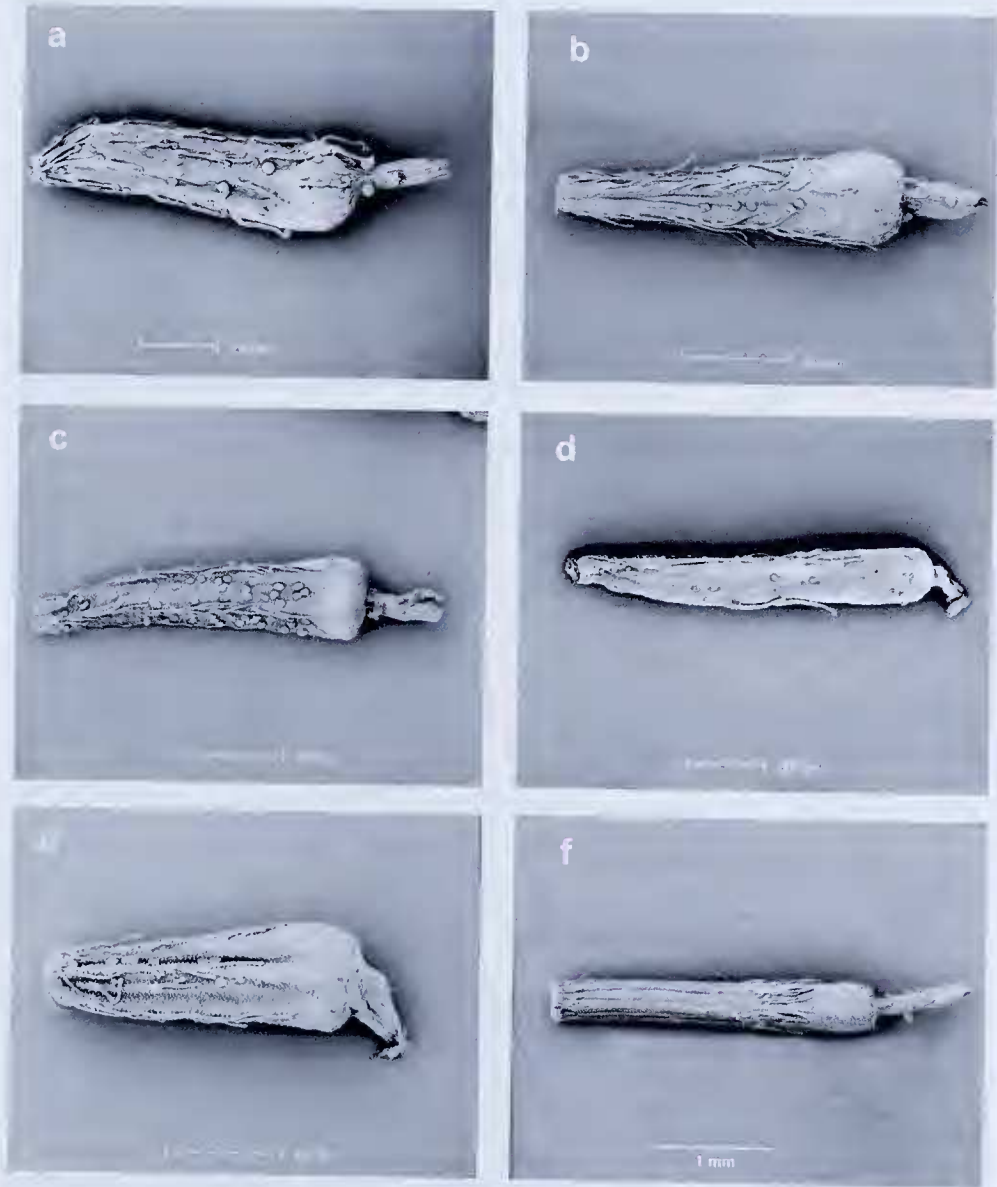


Figure 7. *Centipeda* cypselas. **a** *C. pleiocephala* (Walsh 4949, MEL); **b** *C. aotearoana* (Poole s.n., CHR); **c** *C. cunninghamii* (Cornwall s.n., MEL); **d** *C. crateriformis* subsp. *crateriformis* (Chinnock 7767, AD); **e** *C. crateriformis* subsp. *compacta* (Jackson 1438, PERTH); **f** *C. thespidioides* (Everist 3961, BRI).

obovate with erose membranous margins, 1–1.6 mm long; receptacle convex; corollas of female florets 0.1–0.25 mm long; corollas of bisexual florets 0.3–0.4 mm long. *Fruiting heads* breaking up before stems senesce. *Cypselas* narrowly obcuneate (length-width ratio c. 3–4), 0.6–1.5 mm long, truncate or obtusely rimmed and very slightly impressed at the apex, the 4–6(–8) ribs with short ascending bristles, uniting in the distal quarter to half into a pale, pithy apical portion, faces between ribs with vesicular trichomes in a vertical row or scattered (rarely with scattered hairs), hairs antrorsely appressed to spreading, 0.15–0.2 mm long, acute or obtuse (not inrolled or thickened) at apex.

2a. *Centipeda minima* subsp. *minima*

Stems and base of capitula glabrescent to moderately cottony; *leaves* ± kite shaped, 3–12(–27) mm long, 1.5–6(–11) mm wide, cottony to glabrescent. *Capitula* at anthesis 1.5–3(–3.5) mm diam.; involucre bracts c. 1 mm long; receptacle depressed-hemispherical, 1–1.2(–1.5) mm diam. at anthesis; female florets 75–200, corollas 0.1–0.25 mm long; bisexual florets 10–20, corollas 0.3–0.4 mm long. *Cypselas* narrowly obcuneate, 0.7–1.1 mm long, c. 0.3 mm wide, with scattered vesicular trichomes on faces; angles 4(–6), obtuse to acute. (Figs. 4b, 6b)

The extreme (bracketed) measurements derive from plants growing in premanently moist, shaded sites, or rarely, from wholly submerged plants.

Representative specimens: **AUSTRALIA**: **WESTERN AUSTRALIA**: Rawlinson Range, Pass of the Abencerages, 24.vii.1974, A.S. *George 12134* (PERTH); Carnarvon Basin, Wardawara Pool, 31.viii.1995, G.J. *Keighery & N. Gibson 690* (PERTH); Ruddall River National Park, Little Sandy Desert, 30.iv.1979, A.S. *Mitchell 836* (NT, PERTH); c. 150 km SE of Shay Gap, 11.vii.1984, K. *Newbey 10425* (PERTH);. **NORTHERN TERRITORY**: Gardiner River floodout, 10.vi.1996, D.E. *Albrecht 7884* (DNA); Standley Chasm, 55 km W of Alice Springs, 2.vi.1961, G. *Chippendale s.n.* (DNA, MEL); Central Mt Stuart, 2.vii.1974, T.S. *Henshall 484* (DNA, MEL); Cleary Dam, Loves Creek Station, 16.vii.1991, P.K. *Latz 12044* (MEL, MO, NT). **SOUTH AUSTRALIA**: Wrattobully, xii.1973, K. *Alcock 8* (AD); River Murray opposite Newena Island, 11.ix.1979, W.R. *Barker 3778 & R.M. Barker* (AD, MEL); Cullyamurra Waterhole, 1.xi.1987, P.E. *Courick 2212a* (AD); c. 170 km N of Oodnadatta, 27.viii.1931, E.H. *Ising s.n.* (AD). **QUEENSLAND**: Port Curtis District, Leeks Dam, 9.xi.1987, G.N. *Batianoff 9348* (BRI, K, NSW, US); Warrego District, Charleville, 26.iv.1934, S.T. *Blake 5530* (BRI); Maranoa District, Leichhardt River, Kajibbi, 6.vi.1935, S.T. *Blake 9305* (BRI); North Gregory District, Bladensburg National Park, 18.iii.1998, P.I. *Forster 22168 & R. Booth* (AD, BRI, MEL); Darling Downs District, c. 11 km SE of Mandarra, 22.xi.1959, R.W. *Johnson 1183* (BRI); Mitchell District, Cameron Downs, Hughenden, S.E. *Pearson 165* (BRI). **NEW SOUTH WALES**: Central Coast, Picton Lakes, Thirlmere, 21.xi.1965, E. *McBarron & M.D. Tindale s.n.* (NSW); South West Slopes, Ten Mile Creek, Holbrook, 23.iii.1947, E.J. *McBarron 742* (NSW); Southern Tablelands, Goodradigbee River, Wee Jasper, 26.iii.1963, E.J. *McBarron 7901* (NSW); North Far West Plain, Mootwingee, 22.ix.1972, W.E. *Mullham 580* (NSW); North West Plain, Iolanthe, c. 25 km W of Garah, 3.iv.1972, K.L. *Solling 244* (NSW). **VICTORIA**: Riverina, c. 0.5 km S of Murray River, SW of Tocumwal, 29.x.1982, H.I. *Aston 2355* (MEL); Grampians, Lynch Track, 23.ii.1969, A.C. *Beaglehole 30589* (MEL); Midlands, 14.5 km WSW of Walwa, 16.v.1980, A.C. *Beaglehole 68327* (MEL); Gippsland Plain, Lake Glenmaggie, NE of 'The Retreat', 28.iv.1985, A.C. *Beaglehole 79435* (MEL); Wimmera, Lake Marmal Reserve, 27.xii.1985, A.C. *Beaglehole 82960A* (MEL). **NEW ZEALAND**: **NORTH ISLAND**: Waikouia Kaitaia, Jan. 1898, H. *Carse s.n.* (CHR); Great Barrier Is, Whangapoua catchment, 23 Mar. 1986, E.K. *Cameron 3934*, (AKU, CHR); N. Auckland, Lake Taharoa near Dargaville, Jan. 1981, P.N. *Johnson s.n.* (CHR); Kerikeri Swamp, Bay of Islands, 3 Dec. 1949, R. *Mason & N.T. Moar 366* (CHR); Mansiona House Bay, Kawau Is., 16 Feb. 1972, W.R. *Sykes 290/72* (CHR). **INDIA**: Uttar Pradesh, Mirzapur, 7.ii.1961, U.C. *Bhattacharya s.n.* (L); Calcutta, 7.xi.1916, *Hallier s.n.* (L); Assam & Khasia, s.d., *Masters s.n.* (L) Dharmapuri, 1.v.1979, K.M. *Matthew & N. Venugopal s.n.* (L). **THAILAND**: Chiang Mai, 13.vi.1968, C.F. *Bensekom & C. Phengkhlai 1215*, (AAH, BKF, C. E, K, L, P); Mae La Poan, 29.1.1964, B. *Hansen et al. 10971* (L). **RUSSIA**: Blagoveshchensk, in Amurgebiet, vii.1898, F. *Karo 201* (L). **CHINA**: Songtao Xian, vicinity of Lengjiaba, 5.i.1986, *Sino-American Guizhou Botanical Expedition no 2070* (L). **TAIWAN**: Tomita-cho, Tihoku-shi, 20.v.1932, T. *Tanaka & Y.*

Shimada s.n. (L, NYBG). **JAPAN:** Hondo, Koshigaya, 28.vi.1951, *J. Ohwi s.n.* (L, TNS); Nagasaki, 1862, *R. Oldham s.n.* (K.L). **SINGAPORE:** 21.iv.1951, *J. Sinclair s.n.* (L). **INDONESIA:** Lombok, 6.v.1909, *J. Elbart s.n.* (L); Celebes, 25.vii.1937, *Eyma 1268* (BO, L); Java, Banjoemas, 1923–1925, *D. Kiebits 167* (L); Sarawak, Lundu, 20.ix.1955, *J.W. Purseglove 46031* (L). Sumatra, 10.v.1919, *J. A. Zorszing 6435* (L). **PHILIPPINES:** Mt Province, Luzon, 15.v.1963, *H.C. Conklin & Biwaya s.n.* (L, PNH). **PAPUA NEW GUINEA:** Veiya, 9.ii.1935, *C.E. Carr 11603* (L); Cloudy Mountains, 1878, *Chalmers s.n.* (MEL); Lorne Range, 1878, *Chalmers s.n.* (MEL). **NEW CALEDONIA:** 1886, *F.J. Roberts s.n.* (MEL). **FIJI:** 1860, *B. Seeman 265* (L); xi.1947, *A.C. Smith 6885* (K, L). **SAMOA:** Taleima, Savaii, iv. 1881, *Betche s.n.* (MEL).

Distribution and Conservation Status: Occurs in all mainland States of Australia, overall common, but uncommon below c. 35°S and above c. 20°N, and apparently rare in Western Australia. It is widespread through Pacific Islands and southern Asia, also in Pakistan, Afghanistan and south-eastern Russia. Its apparent absence from extreme northern Australia is surprising, particularly when its distribution through south-east Asia is considered. It is not rare or threatened. (Fig. 8)

Habitat: Occurs on muds, clays, sands etc. surrounding lakes, dams, billabongs and watercourses, or their drying beds. It is occasionally a weed of agricultural land.

Notes: I have seen only photographs of the type at LINN, the specimen being a weak, apparently procumbent plant, but this habit is consistent with many plants seen in Australian herbarium collections, particularly those from shaded or permanently moist

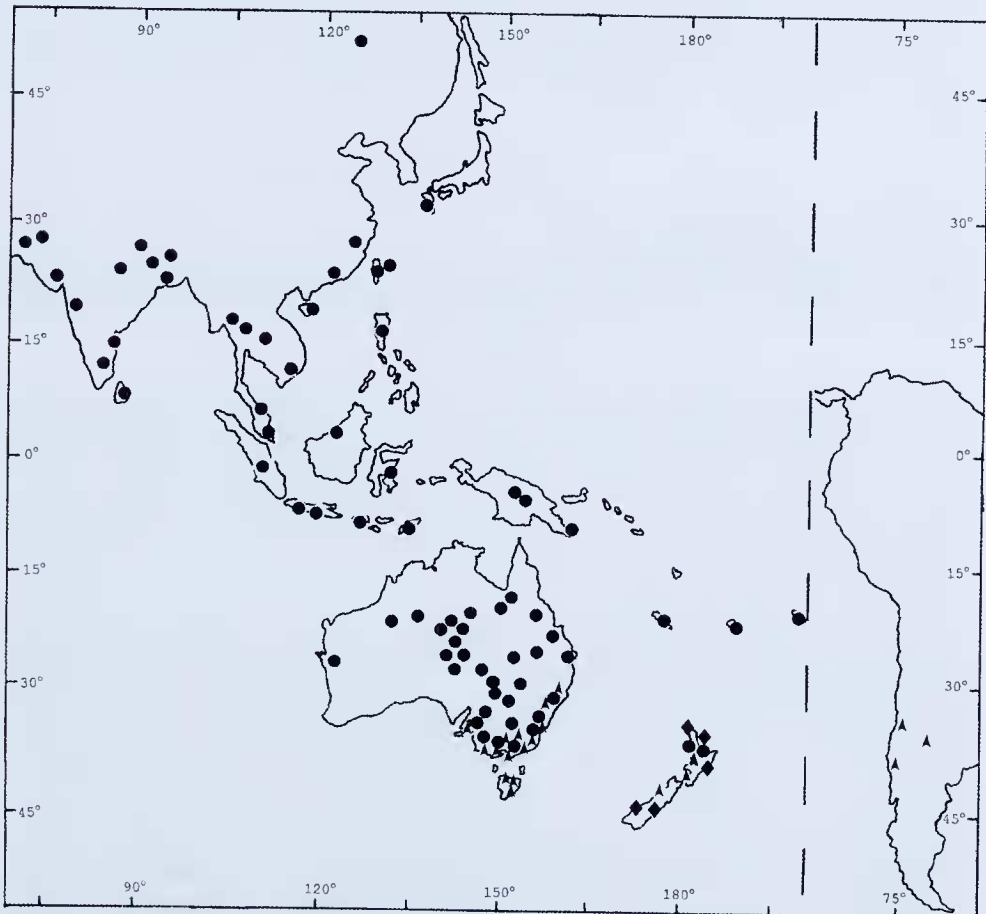


Figure 8. Distribution of *C. elatinooides* (arrowheads); *C. minima* subsp. *minima* (closed circles); *C. aotearana* (diamonds).

sites. The characters of the corollas and cypselas conform to those of Australian specimens of subsp. *minima* as here defined (R. Chinnock, pers. comm.).

Forms from semi-arid areas are often cottony-pubescent. The name *C. minima* var. *lauuginosa* has been applied to such cottony plants, as well as to specimens of *C. minima* subsp. *macrocephala*, *C. borealis* and *C. nidiformis*. However the indumentum observed in specimens of *C. minima* subsp. *minima* ranges from virtually non-existent (as represented by the Linnaean type) to fairly densely cottony, with no sensible disjunction to justify the retention of var. *lauuginosa*.

The Wallich collection (no 349, specimens seen from K and L) cited by DeCandolle in his description of *Cotula sternutatoria* clearly belongs to the typical subspecies as recognised here.

Sphaerouorphaea russelliana DC. var. *glabrata* DC. (type seen, at K) is also referable to this taxon, but specimens of *Sphaerouorphaea russelliana* DC. *sens. str.* (including Wallich's type collection) in DeCandolle's herbarium are of *S. australis* (Less.) Kitam. (syn. *Epaltes australis* Less.).

The type of *C. orbicularis* (Loureiro, Cochin, BM) has female corollas 0.1–0.15 mm long and cypselas 0.9 mm long. The leaves are 3–5(–7) mm long, but less toothed than typical (often obovate or spatulate). There are numerous adventitious roots and the impression is that it might have been aquatic or semi-aquatic. The habitat given in type description 'inculta in agris Cochinchinae' suggests this may have been the case (an agricultural ditch perhaps). It is closely comparable to the type of *C. minima*.

Young and/or incomplete specimens of hairier forms of the taxon may be difficult to distinguish from *C. borealis*, but except in Papua New Guinea (and perhaps Irian Jaya), the two do not appear to be sympatric.

2b. *Centipeda minima* subsp. *macrocephala* N.G. Walsh subsp. nov.

a subspecie typica capitulis et cypselis majoribus, foliis et caulibus gossypinis constanter, et in distributione boreali differt.

Type: Australia, Western Australia, Fortescue Botanical District, Creek crossing, 45 km from Tom Price along Marandoo Development Road, 30.viii.1995, P.S. Short 4280 (holotype: MEL 2027702; isotypes: PERTH, TI).

Stems and base of capitula white-cottony; *leaves* ± kite shaped, 5–13 mm long, 2–5 mm wide, shallowly toothed to pinnatifid, cottony to glabrescent with age; *capitula* at anthesis 3–5 mm diam.; involucre bracts 1.2–2 mm long; receptacle depressed-hemispherical, 1.5 mm diam. at anthesis; female florets (60–)120–250; bisexual florets (7–)16–21; *cypselas* narrowly obconate, 1.15–1.7 mm-long, 0.4–0.45 mm wide, with scattered vesicular trichomes (and sometimes scattered hairs) on faces; angles 4(–8), acute. (Figs 4c, 6c)

Representative specimens: AUSTRALIA: WESTERN AUSTRALIA: Kimberleys, c. 60 km S of Halls Creek, 13.vii.1974, A.C. Beaglehole 47338 (PERTH); Barrow Island, xii.1966, W.H. Butler s.n. (PERTH); Pilbara, c. 8 km N of Ethel Creek Homestead, 28.viii.1995, A.A. Mitchell PRP448 (MEL, PERTH); Hammersley Range, 5.x.1989, B. Nordenstam & A.A. Arneberg 327 (PERTH); Marble Bar Pool, 29.viii.1995, P.S. Short 4265 (MEL, PERTH). NORTHERN TERRITORY: Pargee Rockhole, Western Tanami, 10.vi.1996, D.E. Albrecht 7866 (DNA); Walhollow Station, 9.x.1994, C. Edgoose 1 & A. Kennedy (DNA); Mary Ann Dam, Tennant Ck, 3.v.1993, J. Egan 2269 (DNA); Junction Reserve, 16.vii.1982, P.K. Latz 9316 (DNA); Camping Ground Island, Macarthur River, 7.vii.1984, G. Wightman 1598 (DNA). QUEENSLAND: Near Karumba, c. 32 km NW of Normanton Township, 15.viii.1953, M. Lazarides 3950 (CANB, DNA).

Distribution and Conservation Status: Apparently endemic in Australia, occurring between latitudes c. 16°N and c. 25°N, but apparently confined to areas north of c. 22°N (around Barrow Ck) in Central Australia. It is apparently commonest in north-west

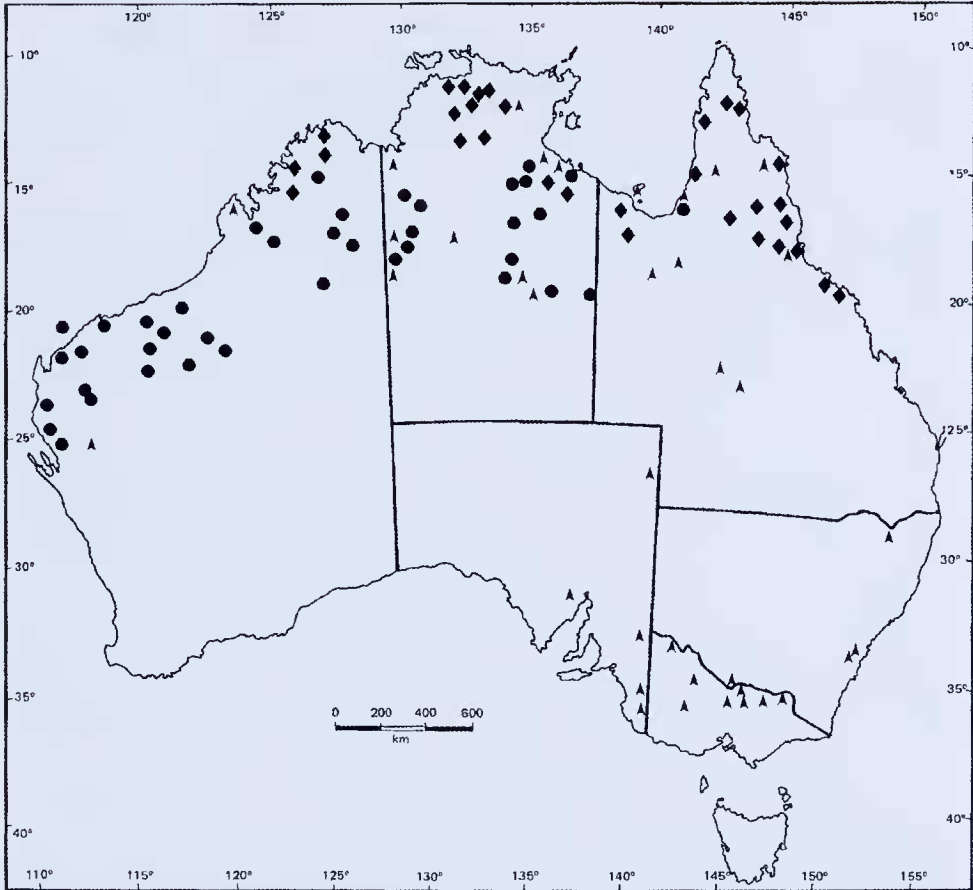


Figure 9. Distribution of *C. minima* subsp. *macrocephala* (closed circles); *C. borealis* (diamonds); *C. nidiformis* (arrowheads).

Western Australia (Carnarvon area), extending to the Gulf district of Queensland (1 record). Not rare or threatened. (Fig. 9)

Habitat: Occurs in sandy or clayey soils at margins of and in dry beds of watercourses, around pools, dams, springs etc.

Notes: Apart from the larger capitula and cypselas, subsp. *macrocephala* is typically a more robust, twiggy plant and is more densely and consistently white-cottony than is subsp. *minima*. It has a generally more northerly distribution than the typical subspecies. Young plants may superficially resemble *C. borealis* but at maturity the larger capitula and cypselas readily distinguish it. Many mature, fruiting specimens are conspicuous in having fallen cypselas retained within the cottony indumentum of lower stems and leaves.

The subspecific name is from Latin, meaning 'large-headed', drawing a comparison of the capitula to those of the typical subspecies.

3. *Centipeda borealis* N.G. Walsh *sp. nov.*

a *C. minima* habitu rhizomatoso, indumento albo-gossypino dense et foliis longioribus angustioribus relative distincta.

Type: Australia, Queensland, 12.1 km from Peninsula Development Road on track following telegraph line to Weipa, 2.viii.1983, *J.R. Clarkson* 4873 (holotype: MEL 676346; isotypes: BRI, DNA, K, L, MO, NSW, QRS).

Centipeda minima auct. non. (L.) A. Braun & Asch.; Dunlop in Cowie *et al.*, *Floodplain Flora* 182 (2000).

Procumbent to ascending, often rhizomatous *herb*, perennial or annual, to c. 30 cm high, usually many-branched from near base, densely white- or grey-cottony on leaves and all but oldest stems. *Leaves* narrowly obovate to \pm oblong in outline, 6–20 mm long, 1.5–2.5(–4) mm wide, distally with 3–5(–7) obtuse to acute teeth or narrow lobes, white- to grey-cottony, sometimes the older leaves glabrescent, both surfaces resin-dotted but obscured by indumentum, \pm concolorous. *Inflorescence* a single sessile capitulum, terminal at anthesis, but subtending vegetative buds often growing out and overtopping capitulum in fruit and the capitula then appearing axillary and subterminal. *Capitula* at anthesis \pm globular, 1.5–3(–4) mm diam.; involucre bracts obovate, 0.7–1 mm long, margins membranous, rinate; receptacle strongly domed (usually as high or higher than wide); female (outer) florets c. 160–250 in 6–10 rows, corollas cylindrical, c. 0.2 mm long; bisexual florets 11–20, corollas funnel-shaped, c. 0.4 mm long (including lobes c. 0.2 mm long and wide). *Fruiting heads* soft, readily disintegrating when mature on still-growing plants; bracts of fruiting heads strongly to moderately reflexed, straight or slightly upcurved distally, not thickened or pithy; fruiting receptacle 0.9–1.3 mm diam., with a pith layer contained entirely the dome, not extending below base of involucre; *cypselas* narrowly clavate to narrowly obcuneoid, 0.8–1.1 mm long, 0.2–0.3 mm wide, truncate at apex, smooth or scabridulous, weakly to strongly 4(–6)-angled, the angles ciliate, united at or above \pm four-fifths of the cypselas length into a slightly thickened, pale, apical portion, the pericarp between the ribs in the lower part very thin, with the brown testa of the seed apparent, the faces with or without a row of hairs down the centre, vesicular trichomes sparsely scattered over faces, hairs antrorsely appressed or subappressed, 0.1–0.2 mm long, acute, not inrolled at apex. (Figs 3d, 4d, 6d)

Representative specimens: AUSTRALIA: WESTERN AUSTRALIA: Kimberley, Gibb River, Kalumburu Mission Road, A.C. Beaglehole 51658 (PERTH); Charmley River, viii.1905, W. Fitzgerald s.u. (PERTH); Mt Trafalgar, Kimberley coast, 14.vi.1988, K.F. Kenneally 10777 (DNA, PERTH); King Edward River floodplain, 22.viii.1993, A.A. Mitchell 3247 (BROOME, MEL, PERTH). NORTHERN TERRITORY: Litchfield National Park, Butterfly Gorge, 29.ix.1991, M.J. Barrett 912 (DNA); Kakadu National Park, 3 km N of Old Goodparla, 3.viii.1994, M.J. Barrett 1109 (DNA); Litchfield Station, 8.x.1989, K.M. Manning 485 (DNA); Mataranka, 22.vi.1999, N.G. Walsh 4989 (MEL); Magela Creek, East of Ja Ja, 21.viii.1980, J.T. Waterhouse s.u. (CANB, DNA). QUEENSLAND: Cook District, Cooktown, viii.1881, E. Betche s.n. (BRI); North Kennedy District, Proserpine, 10.xii.1919, Rev. N. Michael (BRI); Cape York, Archer Bend National Park, 2.viii.1981, A. Mortou 1309 (BRI, MEL); North Kennedy District, Baratta Creek, 21.vi.1949, L.S. Smith 4321 (BRI). PAPUA NEW GUINEA: Western District, Bula Plains, Morehead subdistrict, 10 Nov. 1972, E.E. Henty & D.B. Foreman, NGF 49356 (LAE, L. BRI); Western Province, Tambari Plain, Balamuuk, 18 Sept. 1979, N.A. Jinas & E.K. Naoui 35 (LAE); Marauke, Taram River, 4 Aug. 1954, P. van Royen 4606 (LAE, L).

Distribution and Conservation Status: Occurs in far northern Australia (latitudes near and above c. 20°N), from near-coastal areas of the Kimberley Region, Western Australia eastward to Townsville area in Queensland. It also occurs in western Papua New Guinea and perhaps to be anticipated in suitable areas of Irian Jaya. It is not well represented in herbaria and in the few places that I have seen the species, it is not locally abundant. A Conservation Code of 3RC- is suggested (Briggs & Leigh 1996). (Fig. 9)

Habitat: Occurs in seasonally inundated depressions and on floodplains, commonly around lagoons, billabongs and beside watercourses, mostly on alluvial silts.

Notes: Closely related to *C. minima* but distinguished by the perennial, rhizomatous, more robust habit, conspicuous white-cottony indumentum and longer and relatively narrow leaves. See also notes under *C. minima* (both subspp.).

The epithet is Latin, meaning northern, a reference to its restricted occurrence within Australia.

4. *Centipeda nidiformis* N.G. Walsh *sp. nov.*

a *C. minima* corolla longiore et cypselis angulatis valde differt.

Type: Australia, Northern Territory, Barkly Tableland, Waterhole on Morphet Ck, c. 200 m west of Stuart Hwy crossing, 21.vi.1999, *N.G. Walsh 4982* (holotype: MEL 2060050; isotypes: CANB, NT).

Decumbent to ascending cottony *annual*, spreading to c. 15 cm diam. and/or 15 cm high; adventitious roots not or rarely produced; branches densely white-cottony at least on young growth. *Leaves* \pm spatulate, 3–10 mm long, 1–5 mm wide, usually with very slender petiole-like bases that are often almost as long as (occasionally longer than) the broader part of the lamina, shallowly (often obtusely) toothed or subentire; surfaces usually glabrous (rarely lightly) cottony, with (often indistinct) scattered resin droplets. *Inflorescence* a single sessile capitulum, terminal and/or cauline, subtended by 1–4 leaf-like bracts. *Capitula* at anthesis \pm globular, 2.5–5 mm diam; involucre bracts 1–1.6 mm long, densely cottony (except in specimens from southernmost localities); receptacle depressed hemispherical, 1.5–2.5 mm diam. at anthesis; female florets c. (50–)110–230, corollas 0.35–0.5 mm long; bisexual florets (6–)9–11, 0.6–0.7 mm long. *Fruiting heads* soft, readily disintegrating when mature on still-growing plants; bracts of fruiting heads widely spreading to slightly deflexed, straight or slightly upcurved distally, not thickened or pithy; fruiting receptacle 1–1.5 mm diam., with a thin pith layer contained entirely within the dome, not extending below base of involucre; *cypselas* obcuneate, 0.8–1.1 mm long, c. 0.4–0.5 mm wide, depressed-truncate at apex, usually strongly 4 (rarely 5 or 6)-angled with 1 or 2 lines of vesicular trichomes down centre of usually concave faces, apical rim and ribs at angles very acute or narrowly finned. Hairs on angles subappressed, c. 0.25 mm long, occasionally shorter hairs present on mid-line of faces. (Figs 4e, 6e)

Representative specimens: **AUSTRALIA: WESTERN AUSTRALIA:** Kimberley, Fitzroy River on Great Northern Highway, 29.vii.1974, *A.C. Beaglehole 48097* (PERTH); Carnarvon Basin, Cardilya Pool, 31.viii.1995, *G.J. Keighery & N. Gibson 589* (PERTH); Bunguaduk waterhole, Dampierland Peninsula, 20.viii.1985, *K.F. Kenneally 9454* (PERTH). **NORTHERN TERRITORY:** Near Nourlangie Rock, 12.x.1973, *J. Burrell 1257* (CANB, DNA); Sanctuary Swamp, 4.vii.1980, *J. Maconochie 2465* (CANB, DNA); Tanumbrini Station, 12.vii.1987, *B.G. Thomson 1988* (DNA). **SOUTH AUSTRALIA:** Innamincka Station, 4.xi.1987, *P.E. Conrick 2245* (AD); Murray River floodplain, 6.5 km W of Berri, 20.iv.1957, *H. Eichler 13799* (AD); Chowilla Station, vii.1966, *R.H. Knichel 399* (AD); Mulligans Swamp Conservation Park, 6.iv.1996, *R. Taplin 717 & D. Mumjet* (AD). **QUEENSLAND:** Cook District, west coast of Cape Yorke Peninsula, vii.1977, *P. Black 12* (CANB); Maranoa District, Leichhardt River, Kajabbi, *S.T. Blake 9307* (BRI); Burke District, Normanton, 7.viii.1936, *S.T. Blake 12488* (BRI); North Kennedy District, Wairuna Lake, 10.viii.1976, *M. Lazarides 8164* (BRI, CANB); Mitchell District, Thompson River Crossing, 100 km SW of Longreach, 30.v.1993, *J. Milson 389* (BRI). **NEW SOUTH WALES:** Central Coast, Elderslie near Camden, 1.vi.1968, *E.J. McBarron 15348* (NSW); South-West Plains, 2 km S of Deniliquin, xi.1977, *W.E. Mulham 1201* (NSW). **VICTORIA:** Midlands, Mt Black Flora Reserve, 3.v.1981, *A.C. Beaglehole 68917* (MEL); Murray Mallee, Hattah National Park, Chalka Creek, south of Lake Lockie, 3.x.1982, *D.C. Cheal s.n.* (MEL); Wimmera, Yarriambiack Creek, 31.viii.1902, *F.M. Reader s.n.* (MEL); Riverina, Ulupna Island, 25.i.1993, *P.S. Short 3929 et al.* (MEL).

Distribution and Conservation Status: Apparently commonest in northern Australia (north of the Tropic of Capricorn) where scattered but locally abundant, apparently not rare. Rather rare in southern Australia (northern Victoria, southern and eastern NSW, eastern SA, with disjunct occurrences in the south-western part of the Gascoyne province in WA. (Fig. 9)

Habitat: Margins of streams, waterholes etc. on usually clay or clay-loam soils. In areas of reliable rainfall, but relatively warm climates.

Notes: Close to *C. minima* subsp. *minima* but distinguished by the longer corollas and relatively broader, strongly angular cypselas that typically have concave faces between the ribs. The leaves are generally diagnostic, usually having relatively long, 'pseudopeti-

olate' bases, a feature rarely observed in *C. minima*. Through most of the range of the species, plants are densely cottony-pubescent, but specimens from the southern part of the range may be only lightly pubescent.

See also notes under *C. minima* and *C. borealis*.

The epithet is latin meaning 'nest-shaped', an allusion to the capitula which are typically embedded in cottony indumentum, appearing like a small bird's nest.

5. *Centipeda racemosa* (Hook.) F. Muell., *Syst. Cens. Austral. Pl.* 84 (1883). *Myriogyne racemosa* Hook. in T.L. Mitch., *J. Trop. Austral.* 353 (1848). *Type*: Australia, Maranoa River, 17 Oct. 1846, T.L. Mitchell (lectotype, *hic designatus*, K (*ex herb. hookerianum* 1867, photo seen); isolectotype K (*ex herb. benthamianum*, photo seen)).

Centipeda racemosa var. *lanata* F.M. Bailey, *Qld Agric. Journ.* 28: 276 (1912). *Type*: Australia, 'Herberton, Dr. F. Hamilton Kenny' (BRI).

Erect perennial *herb* with branches annual or perennial from a perennating rootstock, perhaps annual in some situations, to c. 45 cm high, usually many-branched from base, glabrous to quite cottony on stems of current-seasons' growth. *Leaves* \pm oblong, slightly tapered to base, 3–14 mm long, 1–2 mm wide, evenly serrate with acute teeth often incised \pm halfway to the midrib, less commonly shallowly toothed in the upper half only, or subentire, margin usually recurved; glabrous or, when young, lightly white-cottony (rarely persistently lanate), resin-dotted on both surfaces, \pm concolorous. *Inflorescences* racemose, 0.5–1.2(–2) cm long, terminal and sometimes also in upper axils (then sometimes appearing sub-paniculate), of 2–7 capitula; peduncles 0.5–5(–8) mm long. Peduncles each subtended by a bract, more or less intermediate in form and size between the uppermost leaves and involucre bracts. *Capitula* at anthesis highly domed-hemispherical to globular, 1.8–4 mm diam.; involucre bracts obovate, 1–1.5 mm long, margins membranous, ruminant; receptacle distinctly convex; female (outer) florets c. 80–150 in 5–8 rows, corollas narrowly cylindrical, c. 0.3 mm long; bisexual florets 9–18, corollas funnel-shaped c. 0.7–0.8 mm long (including lobes c. 0.3 mm long and wide). *Fruiting heads* soft, readily disintegrating when mature on still-growing plants; bracts of fruiting heads straight or slightly incurved, widely spreading or reflexed, not thickened or pithy; fruiting receptacle 0.8–1.2 mm diam., with a pith layer contained entirely the dome, not extending below base of involucre; *cypselas* narrowly obcuneoid, 0.8–1.1 mm long, truncate at apex, smooth or scabridulous, strongly 4-angled to the apex, the angles ciliate, the intervening faces with a row of similar hairs down the centre, this area sometimes slightly ribbed, vesicular trichomes apparent between lines of hairs on faces, hairs antrorsely appressed or subappressed, c. 0.1–0.2 mm long, not conspicuously inrolled or thickened at apex. (Figs 3e, 4f, 6f)

Representative specimens: **AUSTRALIA: WESTERN AUSTRALIA**: Towrana Station, 25.v.1982, R.J. Cranfield 2105 (PERTH). **NORTHERN TERRITORY**: Lake Surprise, 32 km SW Tennant Creek, 6.v.1994, D.E. Albrecht 5883 (DNA, NSW, NT); S of Mongrel Downs Station, 5.viii.1976, P.K. Latz 6555 (NT); Annitowa Station, 10.v.7023, P.K. Latz 7023 (DNA, NT); 107 km NE of Tanami Bore, 17.v.1971, J.R. Maconochie 1109 p.p. (CANB, K, MEL, NT PERTH). **QUEENSLAND**: Leichhardt District, 'Minerva' N of Springsure, 5.vii.1934, S.T. Blake 7023 (BRI); North Kennedy District, Charters Towers, 2.v.1981, W.R. Carter s.n. (BRI); Burke District, 48 km S of Lyndhurst Station on Hughenden Rd, 15.v.1975, J.R. Clarkson 198 (BRI, K); Mitchell District, c. 64 km NE of Blackall, 18.x.1963, J.K. Cull s.n. (BRI); Cook District, Lyndhurst Station Homestead, 12.viii.1969, N.W. Dolerty s.n. (BRI). **NEW SOUTH WALES**: Central West Slopes, Rocky Creek, 21.iii.1843, F.W.L. Leichhardt s.n. (NSW); North West Slopes, Binnaway, 21.xii.1960, E.J. McBarron s.n. (NSW); North West Plains, Gwabegar, x.1932, H.M.M. Rupp s.n. (NSW).

Distribution and Conservation Status: Occurs mainly in the Northern Territory and Queensland northwards from around 25° latitude, with disjunct occurrences in the gener-

al vicinity of the Warrumbungle Ranges of New South Wales, inland southern Queensland, and a remarkable occurrence in Western Australia, inland from Carnarvon. There are fewer than 50 collections represented in Australian herbaria. It is probably reasonable to regard the species as rare, but as there appear to be no post-1980 collections from New South Wales, and only a few from Queensland, further investigation may indicate it to be threatened. Suggested Conservation Code is 3K (Briggs & Leigh 1996). (Fig. 10)

Habitat: Floodplains and margins of watercourses, gilgais, or other water-retentive sites, with clayey, sandy or rocky substrates. Species or plant associations noted as occurring with *C. racemosa* on herbarium labels include 'Wiregrass' (presumably *Aristida* sp.), 'Box-Sandalwood forest', 'mixed eucalypt forest', 'short grazed turf', 'sedgeland surrounded by *Eucalyptus largiflorens*'. The species may be favoured by soil disturbance, one specimen noting its occurrence in a ploughed paddock, another, from a cattle station noting it to be 'spreading on property in recent years'.

Notes: *Centipeda racemosa* is distinctive in its relatively tall, erect habit, often several-branched from the woody perennating rootstock, and the racemose inflorescence with subglobular to globular capitula. Its cypselas differ from others in the *C. minima* group by the absence of a thickened spongy apical portion.

Two presumed type sheets of *Myriogyne racemosa* are at K, both dated 1846, collected by Mitchell and labelled 'Sub-tropical New Holland', with a determination in

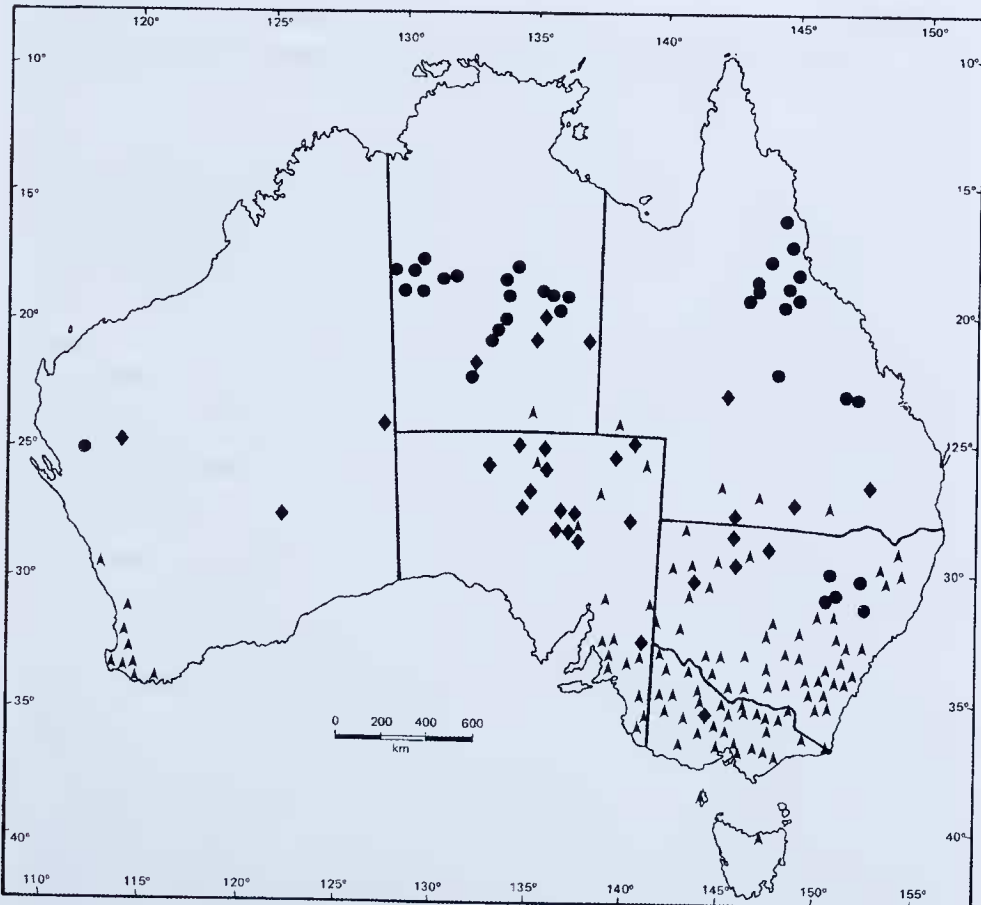


Figure 10. Distribution of *C. racemosa* (closed circles); *C. pleiocephala* (diamonds); *C. cunninghamii* (arrowheads).

Hooker's hand. One is stamped 'Herbarium Benthamianum 1854', the other 'Herbarium Hookerianum 1867'. They are presumably from the same original collection. The specimen from Hooker's herbarium is larger and more floriferous and is here chosen as the lectotype specimen.

Centipeda racemosa var. *lanata* is known only from the type specimen. It differs from other specimens here attributed to *C. racemosa* in being particularly lanate and in having slightly broader, less dentate leaves than typical, that are virtually devoid of resin-droplets on the adaxial surface. It is here included in synonymy, but it is possibly a hybrid with *C. borealis* or a particularly densely cottony form of *C. minima*, or may represent a rare or undercollected form of the species perhaps deserving of infraspecific rank. Further searches in the Herberton area are encouraged to confirm the correct status of this entity.

6. *Centipeda pleiocephala* N.G. Walsh *sp. nov.*

a *C. minima* habitu erecto, inflorescentibus axillaribus racemosis ex 2–4 capitulis compositis differt; a *C. racemosa* habitu annua, capitulis biconvexis, cypselis inflatis apice leniter differt.

Type: Australia, Queensland, Currawinya National Park, NE of Karatta Bore, 21.iii.1997, P.I. Forster 20546 & M. Watson (holotype: MEL 2055149; isotypes: BRI, DNA, NSW).

Erect slender *annual*, to 30(–40) cm high, often several-branched from base, glabrous except for a few cottony hairs on young branchlets, sometimes persisting in axils. *Leaves* ± oblong to narrowly obovate, 8–25 mm long, 2–7 mm wide, serrate, margin flat (sometimes recurved on young leaves), glabrous, resin-dotted on both surfaces, concolorous. *Inflorescences* axillary, of 2–4 capitula, racemously arranged (less commonly a single capitulum), the lowest capitulum usually sessile or subsessile, and the upper 1–3 with peduncles to c. 5 mm long. *Capitula* at anthesis hemispherical to biconvex, 2–4.5 mm diam.; involucre bracts spatulate to obovate, 1–1.5 mm long, margins membranous, runcate; receptacle distinctly convex; female (outer) florets c. 100–170 in 3–5 rows, corollas narrowly cylindrical, 0.2–0.3 mm long; bisexual florets (4–)10–18, corollas narrowly funnel-shaped c. 0.6–0.8 mm long (including lobes 0.2–0.3 mm long and wide). *Fruiting heads* soft, readily disintegrating when mature on still-growing plants; bracts of fruiting heads straight or slightly incurved, widely spreading, not thickened or pithy; fruiting receptacle 1–1.5 mm diam., with a pith layer contained entirely or nearly within the dome, not extending below base of involucre; *cypselas* obloid, narrowly obovoid, or narrowly obtuseoid, 0.8–1.1(1.3) mm long, obtuse or rounded (female florets) or truncate (bisexual florets) at apex, smooth, finely 2–4-ribbed, the ribs confluent with a pale, spongy apical process not or hardly wider than the body of the cypselas and up to one-quarter the entire cypselas length, vesicular trichomes lacking or very sparse, hairs antrorsely appressed, c. 0.1–0.2 mm long, confined to ribs, crowded near base, rather sparse toward apex, straight or minutely inrolled at apex. (Figs 1, 3b, 3c, 5a, 7a)

Representative specimens: **AUSTRALIA:** **WESTERN AUSTRALIA:** East of Giles Creek, south of Rawlinson Range, 22.vi.1960, J.B. Cleland *s.n.* (AD). **NORTHERN TERRITORY:** Ross's Waterhole, Macumba River, 5.i.1927, J.B. Cleland *s.n.* (AD); West MacDonnell National Park, Ellery Ck, 18.vi.1999, N.G. Walsh 4967 (MEL, NT). **SOUTH AUSTRALIA:** Gairdner-Torrens, Canegrass Dam, Stuart Creek Station, 7.viii.1989, F.J. Badman 3379 (AD); North-Western, Mintabie, 6.vii.1989, R. Bates 19961 (AD); Lake Eyre, Wood Duck Waterhole, 2.iii.1984, J.Z. Weber 8756 (AD); c. 30 km W of Coward Springs, 4.iii.1983, J.Z. Weber 8763 (AD, BRI, NSW). **QUEENSLAND:** Mitchell District, Vergemont Creek, 22.ix.1990, A.J. Emmott 466 (BRI); Maranoa District, 10 km E of 'Wongamee', 19.vi.1976, R.W. Purdie 425 (BRI); Darling Downs District, c. 6 km E of Meandarra, 1.viii.1969, M.J. Russell *s.n.* (BRI). **NEW SOUTH WALES:** North Far West Plains, Wanaaring, 1.vi.1947, L.A.S. Johnson 547/126 (NSW); North West Plains, Coolabah-Gongolgon Rd, 26.viii.1973, J. Thompson 1822 (BRI, NSW). **?VICTORIA:** Avoca, F. Mueller *s.d.* (MEL); On the Murray Lagoons, F. Mueller *s.d.* (MEL).

Distribution and Conservation Status: Scattered through inland Australia, mostly between latitudes 20° and 32° south, occurring in all mainland States, except possibly Victoria, with most collections from north-western South Australia (Lake Eyre biological subdivision). Two specimens collected by Mueller and labelled 'Avoca' and 'on the Murray Lagoons' (probably collected during 1853) represent the only known collection of the species from Victoria, c. 300 km from of its nearest confirmed occurrence. The possibility exists that either the specimens were mislabelled or that the species is now extinct or extremely rare in Victoria. It is here assessed as Rare, with Conservation Code 3RCa (Briggs & Leigh 1996). (Fig. 10)

Habitat: Semi arid to arid areas in moist sandy, silty or clay soils (rarely amongst rock) at margins of waterholes, dams, creeklines, and on floodplains and gilgai land-forms. Usually associated with ephemeral herbaceous herbage amongst shrubland (e.g. *Atriplex*, *Maireana*, *Muehlenbeckia*) or woodland (e.g. *Eucalyptus microtheca* F. Muell., *E. largiflorens* F. Muell., *E. camaldulensis* Dehnh., *Acacia stenophylla* A. Cunn. ex Benth.).

Notes: *Centipeda pleiocephala* differs from *C. minima* in its erect habit and axillary, shortly racemose inflorescences typically of 2–4 capitula. It differs from *C. racemosa* in the strictly annual habit, the axillary inflorescences usually of fewer capitula, biconvex (rather than subglobular) capitula, and in the cypselas having a slightly inflated apical process.

The epithet is from Greek, meaning 'many-headed', a reference to the individual inflorescences.

Some distributed specimens of this taxon may have been labelled with the epithet '*pluricephala*'.

7. *Centipeda aotearoana* N.G. Walsh *sp. nov.*

a *C. cunninghamii* foliis minoribus, habitu prostrato, capitulis minoribus plerumque, flosculis bisexualibus paucioribus differt.

Type: New Zealand, South Island, Between Leeston and Southbridge, Canterbury, 27.ii.1967, R. Mason 10626 (CHR).

Prostrate *annual*, 10–30 cm diam., sometimes producing adventitious roots from lower nodes, usually several-branched from base, varying from being glabrescent with a few cottony hairs on young growth, to, rarely, moderately cottony all over. *Leaves* ± obovate to spatulate in outline, 4–8(–12) mm long, 1.5–4 mm wide, mostly with 1–3 acute to blunt teeth along each side, rarely entire, margin slightly thickened and/or sometimes slightly recurved, resin-dotted on both surfaces, concolorous or slightly paler beneath. *Inflorescence* a single sessile capitulum, often leaf-opposed, immediately subtended by a leaf and appearing axillary to it, sometimes in branch-axils. *Capitula* at anthesis ± hemispherical, distinctly domed, 3–4(–7) mm diam., (immature capitula, prior to anthesis, cup-shaped to biconvex); involucre bracts obovate, 1–2 mm long, minutely runcate and membranous distally; receptacle distinctly domed, hemispherical or slightly lower than this; female (outer) florets c. 60–120 in 3–5 rows, corollas narrowly cylindrical, 0.3–0.4 mm long; bisexual florets 8–16, corollas narrowly funnel-shaped, c. 0.5–0.8 mm long (including lobes 0.2–0.3 mm long and wide). *Fruiting heads* firm, somewhat persistent, but disintegrating before stems senesce; bracts of fruiting heads widely spreading to slightly deflexed near base, slightly upcurved in distal half, not significantly thickened and not pithy toward base; fruiting receptacle 0.9–1.3 mm diam., the underlying pith layer not extending below base of involucre; *cypselas* clavate or narrowly obcuneoid (less than 5 times longer than wide), 1.2–1.7 mm long, obtuse (female florets) or truncate (bisexual florets) at apex, smooth or minutely scabridulous in the lower half only, prominently and usually regularly 4-angled with prominent ribs at each of the angles, usually

with a finer rib alternating with each of the major angles, the ribs terminating 2/3 or 4/5 of the cypsela length in a thickened spongy apical portion, pericarp between ribs usually thin, revealing the brown shining seed beneath, vesicular trichomes absent from cypsela body or sparsely scattered over faces, hairs antrorsely spreading or subappressed, 0.2–0.4 mm long, confined to ribs, extending from base to the distal quarter of cypsela, neither inrolled nor conspicuously thickened at apex, acute or obtuse. (Figs 5b, 7b)

Representative specimens: **NEW ZEALAND:** **NORTH ISLAND:** Great Is, Three Kings, 30.xi.1945, *G.T.S. Bayliss* (AK); Elands Lake, Hawkes Bay, 24.v.1990, *P.D. Champion s.n.* (WAIK); Muriwai, Waitakerei, iii.1914, *T.F. Cheeseman* (AK); near Cape Palliser, Wairarapa, ii.1947, *A.P. Druce* (CHR); Taranaki Land District, south of Opunake, 15.iii.1994, *P.N. Johnson 1254* (CHR); Turakirae Head, iv.1973, *C. Ogle* (CHR); Great Barrier Island, 3.iv.1980, *C.C. Ogle 461* (CHR); Whangamarino Swamp, Waikato, 15.i.1981, *C.C. Ogle 616* (CHR); Kapiti Island, Te Wairoua Valley, 27.iv.1982, *C.C. Ogle* (CHR). **SOUTH ISLAND:** Wairarapa Coast, NE of Otorie River, xii.1978, *A.P. Druce* (CHR); Darfield, ?1950s, *A.E. Esler* (AK); Hagley Park, Christchurch, 12.iv.1954, *A.J. Healy 55/43* (CHR); North Canterbury, Medbury, 26.i.1996, *A.J. Healy 96/8* (CHR); Awatere Valley, Marlborough, 23.i.1955, *R. Mason 3144* (CHR); Lake Wanaka, *N. Petrie s.d.* (AK); Saltwater Lagoon, Westland, 7.iii.1980, *P. Wardle* (CHR).

Distribution and Conservation Status: Apparently endemic to New Zealand. From Three Kings Islands in the extreme north south to at least Lake Wanaka on the south island. It does not appear to be rare. (Fig. 8)

Habitat: Occurs chiefly on sandy or muddy shores and drying beds of lakes, swamps, rivers etc.; noted from the beach near Cape Palliser (*Druce, s.n.* CHR 82235). Also relatively common on disturbed sites, e.g. gravel and shale pits, levee banks etc.

Notes: *Centipeda aotearoana* is distinguished from other species in New Zealand (*C. cunninghamii*, *C. elatinooides* and *C. minima*) in the combined features of prostrate habit, and firm, hemispherical fruiting capitula. From *C. cunninghamii* it differs in smaller leaves, prostrate habit, generally smaller capitula, and fewer bisexual florets. From *C. elatinooides* it differs in the firm fruiting heads and the non-flattened cypselas with a pithy apical process. From *C. minima* it differs in the firm, hemispherical fruiting heads, non-flattened and larger cypselas. Amongst other species not occurring in New Zealand, it is closest to *C. crateriformis* subsp. *compacta* from which it differs chiefly in the shape of the capitula (hemispherical vs biconvex), the conspicuously domed receptacle, the generally relatively narrower cypselas, and the cypsela hairs which are acute or obtuse, neither thickened or inrolled at their apices. Both the cypselas and corollas of *C. aotearoana* are less glandular than those of either subspecies of *C. crateriformis*.

The epithet is based on the Maori word for their country, meaning 'land of the long white cloud'.

8. *Centipeda cunninghamii* (DC.) A. Braun & Asch., *Ind. Sem. Hort. Berol. App.* 6 (1867). *Myriogyne cunninghamii* DC., *Prodr.* 6: 139 (1838). *Type:* Australia, New South Wales, 'inundated banks of the Lachlan River', 29 Apr. 1817, *A. Cunningham* (lectotype, *hic designatus*, G-DC (photo seen); isolectotype: K (photo seen)).

Erect or ascending *perennial* (sometimes *annual* in adverse conditions) to c. 30 cm high, new growth commonly resprouting from base, glabrous, or cottony near the growing tips, or rarely cottony overall. *Leaves* oblong or narrowly obovate, 7–30 mm long, 2.5–7 mm wide, serrate, glabrous, resin-dotted on both surfaces, concolorous or slightly paler below. *Inflorescence* a single sessile cauline capitulum, not leaf-opposed, often in branch axils. *Capitula* at anthesis biconvex, hemispherical or subglobose, 4–6(–8) mm diam.; involucre bracts 3–5-seriate, obovate, 1.5–3 mm long, entire or with minutely ruminant membranous margins, glabrous to lightly (rarely densely) cottony; receptacle strongly convex; female (outer) florets c. 200–350, in 7–12 rows, corollas narrowly cylindrical,

0.3–0.5(–0.7) mm long (including lobes c. 0.1 mm long); bisexual florets c. 20–50(–70), corollas funnel-shaped, 0.7–0.8 mm long (including lobes c. 0.3 mm long and wide), pale green, rarely tipped reddish. *Fruiting heads* usually remaining intact until stems senesce; bracts of fruiting heads widely spreading; fruiting receptacle 1.8–2.5(–3.5) mm diam., with a pith layer entirely contained within the dome of the receptacle; *cypsels* oblong, 1.2–1.6 (–2) mm long, truncate or rounded at apex, with 4 prominent ribs, occasionally with 1 or 2 minor ribs, the ribs smooth or scabridulous, united at or above three-quarters of the cypsel length into a thickened, spongy or corky apical portion, the pericarp between the ribs in the lower part normally very thin with the brown testa of the seed apparent; vesicular trichomes scattered over the faces of the cypsel between the ribs. Hairs on ribs antrorse (sometimes appressed), c. 0.1–0.2 mm long, usually tightly inrolled at their apices. (Figs 5c, 7c)

Representative specimens: **AUSTRALIA**: **WESTERN AUSTRALIA**: 3 km E of Quininup, 6.ii.1997, *R.J. Cranfield 10956* (PERTH); Narrogin Brook, ii. 1904, *W.V. Fitzgerald s.n.* (PERTH); Lowden, xi.1910, *M. Koch 1936* (PERTH); Pemberton, xii.1921, *M. Koch 2571* (PERTH); Blackwood River, 30 km W of Nannup, 30.i.1965, *R.D. Royce 8299* (PERTH). **NORTHERN TERRITORY**: Andado Station, 28.ix.2000, *D.E. Albrecht 9429 & R.A. Kerrigan* (MEL, NT). **SOUTH AUSTRALIA**: Lake Eyre Basin, Coward Springs, 8.viii.1984, *Badman 1416*: AD, MEL, Coongie Lakes, 9.xi.1986, *J. Gillen 38* (AD); South-eastern, Nalan Creek, Mundulla, 11.i.1993, *D.N. Kraehenbuehl 5560* (AD, CANB); Murray Mallee, Chowilla, 13.vii.1966, *R.H. Kuchel 2300* (AD). **QUEENSLAND**: Diamantina River, 1.x.1960, *R.B. Filson 3351*: MEL). **NEW SOUTH WALES**: North-West Slopes, Tingha, iii.1917, *J.L. Boorman*, (NSW); Southern Tablelands, 19.1.1988, *E.M. Canning 6460* (CANB, MEL, MO, NSW, P); North Far-West Plains, Warrego River, 19.x.1963, *Constable 4570* (K, NSW); Northern Tablelands, Dangars Lagoon, 10.viii.1987, *P. Hind 5286 & G. D'Aubert* (NSW); South-West Slopes, Munderoo State Forest, 26.xii.1948, *E.J. McBarron 2825* (NSW); Central Tablelands, Rydal, iv.1897, *J. McNab s.n.* (NSW); Central West Slopes, 24 km NW of Temora, 22.iii.1979, *J. Whiteley s.n.* (NSW). **VICTORIA**: Eastern Highlands, Avon River, Valencia Creek township, 10.v.1979, *H.I. Aston 2031* (MEL); Riverina, Murray River, SW of Tocumwal, 29.x.1982, *H.I. Aston 2356* (MEL); Otway Plain, 13 km N of Anglesea, 17.i.1979, *A.C. Beaughtole 63358* (MEL); Lowan Mallee, Broughtons Waterhole, 8.xi.1979, *A.C. Beaughtole 66307* (MEL); Grampians, Mt Arapiles, 16.xii.1981, *R. Brouwers s.n.* (MEL); Murray Mallee, Lake Hattah, 12.xii.1998, *A.C. Cochrane 310* (MEL); Gippsland Plain, Yarra, 1852, *F. Mueller s.n.* (MEL); Wimmera, 45 km SW of Horsham, 6.ii.1963, *F.G. Swindley 1479*; Midlands, Wedderburn, 14.ii.1982, *K.R. Thiele 320* (MEL); East Gippsland, Cann River, 1946, *N.A. Wakefield 3999* (MEL). **TASMANIA**: Sea Elephant River, King Island, 9.i.1979, *D.I. Morris 7962* (HO); Trevallyn State Recreation Area, 18.xii.1991, *A.V. Ratkowsky* (HO). **NEW ZEALAND**: **NORTH ISLAND**: Waikawau Estuary, 8.i.1998, *E.K. Cameron 9080* (AK); St Johns Lake, 14.vi.1930, *L.M. Cranwell s.n.* (AK); Lake Waikaremoana, 10.ii.1970, *P. Hynes s.n.* (AK); Aotea Harbour, Taranaki Bluffs, 12.vi.1985, *P.J. de Lange s.n.* (AK); Lake Whangape, 5.i.1990, *P.J. de Lange s.n.* (AK, WAIK.); **SOUTH ISLAND**: Nelson, near Mt Campbell, 2.v.1991, *W.R. Sykes 262/91* (AK, CHR); Golden Bay, Farewell Spit, 25.v.1977, *A.E. Wright 2383* (AK). **NEW CALEDONIA**: *Jodifroy 3516*, x.1910 (L). **SPAIN**: Cáceres, Guijo de Granadilla, 25.iv.1997, *J.A. Sánchez Rodríguez s.n.* (SALA) (*n.v. in litt.*).

Distribution and Conservation Status: *Centipeda cunninghamii* is probably endemic to Australia. It is regarded by Webb *et al.* (1988) as naturalised in New Zealand, but possibly native there (de Lange pers. comm.). It is common and widespread through south-eastern mainland Australia, mostly south of 30° S; rare in Tasmania (northern parts only) and Northern Territory (1 collection) and confined in Western Australia to the far south-west. A single 1910 collection purportedly from New Caledonia exists at L, but only *C. minima* subsp. *minima* is represented at NOU (M. Duretto pers. comm.). Assuming no mixing of labels, it seems that *C. cunninghamii* occurs (or occurred) there, probably by introduction. It has recently been reported as naturalised beside a reservoir ('*embalse de Gabriel y Galán*') at one site in eastern Spain (Sánchez Rodríguez & Elías Rivas 1998). (Fig. 10)

Habitat: Locally common on banks of perennial rivers, lakes and dams, on sandy, silty or clayey soils. Occurs from near sea-level to c. 500 m altitude.

Notes: Most specimens from Western Australia differ slightly from eastern specimens

in the cypselas having thicker ribs, so that the testa of the enclosed seed is largely obscured. The receptacle of these specimens, although distinctly convex, is less prominent than in most eastern specimens. There may be some introgression in this area with *C. crateriformis* subsp. *compacta*.

Bracketed measurements in the description above correspond to specimens from Andado Station, Northern Territory (*Albrecht 9429*: MEL, NT), Diamantina River, Queensland (*Filson 3351*: MEL) Coward Springs, South Australia (*Baduan 1416*: AD, MEL) and Warrego River, New South Wales (*Coustable 4570*: K, NSW). Not only do these specimens have the largest reproductive parts of all specimens of *C. cuuiughanii* examined, but they are also the most densely cottony and generally are of a more spreading habit than typical. They are amongst the most inland occurrences of the species. Further study may indicate these specimens represent a distinct (probably infraspecific) taxon, although specimens that have floral and fruiting parts of nearly comparable size to these cottony plants but are otherwise typical do exist. The large-flowered specimens are therefore here treated as extreme conditions within a single variable species. It is possible too that they represent hybrids with *C. crateriformis* subsp. *Crateriformis*, which is sympatric at some of these sites.

9. *Centipeda crateriformis* N.G. Walsh *sp. nov.* a speciebus generis capitulis fructioribus duris persistentibus biconvexis crateriformis vel cyathiformibus, receptaculis planis ad concava vel convexa leviter differt.

Type: Australia, Northern Territory, Surprise Dam, Andado Station, 23.x.1980, *P.K. Latz 8508* (holotype: DNA; isotypes: AD, BRI, NT).

Annual or *perennial*, commonly several-branched from base, glabrescent to cottony-pubescent. *Leaves* narrowly obovate to spatulate, serrate, or rarely, entire, resin-dotted on both surfaces, concolorous. *Inflorescence* a single sessile or minutely pedunculate capitulum, sometimes terminal on ultimate branchlets, not leaf-opposed. *Capitula* at anthesis bowl-shaped to cup-shaped or sub-globular, domed or flat-topped; involucre bracts ovate to obovate; receptacle slightly convex, flat, or slightly concave. *Fruiting heads* firm to hard, persistent to some degree; bracts of fruiting heads spreading, slightly upcurved in distal half, the outer ones slightly thickened and pithy toward base; fruiting receptacle with an underlying pith layer extending slightly below base of involucre; cypselas linear or narrowly obcuneoid, obtuse at apex, smooth or scabridulous, 4- or 5-angled with prominent ribs at each of the angles, the ribs terminating in a spongy apical portion usually slightly wider than the body of the cypselas, vesicular trichomes sparsely scattered over faces of cypselas, hairs antrorse, subappressed, confined to ribs, often with minutely inrolled or thickened apices.

There are two subspecies, both apparently endemic to Australia.

9a. *Centipeda crateriformis* subsp. *crateriformis*

Annual to c. 20 cm high, 30 cm diam., typically several-branched from base with branches prostrate to ascending, but sometimes erect and few-branched, glabrescent to conspicuously cottony in axils and toward stem apices. *Leaves* ± narrowly obovate to spatulate, 3–8(–12) mm long, 2–4(–6) mm wide. *Capitula* at anthesis ± hemispherical to bowl-shaped, slightly domed or flat-topped, 3.5–7 mm diam.; involucre bracts ovate to obovate, 1.5–4 mm long, entire or with minutely rinate membranous margins; receptacle flat to very slightly concave or convex; female (outer) florets c. 100–200 in 3–5 rows, corollas narrowly cylindrical, 0.4–0.7 mm long; bisexual florets (7–)12–22, corollas narrowly

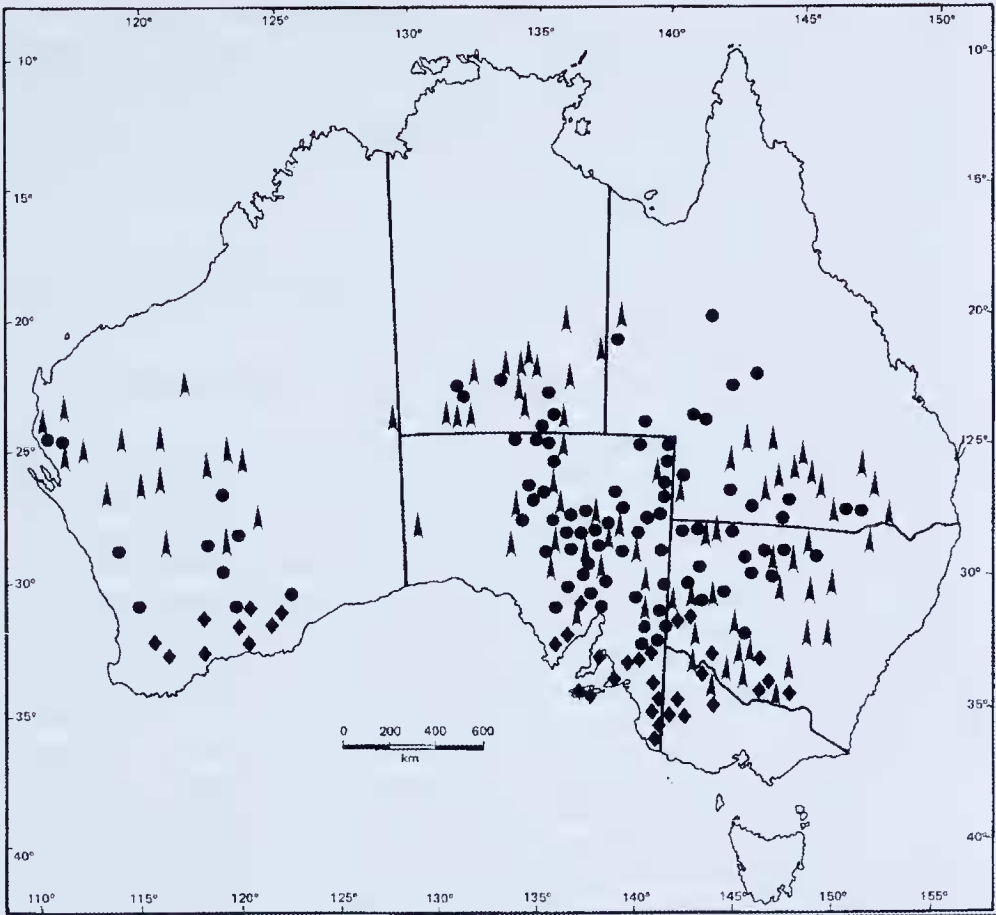


Figure 11. Distribution of *C. crateriformis* subsp. *crateriformis* (closed circles); *C. crateriformis* subsp. *compacta* (diamonds); *C. thespidioides* (arrowheads).

funnel-shaped, ± 0.8 mm long (including lobes ± 0.3 mm long and wide). *Fruiting heads* hard, remaining intact until long after stems senesce (sometimes at least until following season); fruiting receptacle 2–3.5(–4) mm diam.; cypselas linear (at least 5 times longer than wide), (1.4–)1.8–2.5 mm long, smooth or (rarely) scabridulous along ribs, 4- or 5-angled with prominent ribs at each of the angles (uncommonly with a finer rib alternating with some or all of the prominent ribs), the ribs extending from the base of the cypselas and terminating in the distal third in the thickened apical portion, hairs antrorse, sparse, appressed, ± 0.4 mm long, extending from base of cypselas to the lower part of the apical process, mostly not inrolled at apex, but sometimes thickened slightly. (Figs 3a, 5d, 7d)

Representative specimens: **AUSTRALIA:** **WESTERN AUSTRALIA:** Muddy Lake, 3.iv.1994, A. Chapman s.n. (PERTH); Quaderwardup Lake, 19.x.1982, G.J. Keighery 5718 (PERTH); Mokine Nature Reserve, 11.12.1987, G.H. Keighery & J.J. Alford 1212 (PERTH); Rocky Pool, Gascoyne River, x.1975, K.F. Kenneally 4682 (PERTH); 5 km NW of Ongerup, 18.xi.1974, K. Newbey 4592 (PERTH). **NORTHERN TERRITORY:** George Gill Range, Lake Cotteril, 8.vii.1968, A.C. Beauglehole 25980 (DNA, MEL); Simpson Desert, Old Andado Homestead, 29.vii.1968, A.C. Beauglehole 27953 (DNA, MEL); Ilparpa Claypans, c. 8 km SSW of Alice Springs, 19.vi.1999, N.G. Walsh 4971 & D.E. Albrecht (MEL). **SOUTH AUSTRALIA:** Gairdner-Torrens Region, SW end of Lake Aicoona, 2.x.1987, R.J. Chimcock 7767 (AD, MEL); Andamooka Rd, c. 8 km N of Roxby Downs-Woomera Rd, 29.ix.2000, C. Daniels s.n. (MEL); Murray Mallee, Canegrass, c. 60 km NNE of

Morgan, 21.ix.1937, *E.H. Ising s.n.* (AD); Flinders Ranges, Lydhurst, c. 30 km N of Copley, 14.xii.1938, *E.H. Ising & H. Mincham s.n.* (AD); Lake Eyre Region, Lake Walkooanie, 15.viii.1987, *J. Reid 1028* (AD). QUEENSLAND: Warrego District, Bulloo River, xi.1896, *F.M. Bailey s.n.* (BRI); Gregory North District, Glenormiston, Lake Idamea, 28.i.1935, *A.C. Boyle s.n.* (BRI); Mitchell District, 30 km N of Longreach, ix.1952, *D. Davidson 291* (BRI). NEW SOUTH WALES: North Far Western Plains, Sturt National Park, Fort Grey, 3.ix.1989, *R.G. Coveny 13480* (AD, BRI, MEL, NSW); North West Plains, Bourke, ix.1889, *L. Henry s.n.* (NSW); South West Plains, Wanganella via Hay, xii.1903, *E. Officer s.n.* (NSW).

Distribution and Conservation Status: Endemic to Australia. Occurs in all mainland States apparently except Victoria (but possibly to be anticipated there in the extreme north-west). Locally common in semi-arid areas between c. 23° and 35° south. Not considered rare or threatened. (Fig. 11)

Habitat: Occurs mostly on clayey soils of shallow, seasonally inundated lakes and depressions in claypans.

Notes: This subspecies resembles *C. thespidioides* in most respects, but differs in the bowl-shaped involucre, the often slightly domed capitula and receptacle, the ribs of the cypselas bearing hairs from the base almost to the apex, and the smooth (rather than scabridulous) apical process. As in *C. thespidioides*, intact fruits are usually retained on plants until long after aerial stems are dead and leaves have fallen. It differs from *C. cunninghamii* in the virtually flat receptacle and flat-topped or slightly domed, bowl-shaped capitula, the strictly annual lifecycle, the harder, more persistent fruiting heads, and the generally larger cypselas with more pronouncedly scabridulous ribs and longer hairs. Very few specimens appear somewhat intermediate between the two species, sometimes due to the juvenility of the specimens, and generally their habitats are distinct, with *C. crateriformis* subsp. *crateriformis* generally associated with more ephemeral wetlands.

A few specimens from the southern parts of the range (e.g. northern Eyre Peninsula, upper Murray River area of South Australia, Narrogin, Qualup areas in Western Australia) appear intermediate with subsp. *compacta* and there may be some intergradation between the two, but there does not appear to be a gradual or clinal difference in features and most plants can be readily placed in one or the other subspecies.

The epithet is from Latin and refers to the bowl-shaped involucre.

9b. *Centipeda crateriformis* subsp. *compacta* N.G. Walsh subsp. nov.

a subspecie typica capitulis fructioribus minoribus mollioribus, cypselis brevioribus, radicibus adventitiis factis libere differt.

Type: Australia, Western Australia, Eucla Division, Esperance district, c. 18 km north-north-west of Young River crossing on Ravensthorpe–Esperance main road, 16.x.1968, *E.N.S. Jackson 1438* (holotype: AD; isotypes: ?CANB (not found), PERTH).

Tufted or loosely mat-forming *perennial* (probably *annual* in adverse conditions), sometimes shortly rhizomatous or producing adventitious roots from lower nodes, to c. 10 cm high, 20 cm diam., commonly several-branched from base, with branches prostrate to suberect, virtually glabrous except for cottony hairs on young apical growth. *Leaves* ± oblong to spatulate, 4–10(–14) mm long, 1–2(–3.5) mm wide, mostly 3–5(–7)-toothed toward apex, or entire. *Capitula* at anthesis bowl-shaped to cup-shaped or sub-globular, domed, rarely flat-topped, 2.5–5 mm diam.; involucre bracts ovate to obovate, 1.5–1.8(–2) mm long, with minutely rinate membranous margins; receptacle slightly convex or flat; female (outer) florets c. 90–150 in (2–)3–6 rows, corollas narrowly cylindrical, 0.4–0.5 mm long; bisexual florets c. 10–21, corollas narrowly funnel-shaped, c. 0.7–0.8 mm long (including lobes c. 0.3 mm long and wide). Fruiting heads, firm, somewhat persistent, but usually disintegrating within the growing season; fruiting receptacle 1.3–1.6(–2.5) mm diam.; cypselas narrowly obcuneoid (less than 5 times longer than

wide) 1–1.7 mm long, scabridulous, rather thick-walled, 4- or 5-angled with prominent ribs at each of the angles, sometimes with 1–3 finer ribs alternating with the prominent ribs, the ribs terminating from the distal quarter to just below the apex of the cypsela into the thickened spongy portion, hairs antrorse, subappressed, 0.2–0.3 mm long, confined to ribs, extending from base of cypsela to \pm two-thirds of cypsela, minutely inrolled or thickened at apex. (Figs 5e, 7e)

Representative specimens: **AUSTRALIA: WESTERN AUSTRALIA:** Lake Cronin, 3.x.1979, *K. Newbey* 6177 (PERTH); Ponier Rock, 14.ix.1980, *K. Newbey* 7309A (PERTH); c. 26 km N of Esperance – Ravensthorpe Rd, 26.ix.1968, *P.G. Wilson* 7950 (PERTH); Scaddan, 28.xi.1974, *E. Wittwer* 1502 (PERTH); Newmans Rock, 12.xi.1976, *E. Wittwer* 1913 (PERTH). **SOUTH AUSTRALIA:** Kangaroo Island, Rocky River near Shackle Road, 6.i.1966, *H. Eichler* 18599 (AD); Eyre Peninsula, E of Lake Gillies Conservation Park boundary, 7.x.1988, *A.G. Spooner* 11194 (AD); Murray Mallee, c. 34 km NE of Overland Corner, 11.x.1965, *D.E. Symon* 3848 (AD); South East, Big Heath National Park, 6.xi.1969, *J.Z. Weber* 1822 (AD); Southern Lofty, 6.5 km SW of Williamstown, 16.v.1979, *L.D. Williams* 10386 (AD). **NEW SOUTH WALES:** South West Slopes, Henty, iv.1942, *E.J. Bennett* 247 (NSW); South West Plains, ‘Miewurlie’ Station, NE of Hay, 22.iii.1990, *M.F. Porteners* 9005077 (NSW); South Far West Plains, Prungle Station, c. 52 km NNE Robinvale, 28.x.1999, *N.G. Walsh* s.n. (MEL). **VICTORIA:** Lowan Mallee, Wyperfeld National Park, Lunar Clearing, 6.x.1968, *A.C. Beauglehole* 28949 & *Corricks* (MEL); Murray Mallee, Lake Carpul, 2.xi.1999, *I.R.K. Sluiter* s.n. (MEL).

Distribution and Conservation Status: This subspecies is endemic to Australia. It occurs in south-western Western Australia, between Balladonia area and Ravensthorpe where apparently rather rare, south-eastern South Australia (Kangaroo Island, Eyre and Fleurieu (and probably Yorke) Peninsulas, Naracoorte-Penola areas) and adjacent areas in far western and north-western Victoria and south-western New South Wales. It is not regarded as rare or threatened. (Fig. 11)

Habitat: Occurs chiefly on shores and drying beds of lakes, claypans, stream-beds, dams, and seasonally inundated swamps and depressions. In south-west WA it is recorded as occurring on wetter soils of granitic outcrops and their peripheries.

Notes: This taxon is distinctive in its leafy, low, compact, rhizomatous and/or stoloniferous habit, and apparent perenniality. Some specimens resemble, in general habit and capitulum shape, southern forms of subsp. *crateriformis* but are distinguished by the smaller, obtuse cypselas with heavily thickened ribs, and, usually, by the freely produced adventitious roots. Some Western Australian plants, particularly those associated with depressions on granite outcrops are distinctive in their dense, domed habit, but this appears to be at least partly a response to environmental conditions. Further collections from this area may prove this form to be worthy of formal recognition. See also notes under subsp. *crateriformis* and *C. aotearoana*.

The subspecific name is Latin and refers to the compact growth habit, particularly in comparison to the typical subspecies.

10. *Centipeda thespidioides* F. Muell., *Fragm.* 8: 143 (1874). *Type:* Australia, ‘Ad flumina Murray’s et Darling’s River et Murrumbidgee’, *F. Mueller* (MEL); ‘ad flumina Finke’s River et Stuart’s Creek’, *J. Macd. Stuart* (MEL) (lectotype, *hic designatus*, ‘On the River Finke’ *J. Macd. Stuart*: MEL 295548).

Annual to c. 20 cm high, typically several-branched from base, with branches ascending to erect, occasionally simple or branched above base only, glabrescent, but usually somewhat cottony in upper axils and just below capitula. *Leaves* \pm oblong, 4–22 mm long, 2–6(–8) mm wide, serrate, glabrous, resin-dotted on both surfaces, concolorous. *Inflorescence* of one, rarely 2, sessile cauline capitulum(a), sometimes terminal on ultimate branchlets, not leaf-opposed, commonly in branch axils. *Capitula* at anthesis cup-shaped to broadly campanulate or broadly obconical, rarely somewhat urceolate, flat-

topped or slightly depressed (rarely very slightly domed), 3–5(–6.5) mm diam.; involucre bracts ovate to obovate, 2–5 mm long, entire or with minutely runcate membranous margins; receptacle slightly concave or flat; female (outer) florets c. 40–80(–120) in 3–5 rows, corollas narrowly cylindrical, 0.6–0.8 mm long; bisexual florets (3–)10–18(–25), corollas narrowly funnel-shaped, c. 0.8 mm long (including lobes 0.2–0.3 mm long and wide). *Fruiting heads* very hard, remaining intact until after stems senesce (sometimes at least until following season); bracts of fruiting heads straight or slightly incurved, spreading to erect, the outer ones thickened and pithy toward base; fruiting receptacle 2.5–3.5 mm diam., with an underlying pith layer extending below base of involucre; *cypselas* linear, 2.2–3.3 mm long, obtuse or truncate at apex, scabridulous along ribs and on apical process, finely 8–16-ribbed (about half of these more prominent than others), the ribs terminating about two-thirds from base of cypselas in a spongy apical process the same width as the body of the cypselas, vesicular trichomes lacking or very sparse, hairs antrorse, c. 0.3 mm long, in 2 rings, one at the base of the cypselas and one at the point of fusion of the ribs into the apical process, some or all of the hairs finely inrolled at the apex. (Figs 5f, 7f)

Representative specimens: **AUSTRALIA: WESTERN AUSTRALIA:** 10 km ENE of Mt Aubrey, 3.v.1995, R.J. Cranfield 9619 (PERTH); Belele Station, NW of Meekatharra, 22.x.1965, D.W. Goodall 3197 (PERTH); 7.5 km E of Malcolm, 14.iv.1986, J. Neden 25 (PERTH); c. 30 km NE of Carnarvon, 30.ix.198, P.G. Wilson 12728 (PERTH). **NORTHERN TERRITORY:** Hamilton Dam near Mt Hay, 21.viii.1932, J.B. Cleland s.n. (AD); NW Simpson Desert, 30.ix.1973, N.M. Henry 979 (AD, DNA); 50 km N of Alice Springs, 30.x.1962, R. Swinbourne 523 (DNA, NSW). **SOUTH AUSTRALIA:** Flinders Range, Between Myrtle Springs & Witchelina, 29.ix.1962, T.R.N. Lothian 1088 (AD); Lake Eyre Basin, Clayton River, Birdsville Track, 8.iv.1997, H.T. Smyth 178 (AD); Near Nappamerie Station, 20.viii.1968, D.E. Symon 5742 (AD); Gairdner Torrens Region, Durkin Outstation, c. 15 km W of Mulgathing, 27.ix.1971, J.Z. Weber 2829 (AD); Eastern, 5 km SE of Strathearn Homestead, 29.viii.1978, L.D. Williams 10028 (AD). **QUEENSLAND:** Maranoa District, 16 km W of St George, 31.viii.1983, H.I. Aston 2454 (BRI, CBG, MEL); Darling Downs, 94 km from Moonie toward Goondiwindi, 11.x.1983, E.M. Canning 5846 & B. Rimes (BRI, CANB, NSW); North Gregory District, Currawilla c. 160 km W of Windorah, 11.vi.1949, S.L. Everist 3961 (BRI, K); Currawinya National Park, NE of Karatta Bore, 21.iii.1997, P.I. Forster 20545 & M. Watson (BRI, DNA, MEL); Warrego District, c. 14 km SW of Eulo, 13.ix.1973, R.J. Henderson H2044 & D.E. Boyland (AD, BRI, K). **NEW SOUTH WALES:** North Far West Plains, Sturt National Park, 4.ix.1989, R.G. Coveny 13515 & B. Wiecek & M. Savio (AD, BRI, NSW); North West Plains, 10.5 km NE of Janbeth Homestead, 26.x.1981, L. Haegi 2108 (AD, NSW); South Far West Plains, Newell Hwy, Balranald, 24.ix.1973, E.J. McBarron s.n. (NSW); South West Plains, 32 km N of Hay, 1.xi.1983, B. Semple 7829 (NSW). **VICTORIA:** Murray Mallee, Annuello, 29.iv.1977, A.C. Beaglehole 55925 (MEL).

Distribution and Conservation Status: This species is endemic to Australia. It occurs in all mainland States, but is rare in Victoria where confined to the north-west. Locally common in inland areas between c. 22° and 35° south. It is not rare or threatened. (Fig. 11)

Habitat: This is principally a species of semi-arid areas, occurring mainly on heavy clayey soils prone to inundation (gilgais, creeklines etc.) in depressions surrounded by halophytic shrublands, and in eucalypt (e.g. *E. coolabah* Blakely & Jacobs) woodlands.

Notes: This species differs from all other species of *Centipeda* in the campanulate to urceolate, flat-topped or slightly depressed capitula, and in the relatively large, scabridulous cypselas that have hairs arranged in 2 rings. A few specimens from north-western New South Wales have scattered hairs between the basal and subapical bands of hairs but the plants are otherwise indistinguishable from typical *C. thespidioides*. They may be the result of hybridisation with *C. crateriformis* subsp. *crateriformis* which occurs in the same area. As with *C. crateriformis* subsp. *crateriformis*, apparently its closest congener, intact fruits are retained on plants until long after aerial stems are dead and leaves have fallen.

Of specimens cited by Mueller in the protologue, only the Stuart collection from the Finke River could be found despite searches at MEL and K. Two other collections mounted as types at MEL are rejected, one (*F. Mueller*, Murrumbidgee R, 1878) was collected

after the description of *C. thespidioides*, the other (*F. Mueller*, Murray River and tributaries, Mildura Station, s.d.) does not exactly match the locality given in the protologue.

Acknowledgements

I am grateful to Phil & Emma Short (DNA), Michael Barrit (Parks and Wildlife Commission, Northern Territory) and Sandy Cochrane (MEL) for assistance with fieldwork; to Dave Albrecht (NT) for both assistance with fieldwork and sharing his perceptive observations of Central Australian taxa; to Peter de Lange (Department of Conservation, Auckland New Zealand) for information on New Zealand taxa; to my colleague Marco Duretto who examined specimens at NOU; to Jeremy Bruhl (NE), to Nicholas Hind (K) and Michael Dillon (F) for sharing their expertise in the group; to ABLOs Don Foreman, Alex Chapman, Bob Chinnock and Rod Seppelt for searching collections and procuring photographs of critical specimens at K and BM; to Peter Neville-Smith and Barbara Meurer-Grimes for information on chemical constituents; to Jocelyn Carpenter (University of Melbourne) for SEM assistance; to illustrators Enid Mayfield (Fig. 2) and Thomas Brosch (Fig. 3); to colleagues Geraldine Jones and Simon Lewis for assistance with imaging; to horticultural staff at Royal Botanic Gardens Melbourne for curation of living collections, and to staff at AD, BRI, CANB, CHR, CONC, DNA, HO, K, L, LAE, NSW, P, PERTH, WELT, UPNG for prompt attendance to loan requests. Two anonymous reviewers made helpful suggestions on drafts of this paper.

This study was supported by an ABRIS grant.

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