Studies in Euphorbiaceae A.L.Juss. *sens. lat.* 4.

A revision of *Monotaxis* Brongn. (Acalyphoideae Ascherson, Ampereae Müll.Arg.)

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Summary

Halford, D.A. & Henderson, R.J.F. (2002). Studies in Euphorbiaceae A.L.Juss., *sens. lat.* 4. A revision of *Monotaxis* Brongn. (Acalyphoideae Ascherson, Ampereae Müll.Arg.). *Austrobaileya* 6(2): 273–292. The endemic Australian genus *Monotaxis* Brongn. is revised. Within *Monotaxis*, two sections and a total of eight species are recognized. *M.* sect. *Monotaxis* is comprised of *M. linifolia* Brongn., *M. occidentalis* Endl., *M. macrophylla* Benth., *M. luteiflora* F.Muell. and *M. tenuis* Airy Shaw, while *M.* sect. *Hippocrepandra* contains *M. bracteata* Nees, *M. grandiflora* Endl. (including *M. grandiflora* Endl. var. *grandiflora* and *M. grandiflora* var. *obtusifolia* F.Muell. & Tate) and *M. paxii* Grüning. All taxa are described and mapped, and notes on their distribution, habitat of occurrence and phenology are given. Lectotypes are chosen for *M. luteiflora* F.Muell., *M. megacarpa* F.Muell., *M. grandiflora* var. *obtusifolia* F.Muell & Tate and *M. paxii* Grüning. Identification keys to species and varieties are provided.

Key words: Euphorbiaceae, *Monotaxis*, Australian flora, taxonomy, nomenclature

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Introduction

Monotaxis Brongn. is a small endemic Australian genus found in all mainland states of the continent except for Victoria with its centre of diversity in south-western Western Australia. The genus was erected by Brongniart (1833) and included a single species, *M. linifolia.* It was based on collections made by Dumont d'Urville from near Port Jackson, New South Wales, in 1824. The name is derived from the Greek *monos*, single, and *taxis*, arrangement, a reference to the single row of stamens in male flowers. Over the subsequent 30 years, seven more species were described as belonging to this genus (Endlicher 1834 & 1837, Klotzsch 1845, Nees 1848, F. Mueller 1864).

In 1865, Müller Argoviensis described the genus *Hippocrepandra*. In his new genus, he included four species, two he renamed *H. neesiana* Müll.Arg. (*nom. illeg.* = *Monotaxis bracteata* Nees) and *H. ericoides* (Klotzsch) Müll.Arg. (= *Monotaxis grandiflora* Endl.), and two new species he named *H. gracilis* and *H. lurida*. Apparently he was unaware of Ferdinand Mueller's *M. megacarpa* of 1864 which would also have come within the circumscription of his new genus. *Hippocrepandra* was distinguished from *Monotaxis* by the habit of plants and the imbricate (quincuncial) calyx of their male flowers. At this time, Müller Argoviensis retained *Monotaxis* as a monotypic genus containing *M. linifolia* with three varieties namely *M. linifolia* var. *genuina* (*nom. inval.* = *M. linifolia* var. *linifolia*), *M. linifolia* var. *tridentata* (based on *M. tridentata* Endl.) and *M. linifolia* var. *occidentalis* (based on *M. occidentalis* Endl.).

Baillon (1866), however, reduced *Hippocrepandra* to a section of *Monotaxis.* Within *Monotaxis*, he recognised two sections, *Monotaxis* sect. *Linidion* (= *Monotaxis* sect. *Monotaxis*) containing a single species, *M. linifolia*, with only two varieties, *M. linifolia* var. *linifolia* and *M. linifolia* var. *occidentalis* (based on *M. occidentalis* Endl.), as well as *Monotaxis* sect. *Hippocrepandra* containing *M. grandiflora* Endl., *M. megacarpa* F.Muell., *M. gracilis*

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(Müll.Arg.) Baill. (based on *Hippocrepandra gracilis* Müll.Arg.), *M. neesiana* (*nom. illeg.* = *M. braceata* Nees) and *M. oldfieldii* Baill. He distinguished these sections on the basis of inflorescence structure, and the number and aestivation of male sepals.

Bentham (1873) followed Baillon in treating *Hippocrepandra* as congeneric with *Monotaxis* and maintained his sectional divisions. He recognized *Monotaxis* sect. *Eumonotaxis* (*nom. inval.* = *Monotaxis* sect. *Monotaxis*) as including *M. linifolia* Brongn. (for which *M. tridentata* Endl. was listed as a synonym), *M. occidentalis* Endl. (for which *M. cuneifolia* Klotzsch was listed as a synonym) and a new species, *M. macrophylla* Benth. For *Monotaxis* sect. *Hippocrepandra* he included *M. grandiflora* Endl. (for which *M. ericoides* Klotzsch and *M. bracteata* Nees were listed as synonyms), *M. megacarpa* F.Muell., *M. gracilis* (Müll.Arg.) Baill. and *M. lurida* (Müll.Arg.) Benth. (for which *M. oldfieldii* Baill. was listed as a synonym).

In the most recent account of *Monotaxis* as a whole, Grüning (1913) also maintained Baillon's two sections and enumerated nine species including a new species *M. paxii* in *M.* sect. *Hippocrepandra*. Two other species of *Monotaxis* have been described since Grüning's publication, namely *M. stowardii* S.Moore (1920) and *M. tenuis* Airy Shaw (1980).

As a result of the present study, only eight species are now recognized in the genus *Monotaxis*. We support recognition of two infrageneric sections as circumscribed by Baillon and followed by Bentham and Grüning, namely *Monotaxis* sect. *Monotaxis* and *M.* sect. *Hippocrepandra*.

Monotaxis is currently classified with *Amperea* in subfamily Acalyphoideae Ascherson and tribe Ampereae Müll.Arg. (Webster 1994). *Amperea* was revised by Henderson (1992) who suggested that perhaps *Monotaxis* and *Amperea* should be united. However, before such major changes are made, detailed studies need to be made of these two taxa, particularly of their leaf and stem anatomy. The retention of these groups as separate genera is supported by differences in anther morphology, and the presence or absence of petals in male flowers respectively.

Methods

The present study involved examination of herbarium specimens by the authors, together with field investigations by the second author from 1988 to 1992. Altogether, approximately 400 specimens have been examined and annotated. These comprise collections from the following herbaria: B, BRI, CANB, K, LD, MEL, NSW and PERTH. The above acronyms and ones used in the text to indicate herbaria holding particular specimens are those given by Holmgren *et al.* (1990). Author abbreviations follow Brummitt & Powell (1992). All specimens cited have been seen unless otherwise indicated (as *n.v.*).

Descriptions of taxa were made from dried herbarium specimens, material preserved in 70% ethanol or dried material reconstituted by placing in boiling water for a few minutes. Measurements listed are based upon the total variation observed in the herbarium specimens examined. Colour of fresh vegetative and floral parts where given are either from herbarium label notes or from photographs taken by the second author during field studies. Plant size, habit, flowering and fruiting times, and habitat data were obtained from herbarium labels. The morphological data for this revision were recorded using the DELTA system (Dallwitz *et al.* 1993). The distribution maps were produced with MapInfo Version 3 and are based on herbarium specimen locality data.

Taxonomy

Monotaxis Brongn., Annal. Sci. Nat. Paris, ser. 1, 29: 386 (1833) and in Duperrey, Voy. monde 224, t.49B (1834) ('1829'). **Type:** *M. linifolia* Brongn.

Hippocrepandra Müll.Arg., Linnaea 34: 61 (1865). **Type:** *H. gracilis* Müll.Arg. (= *M. bracteata* Nees; lectotype designated by Wheeler (1975)).

Monoecious or rarely dioecious, annuals or herbaceous perennials. Stems erect, ascending or decumbent, sparingly to much-branched; branchlets ± terete, smooth, papillose or striate,

hollow or filled with pith. Leaves alternate, subopposite or subwhorled, stipulate, sessile or shortly petiolate; laminae simple, entire or toothed. Stipules entire or deeply lobed, persistent. Inflorescences braceate, of sessile or pedunculate, terminal, head-like, compound cymes. Flowers sessile or on articulate pedicels, gamosepalous; calyx deeply lobed; corolla present or absent; disc present. Male flowers usually numerous per cyme; calyx lobes 4 or 5, valvate or imbricate; petals always present, 4 or 5, clawed, proximally cordate or auriculate with lobes inrolled around adjacent staminal filament; disc of 4 or 5 discrete glands; glands antisepalous, stalked, glabrous or with a tuft of simple hairs distally; stamens 8 or 10(rarely 11); filaments free; anthers 2-celled; anther cells subglobose, free, divergent to pendant on a conspicuous transverse connective, dehiscing by ± longitudinal slits; rudimentary ovary present or absent. Female flowers 1 or many per cyme; calyx lobes 5(or 6), imbricate, persistent, appressed to fruit; petals absent or when present 5, clawed and persistent; disc of 3–10 discrete glands or a continuous ring around ovary; ovary 3-locular, smooth, glabrous; locules uniovulate; ovules pendulous; styles 3, shortly fused at base, spreading, deeply bifid, fimbriate or lobed, persistent. Fruit capsular, ovoid, ellipsoid or subglobose, usually shallowly 3-lobed, smooth or slightly rugose, glabrous, dehiscing septicidally into 3 bivalved segments leaving a persistent columella. Seeds obloid, ellipsoid or ovoid to globose, smooth or rugose, shiny, carunculate.

A genus of 8 species endemic in tropical and temperate Australia.

Key to species of *Monotaxis*

1. Petals of male flowers shorter than sepals 2
   Petals of male flowers longer than sepals 6

2. Annuals or short lived herbaceous perennials to 90 cm high; stems sparingly to much branched, ascending to erect (rarely decumbent), up to 5 mm across; stipules ≥ 0.7 mm long 3
   Herbaceous perennials to 20 cm high; stems sparingly branched, prostrate, decumbent to ascending, up to 0.9 mm across; stipules < 0.7 mm long 5

3. Leaves acute-toothed; inflorescences on slender peduncles 0.2–0.3 mm across ..... **5. M. tenuis**
   Leaves entire or obtuse-toothed; inflorescences on stout peduncles 0.4–0.9 mm across 4

4. Staminal filaments 1.9–2.5 mm long; seeds obloid ..... **4. M. luteiflora**
   Staminal filaments 1.0–1.8 mm long; seeds ellipsoid and slightly dorsi-ventrally flattened ..... **3. M. macrophylla**

5. Stems with smooth longitudinal ridges; petals of male flowers with apex obtuse to rounded ..... **1. M. linifolia**
   Stems with crenate longitudinal ridges; petals of male flowers with apex acute ..... **2. M. occidentalis**

6. Leaf laminae ± flat or somewhat concave; adaxial leaf surface foveate ..... **8. M. paxii**
   Leaf laminae with recurved or revolute margins; adaxial leaf surface ± smooth 7

7. Stems smooth; leaf laminae with revolute margins obscuring abaxial leaf surface except for midrib ..... **7. M. grandiflora**
   Stems smooth or papillose; leaf laminae dark green, with recurved or revolute margins not obscuring all of the abaxial leaf surface ..... **6. M. bracteata**

Monotaxis Brongn. sect. **Monotaxis,** Baill., Adansonia 6: 291 (1866). **Type:** *M. linifolia* Brongn.

Monotaxis sect. *Linidion* Baill., Adansonia 6: 291 (1866), *nom. inval.*

Monotaxis sect. *Eumonotaxis* Benth., Fl. Austral. 6: 78 (1873), *nom. inval.*

Monoecious annuals or short-lived herbaceous perennials; stems hollow. Leaves widely spaced with internodes 20–70 mm long; laminae with margins entire or coarsely toothed, flat or rarely slightly to strongly recurved. Inflorescences sessile or pedunculate. Male flowers 4(rarely 5)-merous; calyx valvate, with sessile glands on abaxial surface; petals shorter than calyx lobes; antisepalous glands glabrous; stamens 8(rarely 10); connective stout; rudimentary ovary absent or rarely present. Female flowers 5(rarely 6)-merous; calyx imbricate, with sessile glands on abaxial surface; petals absent or rudimentary; styles stout, fimbriate.

***Distribution*:** The species of *Monotaxis* sect. *Monotaxis* occur in Western Australia, Northern Territory, South Australia, Queensland and New South Wales.

1. Monotaxis linifolia Brongn., Ann. Sci. Nat. (Paris) 29: 387 (1833); *Monotaxis linifolia* Brongn. var. *linifolia*, Müll.Arg., Linnaea 34: 63 (1865). **Type:** (New South Wales.) Port Jackson, (without date,) *d'Urville* (holo: P).

Monotaxis tridentata Endl., Atakta bot. 8/9, t.8 (1834)('1833'); *Monotaxis linifolia* var. *tridentata* (Endl.) Müll.Arg., Linnaea 34: 63 (1865). **Type:** (New South Wales.) Nova-Hollandia, (without date,) *Sieber* (holo: W; iso: G-DC *n.v.*, microfiche IDC 800-73. 2456: I. 7).

Monotaxis linifolia var. *cuneata* Grüning in A.Engler, Pflanzenr. H.58: 81 (1913). **Type:** New South Wales. Port Jackson, (without date,) *R. Brown* (holo: ?; iso: BM *n.v.* (transparenies at BRI), K).

Monotaxis linifolia var. *genuina* Müll.Arg., Linnaea 34: 63 (1865), *nom. inval.*

Monotaxis linifolia var. *genuina* Grüning in A.Engler, Pflanzenr. H.58: 81 (1913), *nom. inval.*

***Illustrations*:** G. Grüning (1913: 80, fig.13 A-D); T.A. James and G.J. Harden (1990: 405).

Glabrous, monoecious, diffuse, herbaceous perennials to 20 cm high, with few to many stems arising from a rootstock. Stems sparingly branched, decumbent to ascending, up to 0.8 mm across; young branchlets striate, pale green; striae smooth. Leaves subsessile, alternate, subopposite or subwhorled distally on branchlets; stipules triangular, 0.4–0.5 mm long, with apex acute and margins entire, pale green; laminae linear or narrowly elliptic, 5–13 mm long, 0.9–1.5 mm wide, with base attenuate and apex acute, flat with margins entire or sometimes 3-toothed distally and slightly to strongly recurved, smooth adaxially and abaxially, slightly discolorous, crustaceous when dried; midrib slightly impressed adaxially, prominent abaxially. Inflorescence sessile or sometimes pedunculate when peduncles slender, 1–3 mm long and 0.1–0.4mm across; bracts numerous; outer bracts ovate, 0.9–1.1 mm long, with margins entire or toothed distally, pale green. Male flowers 6–9 per cyme; pedicels 1.4–1.7 mm long; calyx lobes ovate-elliptic, 1.3–1.4 mm long, c. 0.7 mm wide, with apex acute to obtuse and margins entire, flat, pale green with maroon coloured mottling; petals reniform, 0.7–0.8 mm long including claw, 0.8–1 mm wide, with base cordate, apex obtuse to rounded and margins entire, white; glands c. 0.1 mm long, glabrous; staminal filaments 0.7–0.8 mm long; anthers 0.2–0.3 mm long; connective tissue 0.2–0.4 mm long; rudimentary ovary present with 1 or 2 erect linear lobes; lobes up to 0.5 mm long. Female flowers 1 per cyme, sessile; calyx lobes ovate, 1–1.4 mm long, 0.7–0.8 mm wide, with apex obtuse and margins ± entire, slightly concavo-convex, green; petals absent; glands 5, 0.7–0.9 mm long; ovary trigonal-globose, c. 1.5 mm across and 1.3 mm long; styles 0.7–1.3 mm long, 2-lobed; lobes c. four-fifths the length of style. Capsule ovoid, 2.3–2.6 mm long, 1.9–2.1 mm across, smooth or ± rugose distally. Seeds not seen. Fig. 1.

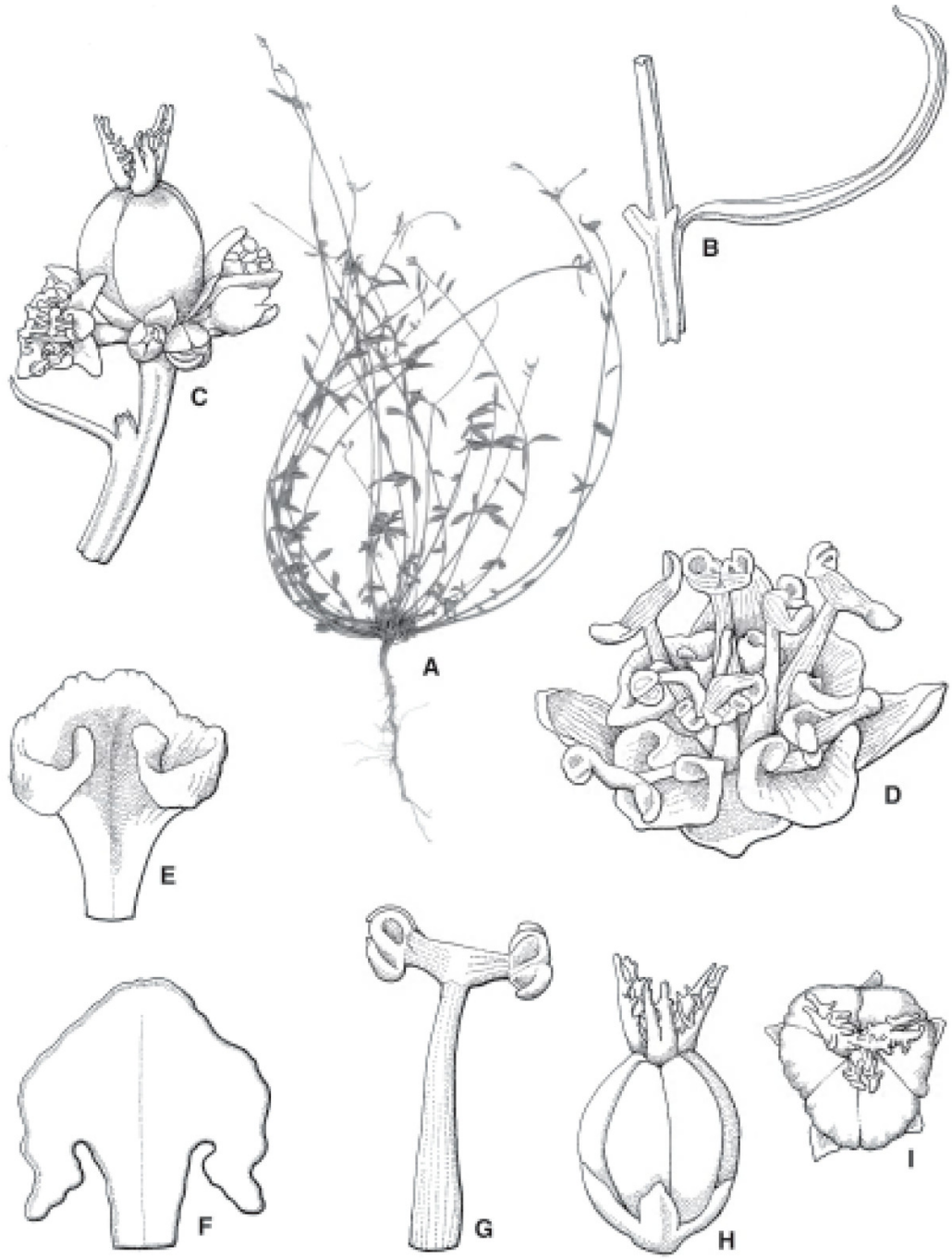

Fig. 1. ***Monotaxis linifolia*.** A. habit. ×0.5. B. section of branchlet with stipule and leaf. ×8. C. flowering branchlet. ×8. D. male flower. ×20. E. adaxial view of petal of male flower. ×40. F. adaxial view of petal of male flower, flattened out. ×40. G. abaxial view of antipetalous stamen. ×40. H. fruit from side. ×8. I. fruit from above. ×8. A–I from *Coveny et al.* 17343 (BRI). Del. W. Smith.

***Selected specimens (from 30 examined)*: Australian Capital Territory.** 0.9 miles (c. 1.4 km) S of Jervis Bay by road on the Wreck Bay Road, Oct 1971, *Coveny* 3770 (NSW); Australian National Botanic Gardens, Jervis Bay Annexe, Aug 1991, *Lyne* 336 & *Rudd* (CANB, MEL, NSW); Jervis Bay, bridge on the Wool road, c. 0.7 miles (1.1 km) SW of Vincentia, Jan 1972, *Berg* RYB698A (CANB). **New South Wales.** Wisemans Ferry road, Gosford, Jan 1926, *Blakely* & *Shiress* (NSW); Tuggerah, Oct 1900, *Boorman* (NSW); Narrow Neck, Katoomba, Dec 1961, *Burgess* (CANB); Katoomba, Dec 1908, *Camfield* (NSW); Pile Road, Somersby Industrial Estate, Sep 1996, *Coveny* 17343 *et al.* (BRI, MEL, NSW); Belrose, Nov 1981, *Coveny* 11063 & *Hind* (NSW); La Perouse, May 1976, *Coveny* 7663 & *Davies* (NSW); DeeWhy Lagoon, c. 10 miles (16 km) NNE of Sydney, Jul 1966, *Coveny* (NSW); Bateau Bay, near The Entrance, Tuggerah Lake, Mar 1970, *Johnson* & *Briggs* BGB3249 (NSW); Mt Ausley, near Wollongong, Nov 1949, *McBarron* 4079 (NSW); 3 miles (c. 4.8 km) S of Audley, Royal National Park, Mar 1971, *O'Hara* & *Coveny* 3558 (NSW); 1.35 km ESE of Nerriga, Sep 1971, *Pickard* 1673 (NSW); Royal National Park, Sir Bertram Stevens Drive, Sep 1986, *Rodd* 5610 *et al.* (NSW); 10 miles (c. 16 km) SE of Robertson, Oct 1943, *Rodway* (NSW); Mount Pigeon House, Milton, Nov 1917, *Rodway* (NSW); Cowan Station-Jerusalum Bay, Nov 1954, *Salasoo* 1243 (NSW); Budawang Range, Mt Currockbilly, Dec 1973, *Sikkes* & *Telford* BR402 (BRI, CANB, NSW).

***Distribution and habitat*:** *Monotaxis linifolia* is confined to subcoastal and coastal areas of New South Wales and the Australian Capital Territory, from Tuggerah Lake southwards to Budawang Range (Map 1). It is recorded as growing in heathland, mallee and open eucalypt forest communities, on mostly damp sandy soils overlying sandstone, on creek banks, hillslopes and ridges.

***Phenology*:** Flowers have been collected throughout the year, particularly from September to December, fruits in November and January.

***Notes*:** *Monotaxis linifolia* is most closely related to *M. occidentalis* but differs from that by its smooth rather than crenate longitudinal ridges on the stems, its petals in male flowers obtuse to rounded rather than acute at the apex, and having a rudimentary ovary present in male flowers.

2. Monotaxis occidentalis Endl., Enum. pl. 19 (1837); *Monotaxis linifolia* var. *occidentalis* (Endl.) Müll.Arg., Linnaea 34: 63 (1865). **Type:** (Western Australia.) Swan River, (without date,) (*K.A.A.F.*) *Hügel* (holo: W *n.v.* (transparencies at BRI)).

Monotaxis cuneifolia Klotzsch in Lehm., Pl. Preiss. 1: 176 (1845). **Type:** (Western Australia.) Guildford, Perth, 14 Sep 1839, *L. Preiss* 1222 (holo: LD; iso: K (ex herb. Benth.), G-DC *n.v.*, microfiche IDC 800-73. 2456: I. 8, MEL [MEL2065969, MEL2065971, MEL2062924 (ex herb. Sonder)]).

Glabrous, monoecious, diffuse to compact, herbaceous perennials to 20 cm high, with few to many stems arising from a rootstock. Stems sparingly branched, prostrate or ascending, up to 0.9 mm across; young branchlets striate, pale green; striae crenate. Leaves petiolate, mostly alternate or subopposite distally on branchlets; stipules triangular, 0.2–0.5 mm long, with apex acute and margins entire, red-brown; petiole c. 0.5 mm long, plano-convex in transverse section; laminae narrowly obovate to obovate or narrowly elliptic to broadly elliptic or rarely ovate, (2.3–)6–12 mm long, 1–3 mm wide, with base cuneate or rarely truncate and apex acute and shortly apiculate, flat, with margins entire and slightly recurved, smooth adaxially and abaxially, ± concolorous, crustaceous and somewhat wrinkled when dried; midrib obscure adaxially, prominent abaxially. Inflorescence sessile; bracts numerous; outer bracts ovate to broadly ovate, 0.7–1 mm long, with margins entire, brown. Male flowers 4–9 per cyme; pedicels 0.5 to 0.9 mm long; calyx lobes narrowly ovate or ovate-elliptic, 1.1–1.6 mm long, 0.5–0.8 mm wide, with apex acute to shortly acuminate and margins entire, ± flat but slightly recurved distally, of unknown colour when fresh; petals ovate to broadly ovate, 0.8–1.2 mm long including claw, 0.7–0.9 mm wide, with base deeply cordate, apex acute and margins entire, coarsely toothed or somewhat undulate, white; glands up to 0.2 mm long, glabrous; staminal filaments 0.6–1 mm long; anthers c. 0.2 mm long; connective tissue c. 0.2 mm long; rudimentary ovary absent. Female flowers 1 or 2 per cyme, sessile; calyx lobes narrowly ovate to ovate, 1.2–1.5 mm long, 0.5–0.6 mm wide, with apex acute to shortly acuminate and margins entire, concavo-convex, of unknown colour when fresh; petals absent; glands forming a continuous deeply 5–9-lobed ring, with lobes 0.5–0.7 mm long; ovary trigonal-ellipsoid, 0.7–1 mm across and 1–1.2 mm long; styles 1.0–

1.3 mm long, deeply 2-lobed; lobes four-fifths the length of style. Capsule ovoid, 2–3.2 mm long, 1.5–1.9 mm across, ± rugose distally. Seeds obloid, 1.1–1.6 mm long, 0.6–0.8 mm wide, 0.5–0.6 mm deep; testa smooth, brown; caruncle sagittate in outline, 0.4–0.5 mm long, 0.4 mm across, white.

***Selected specimens (from 24 examined)*: Western Australia.** Guildford, Sep1901, *Andrews* (PERTH); Dwellingup, Nov 1942, *Burbidge* (PERTH); 8 km N of Bullsbrook, Nov 1984, *Cranfield* 5025 (PERTH); Gravel Reserve, Howell Road, off South Coast Highway, W of Albany, Oct 1990, *Croxford* 1 (BRI); Gnangarra, Oct 1945, *Gardner* (PERTH); Pinjarra, Murray River, Sep 1897, *Helms* (PERTH); Bow River, Nov 1912, *Jackson* (NSW); 3 miles (c. 5 km) SE of Bunbury on Boyanup road, Jan 1970, *Keighery* 988 (PERTH); Lowden, 1909, *Koch* 1946 (MEL, PERTH); Kelmscott, Dec 1900, *Morrison* (BRI); Yallingup National Park, Jul 1974, *Orchard* 4314 (CANB, PERTH); Northcliffe-Pemberton district, Oct 1962, *Phillips* 2595A (CANB); Marriott Road between Brunswick and Rosamel, Middle Wellesley River, Dec 1974, *Pullen* 9839 (CANB, PERTH); c. 10 km W of Cookernup, Dec 1974, *Pullen* 9834 (CANB); 15 miles (c. 24 km) W of Gingin, Dec 1953, *Royce* 4725 (PERTH); 5 miles (c. 8 km) SW of Nannup, Sep 1966, *Scrymgeour* 1207 (PERTH); 11 miles (c. 18 km) along Stewart Road towards Augusta, Oct 1966, *Scrymgeour* 1610 (PERTH); Jandakot Marsupial Breeding Station, Lake Banganup, Oct 1974, *Weston* 9760 (PERTH); Scott River, Dec 1978, *Wittwer* W2251 (CANB, PERTH).

***Distribution and habitat*:** *Monotaxis occidentalis* is confined to the south-west of Western Australia where it occurs in coastal to subcoastal areas from near Gingin southward to the Bow River area and east to Walpole (Map 2). It is recorded as growing in heathland, *Banksia* and *Casuarina* woodland, and *Eucalyptus marginata* and *Casuarina* woodland communities, on grey or white sandy soils on sand plains, rarely on gravelly loam soils. It is also recorded in *Melaleuca* woodland communities in swampy areas on black peaty or clayey sands.

***Phenology*:** Flowers and fruits have been collected from September to January.

***Notes*:** *Monotaxis occidentalis* is the only species in *M.* sect. *Monotaxis* that occurs in Western Australia. It is most closely related to *M. linifolia* in eastern Australia. For differences from *M. linifolia*, refer to notes under that species.

Typical specimens of *M. occidentalis* have a diffuse habit and narrowly obovate to obovate or narrowly elliptic to broadly elliptic leaf laminae measuring 6–12 mm long. The collections *Phillips* 2595A (CANB), *Jackson* [NSW273987](NSW), *Scrymgeour* 1610 (PERTH) and *Croxford* 1 (BRI) from between Augusta and Walpole have a smaller, compact habit and smaller, ovate leaf laminae which are only 2–3 mm long. This variation may be worth formal recognition and warrants further field studies of this taxon.

3. Monotaxis macrophylla Benth., Fl. Austral. 6: 79 (1873). **Type:** (New South Wales/ Queensland.) summit of Mount Danger, Moreton Bay, (without date,) *A. Cunningham* (holo: K *n.v.* (cibachrome at BRI)).

***Illustrations*:** G.M. Cunningham *et al.* (1982: 459); T.A. James and G.J. Harden (1990: 404).

Glabrous, monoecious, fruticose annuals or short-lived herbaceous perennials to 90 cm high, with few to many stems arising from base. Stems sparingly to much branched, ascending to erect, up to 4 mm across; young branchlets smooth, pale green or purplish green. Leaves petiolate, mostly alternate or subopposite or subwhorled distally on branchlets; stipules subtriangular, 0.9–1.5 mm long, with apex acuminate and margins with irregular gland-tipped lobes, pale yellow to white; petiole 1–5 mm long, concavo-convex in transverse section; laminae ovate or narrowly obovate to obovate, (6–)10–35 mm long, (1.5–)2–15 mm wide, with base attenuate and apex acute to obtuse and minutely apiculate, flat, with margins entire or coarsely toothed distally with obtuse-tipped teeth, smooth adaxially and abaxially, discolorous, chartaceous and smooth when dried; midrib slightly impressed adaxially, prominent abaxially. Inflorescence sessile or pedunculate when peduncles stout, up to 25 mm long and 0.5–0.8 mm across; bracts numerous; outer bracts ovate, c. 0.8 mm long, with margins entire, yellow. Male flowers 3–14 per cyme; pedicels 1.5–3.5 mm long; calyx lobes ovate, ovate-elliptic or elliptic, 1.2–1.7 mm long, 0.7–1.1 mm wide, with apex acute and margins entire, keeled distally, yellow; petals reniform, 0.5–1.1 mm long including claw, 0.8–1.3 mm wide, with base

deeply cordate, apex rounded but sometimes notched and margins entire or undulate, white; glands 0.2–0.3 mm long, glabrous; staminal filaments 1.1-1.7 mm long; anthers 0.2–0.3 mm long; connective tissue 0.1–0.2 mm long; rudimentary ovary absent. Female flowers 1 or 2 per cyme, sessile; calyx lobes ovate to broadly ovate, 1–1.3 mm long, 0.7–0.9 mm wide, with apex acute and margins entire, concavo-convex, yellow; petals absent; glands 3–5, 0.3–0.4 mm long; ovary trigonal-globose, c. 1.7 mm across and 1.4 mm long; styles 0.9–1.2 mm long, 2-lobed; lobes c. half the length of style. Capsule ovoid, 3–4 mm long, 2.9–3 mm across, smooth. Seeds obloid, 1.8–2 mm long, 1.2–1.3 mm wide, 0.9–1 mm deep; testa smooth, brown to black; caruncle hemispherical, 0.3–0.6 mm long, 0.6–0.7 mm across, white or pale red. Fig. 2.

***Selected specimens (from 56 examined)*: Queensland.** Mitchell District: near Red Gorge, White Mountains National Park, Jun 1992, *Bean* 4579 (BRI); 41 km N of Torrens Creek, May 1993, *Thompson & Turpin* HUG260 (BRI). Leichhardt District: Mt Zamia EP, just W of Springsure, Nov 1993, *Bean* 6912 (BRI). Port Curtis District: Amos road, N of Mullet Creek, NW of Bundaberg, Aug 1996, *Bean* 10542 (BRI, NSW). Burnett District: Abbeywood, NNE of Proston, May 1996, *Bean* 10281 (BRI); 2.5 km W of "Toondahra" Homestead, base of Mt Lorna, Sep 1985, *Forster* PIF2225 (BRI). Wide Bay District: Mt Tinbeerwah, c. 5 miles (8 km) W of Tewantin, Jan 1970, *Henderson* H538 (BRI); 2 km SE of Woodgate, Nov 1993, *Bean* 7040 (BRI, NSW); Kinkuna National Park, SE of Bundaberg on southern boundary of park, Apr 1994, *Brushe* JB770 (BRI); Mt Walsh summit, Mt Walsh National Park, Aug 1996, *Forster* PIF19547 *et al.* (BRI); Elliott River, on main road S of Bundaberg, Jul 1958, *Gittins* (BRI); Mt Tinbeerwah, about 6 km W of Tewantin, Jan 1989, *Sharpe* 4841 (BRI); Mt Tinbeerwah, May 1969, *Smith* (BRI). Darling Downs District: 1.6 miles (C.2.6km) S of Miles, Mar 1994, *Bean* 7578 (BRI, MEL); Miles, Jun 1946, *Webb* 1160 & *White* (BRI). Moreton District: Canungra Army Reserve, Sep 1994, *Forster* PIF15777 (BRI, NSW). **New South Wales.** Hermitage Plains, Cobar District, Jul 1903, *Bauerlen* (NSW); c. 0.9 km SE of the confluence of Burra Creek and Oulla Creek, Jan 1991, *Albrecht* 4698 & *Westaway* (MEL); Deua National Park, Burra Creek, 1.5 km due ESE of the confluence of Burra and Coondella Creeks, Jan 1993, *Albrecht* 5307 (MEL).

***Distribution and habitat*:** In Queensland, *M. macrophylla* occurs from near Rockhampton southwards to the McPherson Range, with isolated populations near Hughenden and Springsure. *M. macrophylla* also occurs in isolated occurrences in New South Wales from Howell, Cobar and Batemans Bay districts (Map 3). In coastal areas, it is recorded as growing in heathland, *Banksia* woodland and open *Eucalyptus* forest communities, on deep white sandy soils. In subcoastal and inland areas, it is recorded as growing in heathland and *Eucalyptus* woodland and open forest communities, on shallow sandy or red loam soils, on stony ridges, rocky mountain slopes, and sandstone gorges and plateaux. It is also recorded as growing in areas subject to disturbance such as cultivation and along firebreaks.

***Phenology*:** Flowers and fruits have been collected throughout the year.

***Notes*:** *Monotaxis macrophylla* is closely related to *M. luteiflora* and *M. tenuis*. It differs from *M. luteiflora* in its longer staminal filaments (1.9–2.5 mm long as compared with 1.0–1.8 mm long) and obloid rather than ellipsoid seeds. *M. macrophylla* generally has green leaves, although sometimes with a purplish tinge, while *M. luteiflora* has yellowish green leaves. *Monotaxis macrophylla* differs from *M. tenuis* in its robust habit, fleshier leaves, entire or obtuse-toothed rather than acute-toothed leaves and stouter peduncles (0.5–0.8 mm across as compared with 0.2–0.3 mm across).

There is considerable variation in the size of the leaves and degree of division of the leaf margins of this species as circumscribed here. The collections *Henderson* H538 (BRI) from the Wide Bay District, *Bean* 7578 (BRI) and *Webb* 1160 & *White* (BRI) from the Darling Downs District and *Thompson & Turpin* HUG260 (BRI) from the Mitchell District all have comparatively very small entire leaves (6–10 mm long, 1.5–2.0 mm wide) and the stems are much more intricately branched than are those in other variants of this species. However, these variations tend to intergrade and are not considered worthy of formal recognition.

4. Monotaxis luteiflora F.Muell., Fragm. 10: 51/ 52 (1876). **Type:** (Western Australia.) Victoria Spring, (in 1875,) *J. Young* (lecto, here chosen: MEL [MEL2065966]).

***Illustrations*:** G. Grüning (1913: 80, fig. 13 E); A. Kalotas (1981: 191, fig. 217); J.Z. Weber (1986: 758, fig. 405).

Fig. 2. ***Monotaxis macrophylla*.** A. habit. ×0.4. B. section of branchlet with stipule and leaf. ×16. C. flowering branchlet. ×4. D. male flower. ×16. E. adaxial view of petal of male flower. ×30. F. adaxial view of petal of male flower, flattened out. ×30. G. abaxial view of antipetalous stamen. ×30. H. fruit from side. ×12. I. fruit from above. ×12. A from *Smith* [AQ316165] (BRI); B, C from *Bean* 10542 (BRI); D–G from *Henderson* H3206 (BRI); H, I from *Francis* [AQ204098] (BRI). Del. W. Smith.

Glabrous, monoecious, fruticose annuals or possibly short-lived herbaceous perennials to 60 cm high, with few to many stems arising from the base. Stems sparingly to much-branched, ascending to erect or sometimes decumbent, up to 4 mm across; young branchlets smooth, their colour when fresh unknown. Leaves petiolate, alternate or subopposite or subwhorled distally on branchlets; stipules triangular, 1.5–2.5 mm long, with apex acute to acuminate and margins with irregular, gland-tipped lobes, pale yellow; petiole 2–15 mm long, concavo-convex in transverse section; laminae narrowly elliptic to elliptic, narrowly ovate or narrowly obovate, 15–50 mm long, 3–14 mm wide, with base attenuate and apex obtuse, flat, with margins entire or coarsely toothed distally with obtuse-tipped teeth, smooth adaxially and abaxially, discolorous, crustaceous and somewhat wrinkled when dried; midrib impressed adaxially, prominent abaxially. Inflorescence sessile or pedunculate when peduncles stout, 3–30 mm long, 0.7–0.9 mm across; bracts numerous; outer bracts broadly ovate, 1.4–2 mm long, with margins entire, yellow. Male flowers 3–22 per cyme; pedicels 2.2–5 mm long; calyx lobes narrowly ovate or ovate-elliptic, 1.9–2.4 mm long, 1–1.2 mm wide, with apex acute and margins entire, slightly keeled distally, yellow; petals reniform, 0.8–1.3 mm long including claw, 1.4–1.8 mm wide, with base deeply cordate, apex rounded and notched and margins entire, white or yellow; glands 0.1–0.2 mm long, glabrous; staminal filaments 1.9–2.5 mm long; anthers 0.2–0.3 mm long; connective tissue 0.1–0.2 mm long; rudimentary ovary absent. Female flowers 1–3(–6) per cyme, subsessile; calyx lobes broadly ovate or suborbicular, 1.2–1.8 mm long, 1.2–1.8 mm wide, with apex obtuse and margins entire or undulate, flat, yellow; petals absent or rarely present as minute rudimentary lobes; glands 5, up to 0.4 mm long; ovary trigonal-globose, 1.1–1.6 mm across and 1.3–1.6 mm long; styles 1–1.5 mm long, 2-lobed; lobes c. half the length of style. Capsule subglobose, 2.7–3.2 mm long, 2.7–3 mm across, smooth. Seeds ellipsoid, slightly dorsi-ventrally flattened, 1.8–1.9 mm long, 1.4–1.5 mm wide, 1.1–1.4 mm deep; testa smooth, brown; caruncle hemispherical, 0.4–0.6 mm long, 0.5–0.7 mm across, white or pale red.

***Selected specimens (from 42 examined)*: Western Australia.** 36 miles (c. 58 km) N of Wiluna, Sep 1973, *Beard* 6557 (NSW, PERTH); 5 km N of Gary Junction-Well 35 track along Billiluna track, May 1979, *George* 15659 (CANB, PERTH); No 16 Well, Canning Stock Route, May 1968, *de Graaf* 174 (PERTH); 70 km E of Calvert Range, Jun 1984, *Morse* 212 (CANB, PERTH); 40 km NE of Earaheedy HS (Homestead), Sep 1979, *Toelken* 6265 (MEL); 76 miles (c.122 km) N of Sandstone, Jul 1963, *George* 5649 (PERTH); c. 45 km E of Milbillillia Homestead on Barwidgee road, May 1978, *Craven* 5371 (CANB); 30 miles (c. 48 km) N of Wiluna, Sep 1957, *Speck* 832 (CANB, PERTH); 62 miles (c. 100 km) N of Agnew on road to Wiluna, Aug 1963, *Aplin* 2398 (MEL, PERTH); 48 km N of Leonora, Sep 1939, *Blackall* 4118 (PERTH); Comet Vale, Sep 1927, *Gardner* 2157 (PERTH); c. 35 km W of Plumridge Lakes, 8.5 km WNW of Salt Creek airstrip, Sep 1979, *Crisp* 5834 *et al.* (CANB); Officer Basin, Nov 1986, *Pearson* 130 (PERTH); 9 miles (c.14 km) W of Coolgardie, Sep 1962, *Phillips* [CBG038821] (CANB); 5.2 km W of Zanthus, Oct 1986, *Keighery & Alford* 908 (PERTH); Panton (Ponton) Creek, 144 miles (c. 232 km) E of Kalgoorlie, Jun 1974, *Aplin* 5718 & *Trudgen* (CANB, PERTH). **Northern Territory.** Hasst Bluff Station, Dec 1977, *Latz* 7515 (BRI); Talipata East, W of Haast Bluff, Dec 1977, *Latz* 7533 (BRI). **South Australia.** 2 km NW (of) Victory Well, The Everard Ranges, May 1991, *Latz* 11890 (AD); Mount Illbillee, The Everard Ranges, Sep 1968, *Spooner* 121 (AD).

***Distribution and habitat*:** *Monotaxis luteiflora* is confined to the central and southern inland areas of Western Australia from the Great Sandy Desert southwards to Zanthus, with disjunct populations in southern Northern Territory on Haast Bluff Station and in The Everard Ranges in the Far North West district of South Australia (Map 4). It is recorded as growing in *Triodia* grassland, shrub steppe and mallee communities, on red sandy soils, on plains and dunefields, and was frequently noted to occur in areas regenerating after fire (*Speck* 832 (CANB, PERTH), *Latz* 7522 (BRI), *Beard* 6557 (NSW, PERTH), *Latz* 11890 (AD)). At Haast Bluff, *M. luteiflora* has been collected from along a small watercourse and the upper slopes of quartzite hills.

***Phenology*:** Flowers and fruits have been collected from May to November, with occasional collections from February and March.

***Typification*:** Mueller (1876) cited two collections in the protologue of *M. luteiflora*, viz. "Ad Victoria-Spring et Ularing: Young". We have located three sheets that are relevant, viz. East of Ularing, 10-15 Oct 1875, *Young* [MEL2065961] (MEL); Victoria Springs, *Young* [MEL2065966](MEL); East of Ularing,

1875, *Young* (K). The sheet MEL2065966 at MEL is here chosen as the lectotype of the name *M. luteiflora* because it is the most complete of the three having both leaves and flowers still attached to the branchlets.

***Notes*:** *Monotaxis luteiflora* is most closely related to *M. macrophylla* and *M. tenuis*. It differs from *M. macrophylla* in its shorter staminal filaments (1.0–1.8 mm long as compared with 1.9–2.5 mm long) and ellipsoid rather than obloid seeds. *M.luteiflora* has generally yellowish green leaves while *M. macrophylla* has mostly green leaves. *Monotaxis luteiflora* differs from *M. tenuis* by its robust habit, more fleshy leaves, entire or obtuse-toothed rather than acute-toothed leaves and stouter peduncles (0.7–0.9 mm across as compared with 0.2–0.3 mm across).

5. Monotaxis tenuis Airy Shaw, Muelleria 4: 239 (1980). **Type:** Northern Territory. 41 miles (c. 65 km) NE of Pine Creek, 25 Jul 1971, *M.M.J. van Balgooy & N. Byrnes* 1358 (holo: K; iso: CANB).

Glabrous, monoecious, diffuse annuals to 60 cm high, with a single stem at the base. Stems sparingly to much branched, ascending to erect, up to 5 mm across; young branchlets smooth, pale green to greenish yellow. Leaves petiolate, alternate or subopposite or subwhorled distally on branchlets; stipules triangular, 0.8–1.5 mm long, with apex acuminate and margins with irregular, gland-tipped lobes, white to pale yellow; petiole 2–17 mm long, concavo-convex in transverse section; laminae narrowly ovate, narrowly obovate or narrowly elliptic, 12–50 mm long, 4–13 mm wide, with base attenuate to cuneate and apex acute to obtuse, flat with margins coarsely toothed with acute-tipped teeth, smooth adaxially and abaxially, discolorous, chartaceous when dried; midrib impressed adaxially, prominent abaxially. Inflorescence sessile or pedunculate with peduncles slender, up to 40 mm long and 0.2–0.3 mm across; bracts numerous; outer bracts ovate to broadly ovate, 1–1.2 mm long, with margins entire or toothed, greenish yellow. Male flowers 3–11 per cyme; pedicels 1.3–2 mm long; calyx lobes ovate-elliptic, 0.9–1.5 mm long, 0.5–0.9 mm wide, with apex acute and margins entire, slightly keeled distally, greenish yellow or white; petals reniform, 0.6–0.9 mm long including claw, c. 1 mm wide, with base deeply cordate, apex rounded and margins entire, white or pale yellow; glands c. 0.1 mm long, glabrous; staminal filaments 1.1–1.5 mm long; anthers 0.1–0.2 mm long; connective tissue up to 0.1 mm long; rudimentary ovary absent. Female flowers 1 or 2 per cyme, sessile or shortly pedicellate when pedicels c. 0.1 mm long; calyx lobes narrowly ovate to ovate, 1.1–1.7 mm long, 0.5–1 mm wide, with apex acute and margins ± entire, concavo-convex, greenish yellow; petals absent; glands up to 5, 0.3–0.6 mm long; ovary trigonal-ellipsoid, 1.4–1.6 mm across and 1.5–2.1 mm long; styles 1–1.4 mm long, 2-lobed; lobes c. two-thirds the length of style. Capsule ellipsoid, 3–3.5 mm long, 2.5–2.7 mm across, ± smooth. Seeds obloid to ellipsoid, slightly dorsi-ventrally flattened, 1.8–2.1 mm long, 1.2–1.4 mm wide, 0.8–1 mm deep; testa smooth, brown; caruncle sagittate in outline, c. 0.5 mm long, c. 0.6 mm across, pinkish white.

***Selected specimens (from 19 examined)*: Western Australia.** Mitchell River, Feb 1980, *Dunlop* 5290 (PERTH). **Northern Territory.** Mt Brockman, Feb 1977, *Barnett & Azzoardi* 49 (CANB); Kakadu National Park, Upper Gimbat Creek, Apr 1990, *Cowie* 1154 & *Leach* (MEL); 23.5 km WSW of Twin Falls, May 1980, *Craven* 6206 (CANB, MEL); 1 km S of Twin Falls, May 1980, *Craven* 5805 (CANB); Kakadu National Park, Apr 1990, *Dunlop* 8569 & *Munns* (BRI); Deaf Adder Gorge, Feb 1977, *Dunlop* 4433 (CANB, NSW); East Alligator River area, Mar 1973, *Dunlop* 3423 (BRI); Ikoymarrwa Lookout, 70 km NE of Pine Creek, Kakadu National Park, Apr 1992, *Halford* Q1163 (BRI); Baroalba Springs, Kubarra, Kakadu National Park, Apr 1992, *Halford* Q1106 (BRI); Mt Brockman Outlier, 15 km SE of Jabiru, Apr 1989, *Johnson* 4800 (BRI); c. 31 miles (50 km) ENE of Mudginbarry HS (Homestead), Feb 1973, *Lazarides* 7774 (BRI, NSW); 15.5 km SW of Twin Falls, May 1980, *Lazarides* 9113 (CANB); 2-3 miles (c. 3-5 km) N (of) El Sharana, Jan 1973, *Martensz & Schodde* AE561 (CANB); UDP Falls, near El Sharana, Jan 1973, *McKean* B866 (BRI, CANB).

***Distribution and habitat*:** *Monotaxis tenuis* occurs in the Mitchell River area of the Kimberley region, Western Australia, and in Kakadu National Park, Northern Territory (Map 5). It is recorded from seasonally moist sandy habitats on sandstone outcrops.

***Phenology*:** Flowers and fruits have been collected from January to April.

***Notes*:** Airy Shaw (1980) recorded *Monotaxis tenuis* as occurring in south-east Queensland, based on a collection by C.T. White from near Canungra (*White* 11051). Examination of BRI holdings of this collection shows it to be *M. macrophylla*.

Monotaxis tenuis is most closely related to *M. macrophylla* and *M. luteiflora*. It differs from both these species by its slender habit, thinner textured, acute-toothed (as opposed to entire or obtuse-toothed) leaves and slender peduncles 0.2–0.3 mm (as compared with 0.4–0.9 mm) across.

Monotaxis sect. **Hippocrepandra** (Müll.Arg.) Baill., Adansonia 6: 291 (1866). **Type:** *M. gracilis* (Müll.Arg.) Baill. (= *M. bracteata* Nees)

Monoecious or dioecious, herbaceous perennials; stems filled internally with spongy parenchyma tissue. Leaves crowded with internodes 1–20 mm long; laminae with margins entire, mostly revolute. Inflorescences sessile. Male flowers 5-merous; calyx imbricate, without glands on abaxial surface; petals present, longer than calyx lobes; antisepalous glands with terminal tuft of simple hairs; stamens 10(rarely 11); connective slender; rudimentary ovary present. Female flowers 5(rarely 6)-merous; calyx imbricate, without glands on abaxial surface; petals present, longer than calyx lobes; styles slender, with numerous linear lobes abaxially.

***Distribution*:** The species of *Monotaxis* sect. *Hippocrepandra* are confined to south-western Western Australia.

6. Monotaxis bracteata Nees in Lehm., Pl. Preiss. 2: 230 (1848); *Hippocrepandra neesiana* Müll.Arg., Linnaea 34: 62 (1865), *nom. illeg.*; *Monotaxis neesiana* Baill., Adansonia 6: 293 (1866), *nom. illeg.* **Type:** (Western Australia.) York, 12 Sept 1839, *L. Preiss* 1219 (holo: LD; iso: G-DC *n.v.*, microfiche IDC 800-73. 2455: III. 5, MEL [MEL2065970, MEL2062922 (ex herb. Sonder)]).

Monotaxis megacarpa F.Muell., Fragm. 4: 143 (1864). **Type:** (Western Australia.) Murchinson River, (without date,) *A.F. Oldfield* (lecto, here chosen: MEL [MEL2065964]; isolecto: K (ex herb. Hook.); MEL [MEL2065963]).

Hippocrepandra gracilis Müll.Arg., Linnaea 34: 62 (1865); *Monotaxis gracilis* (Müll.Arg.) Baill., Adansonia 6: 293 (1866); *Monotaxis gracilis* Müll.Arg. var. *gracilis*, Grüning in A. Engler, Pflanzenr. H.58: 83/84 (1913). **Type citation:** (Western Australia.) "Ad Swan River (*Drummond* ser.3. n.18)" (holo: G-DC *n.v.*, microfiche IDC 800–73. 2455: III. 4; iso: K (2 sheets), PERTH).

Hippocrepandra lurida Müll.Arg., Linnaea 34: 61/ 62 (1865); *Monotaxis lurida* (Müll.Arg.) Benth., Fl. Austral. 6: 80 (1873). **Type:** (Western Australia.) Swan River, (without date,) *J. Drummond* ser.6. n.87 (holo: G-DC *n.v.*, microfiche IDC 800–73. 2455: III. 3; iso: K; MEL [MEL2065967]).

Monotaxis oldfieldii Baill., Adansonia 6: 293 (1866). **Type:** (Western Australia.) Murchison river, (without date,) *A.F. Oldfield* (holo: MEL [MEL2065962]; iso: K, MEL [MEL2065968]).

Monotaxis gracilis var. *virgata* Grüning in A. Engler, Pflanzenr. H.58: 83/84 (1913). **Type:** Western Australia. Watheroo Rabbit Fence, Sep 1905, *M. Koch* 1457 (syn: ? *n.v.*; isosyn: K (2 sheets), MEL [MEL2065960], NSW, PERTH); Western Australia. Victoria, Greenough River Crossing, (without date,) *Diels* 3297a (syn: ? *n.v.*).

Monotaxis stowardii S.Moore, J. Linn. Soc., Bot, 45: 192/193 (1920). **Type:** Western Australia. Traying, in 1917, *F. Stoward* 292 (holo: BM *n.v.* (transparenies at BRI); iso: MEL [MEL2065965]).

Monotaxis gracilis var. *genuina* Grüning in A.Engler, Pflanzenr. H.58: 84 (1913), *nom. inval.*

***Illustration*:** G. Grüning (1913: 83, fig.14 A), as *M. gracilis* var. *virgata.*

Glabrous, monoecious or sometimes apparently dioecious, compact herbaceous perennials to 50 cm high, with few to many stems arising from a single rootstock. Stems sparingly to much branched, ascending to erect, up to 4 mm across; bark spongy, fissured, dull greyish white; young branchlets smooth or papillose, reddish brown. Leaves petiolate or subsessile, alternate; stipules narrowly triangular to subulate, 0.3–2 mm long, erect, mostly entire or sometimes unequally 2(to 4)-fid, red-brown; petiole up to 0.8 mm long, plano-convex in transverse section; laminae lanceolate, narrowly ovate, narrowly elliptic, narrowly oblong-elliptic or lorate, (5–)8–30 mm long, (0.6–)3–6 mm wide, with base obtuse or cuneate and apex acute to obtuse with short apiculum, ± flat with margins entire and recurved to revolute, smooth adaxially and abaxially, discolorous, crustaceous and dull green to brown when dried; midrib obscure or slightly impressed adaxially, prominent abaxially. Inflorescence sessile; bracts numerous; outer bracts ovate, up to 2.5 mm long, with margins toothed, reddish brown. Male flowers 6–9 per cyme; pedicels 2–3.3 mm long; calyx lobes ovate, 1–1.8 mm long, 0.7–1.2 mm wide, with apex acute to obtuse and margins erose, ± flat, dark red or yellowish green with margins red; petals ovate or oblong, 2.1–4.1 mm long including claw, 1.3–2.3 mm wide, with base cordate or auriculate, apex obtuse to rounded or acute and margins entire or erose, white or yellowish white; glands 0.3–0.8 mm long, with terminal tuft of hairs 0.4–1.4 mm long; staminal filaments 1.7–3.1 mm long; anthers 0.3–0.4 mm long; connective tissue 0.2–0.9 mm long; rudimentary ovary present, with 3–5 erect linear lobes; lobes 1.2–2.7 mm long. Female flowers 1–4 per cyme, pedicellate; pedicels 2–3.2 mm long; calyx lobes ovate, 1.6–2.8 mm long, 0.9–1.3 mm wide, with apex acute or shortly acuminate and margins erose, ± flat, green with a reddish blush on margins; petals ovate or elliptic, 2.5–3.8 mm long including claw, 1.5–2.4 mm wide, with base truncate or cuneate, apex acute or obtuse to rounded and margins erose, ± flat, white or yellowish white; glands 7–10, 0.4–0.5 mm long, glabrous; ovary trigonal-globose, 1.1–2.8 mm across and 1.1–2.2 mm long; styles 1.5–2.3 mm long, 2-lobed; lobes two-thirds to three-quarters the length of style. Capsule subglobose, 3.5–4.5 mm long, 3–4.5 mm across, ± smooth. Seeds ellipsoid, ovoid or obloid, slightly dorsi-ventrally flattened, 1.8–2.5 mm long, 1.1–1.5 mm wide, 1.1–1.5 mm deep; testa slightly rugose or smooth, grey or reddish-brown; caruncle sagittate in outline, 0.7–0.9 mm long, 0.6–0.8 mm across, yellowish white. Fig. 3.

***Selected specimens (from 100 examined)*: Western Australia.** Kalbarri National Park, c. 6 km along the track to the Z-bend from the intersection with the Ajana-Kalbarri Road, Sep 1990, *Albrecht* 4217 & *Fuhrer* (MEL); 3 miles (c. 5 km) N of Drummonds Crossing on Eneabba-Dongara Highway, Nov 1974, *Beard* 7277 (PERTH); Ajana, Aug 1980, *Bellairs* 1383 (PERTH); between Northampton and Geraldton, Sep 1932, *Blackall* 2734 (PERTH); Pindar, Sep 1931, *Blackall* 656 (PERTH); South Arrowsmith River, Sep 1969, *Burns* 113 (PERTH); 17.1 miles (c. 27.5 km) from Wubin towards Wongan Hills, Sep 1968, *Canning* (BRI, CANB); 6 km NNW of Mount Muggawa, Sep 1990, *Cranfield* 7873 & *Spencer* (CANB); South Eneabba road, Jul 1980, *Cranfield* 1476 (CANB, PERTH); 15 km NW of Jitarning, Oct 1983, *Cranfield* 4745 (PERTH); Murchinson House Station, Shark Bay track, 23 km N of river, Oct 1993, *Craven* 8930 *et al.* (CANB, MEL); 5 km S of Kalbarri airstrip, Oct 1979, *Crisp* 6302 *et al.* (CANB); c. 9 km NE of Perenjori, on road to Morawa , Sep 1988, *Henderson* H3152 (BRI); c. 11 km NW of Three Springs, on The Midlands Road to Mingenew, Sep 1988, *Henderson* H3142 (BRI); SE foothills of Mt Caroline, c. 19 km SSW of Kellerberrin, Sep 1988, *Henderson* H3159 (BRI); St Ronans Nature Reserve, 17 km W of York, Nov 1985, *Keighery* & *Alford* 381 (PERTH); 30 miles (c. 48 km) E of Geraldton, Apr 1960, *Long* 46 (PERTH); 24 miles (c. 39 km) from Dongara towards Eneabba, Sep 1968, *Phillips* (CANB, MEL); 25 km from North West Coastal Highway along road to Kalbarri, Sep 1983, *Purdie* 5202 (CANB); 6 miles (c. 10 km) NW of Three Springs, Geraldton Highway, Sep 1966, *Smith* 66/249 (CANB, MEL, PERTH).

***Distribution and habitat*:** *Monotaxis bracteata* is confined to the south-west of Western Australia, from Kalbarri south-east to Jitarning (Map 6). It is recorded as growing in sandplain heath, shrubland and eucalypt woodland communities, on deep sandy soils or sandy to sandy loam soils sometimes with lateritic gravel in the soil profile or over laterite, on sandplains and low undulating country. It is also recorded from granitic soils on Mt Stirling and near Wubin.

***Phenology*:** Flowers have been collected from April to November, fruits from August to December.

***Typification*:** Mueller (1864) cited "Ad flumen Murchison River, Oldfield" in the protologue of *Monotaxis megacarpa*. Three relevant

Fig. 3. ***Monotaxis bracteata*****.** A. habit. ×0.4. B. section of branchlet with stipule. ×16. C. flowering branchlet. ×4. D. male flower. ×8. E. adaxial view of petal of male flower. ×12. F. adaxial view of petal of male flower, flattened out. ×12. G. abaxial view of antisepalous stamen. ×16. H. abaxial view of antipetalous stamen. ×16. I. fruit from side. ×8. J. fruit from above. ×8. A, C–J from *Henderson* H3142 (BRI); B from *Canning* [AQ204085] (BRI). Del. W. Smith.

specimens have been located, two at MEL (MEL2065964 and MEL2065963) and one at K. All three are labelled *M. megacarpa*. The two MEL sheets have been labelled *M. megacarpa* in what we believe to be Mueller's hand. The MEL sheet MEL2065964 is here chosen as the lectotype of Mueller's name *M. megacarpa.*

***Notes*:** Bentham (1873) and Grüning (1913) placed the name *M. bracteata* Nees in synonymy under *M. grandiflora* Endl. As noted by Bentham, the type material of *M. bracteata* (*Preiss* 1219) is lacking leaves along the main stems, but it has a few leaves attached to the shorter lateral branchlets. However, after close examination of specimens of *Preiss* 1219 held at LD and MEL, it is clear that *M. bracteata* does not apply to the species named *M. grandiflora*. The young branchlets of *Preiss* 1219 are clearly papillose, a character state that has not been observed by us in material referred to *M. grandiflora*. Since it is conspecific with the species here circumscribed, the name *M. bracteata*, being the earliest legitimate name available for it, is thus the correct name to apply to this taxon.

As circumscribed here, *M. bracteata* is morphologically variable. There is considerable variation in the general aspect of plants, leaf and stem thickness, degree of stem branching and the degree of curvature of the leaf lamina margins. The majority of names placed in synonymy of *M. bracteata* Nees are applicable to one of two common forms of the plant. *M. megacarpa* F.Muell., *M. gracilis* (Müell Arg.) Baill. and *M. stowardii* S.Moore apply to slender stemmed, thin leaved and regularly branched forms, while the names *M. lurida* (Müell.Arg.) Benth. and *M. oldfieldi* Baill. apply to more robust stemmed, thick leaved and generally less-branched forms.

7. Monotaxis grandiflora Endl., Enum. pl. 19/20 (1837). **Type:** (Western Australia.) King George Sound, (without date,) *K.A.A.F. Hügel* (holo: W *n.v.* (transparencies at BRI)).

Glabrous, monoecious or dioecious, compact to diffuse herbaceous perennials to 30 cm high, with few to many stems arising from a single rootstock. Stems sparingly to much branched, ascending to erect, up to 4 mm across; bark spongy, ± smooth or fissured, dull yellowish brown; young branchlets ± smooth or slightly striate when dried, reddish brown. Leaves petiolate or subsessile, alternate or subopposite directly below inflorescences; stipules subulate, (0.6–)1–3 mm long, erect, with apex entire or unequally bifid with secondary lobes up to 1.5 mm long, twisted and usually reflexed, red-brown; petiole up to 0.7 mm long, plano-convex in transverse section; laminae linear, lorate or lanceolate, 2–20 mm long, 0.6–1.2(–1.6) mm wide, with base cuneate and apex acute with prominent apiculum up to 0.4 mm long or obtuse, with margins entire, strongly revolute to midrib, smooth adaxially, smooth or papillate abaxially, crustaceous and grey-white when dried; midrib obscure adaxially, prominent abaxially. Inflorescence sessile; bracts numerous; outer bracts ± oblong, up to 1.5 mm long, with margins toothed distally, reddish brown. Male flowers 2–15 per cyme; pedicels 2.6–5.4 mm long; calyx lobes ovate or ovate-elliptic, 0.7–2.2 mm long, 0.5–0.9 mm wide, with apex acute or shortly acuminate and margins ± entire, ± flat, pale green with pink or pink-orange margins; petals ovate or oblong, 2.0–2.6 mm long including claw, 1.0–1.6 mm wide, with base cordate or auriculate, apex rounded or obtuse with a minute apiculum and margins entire or erose, pink, creamy white or pale yellow; glands 0.1–0.4 mm long, with a terminal tuft of hairs up to 0.2 mm long; staminal filaments 1.3–2.1 mm long; anthers 0.2–0.3 mm long; connective tissue 0.2–0.5 mm long; rudimentary ovary present, with 3–5 erect linear lobes 1.3–1.7 mm long. Female flowers 1–5 per cyme, pedicellate; pedicels 0.8–2 mm long; calyx lobes ovate to broadly ovate, 1.1–2.9 mm long, 0.4–1.2 mm wide, with apex acute to shortly acuminate and margins entire or erose, ± flat, pale green with pink or pink-orange margins; petals ovate or elliptic, 2.2–3.4 mm long, 1.3–1.6 mm wide, with base cuneate, apex acute to obtuse and sometimes shortly apiculate and margins entire or erose, ± flat, pink, creamy white or pale yellow; glands 5, 0.2–0.5 mm long, glabrous; ovary trigonal-globose, 1.1–1.6 mm across and 1.1–1.6 mm long; styles 1.2–1.8 mm long, 2-lobed; lobes c. four-fifths the length of the style. Capsule subglobose, 2–3 mm long, 2–3 mm across, ± smooth. Seeds ovoid to globose or

ellipsoid, slightly dorsi-ventrally flattened, 1.2–1.8 mm long, 0.9–1.4 mm wide, 0.8–1.1 mm deep; testa smooth, brown to dark brown; caruncle reniform to sagitate in outline, 0.7–0.9 mm long, 0.6 mm across, yellowish white.

***Distribution*:** *Monotaxis grandiflora* is confined to the south-west of Western Australia, in an area approximately bounded by Dongara, Perth, Stirling Ranges, Esperance, Widgiemooltha and Wubin (Maps 7 & 8).

***Notes*:** *Monotaxis grandiflora* differs from *M. bracteata* in having generally narrower leaf laminae with the margins revolute to the midrib so that only the midrib is visible on the abaxial surface, and having a greyish white appearance when dried, as well as branchlets which are smooth and never papillose.

Variability within this species warrants two varieties being recognised. They can be distinguished using the following key.

1. Leaf apex apiculate ..... **7a. M. grandiflora** var. **grandiflora**
   Leaves apex obtuse or acute ..... **7b. M. grandiflora** var. **obtusifolia**

7a. **Monotaxis grandiflora** Endl. var. **grandiflora**

Monotaxis ericoides Klotzsch in Lehm., Pl. Preiss. 1: 177 (1845); *Hippocrepandra ericoides* (Klotszch) Müll.Arg., Linnaea 34: 62 (1865) *nom. reject.* **Type:** Western Australia. Perth, 19 Sep 1839, *L. Preiss* 1218 (holo: LD; iso: B (Herb. L.C.Treviranus acc.1936), G-DC *n.v.*, microfiche IDC 800-73. 2455: I. 6 (top element), MEL [MEL2062925 (ex herb. Sonder), MEL2062923 (ex herb. Sonder), MEL2066088]).

Monotaxis grandiflora var. *typica* Grüning in A. Engler, Pflanzenr. H.58: 85 (1913), *nom. inval.*

Perennials to 30 cm high. Leaves with petiole 0.5–0.7 mm long; laminae linear to lanceolate, 4–20 mm long, 0.6–1.2(–1.6) mm wide, the apex acute with a prominent apiculum up to 0.4 mm long. Male flowers with calyx lobes ovate or ovate-elliptic, 1.1–2.2 mm long and acute or shortly acuminate, and with petals ovate or oblong, 2.2–2.6 mm long. Female flowers with calyx lobes ovate and 2.0–2.9 mm long with petals ovate, 2.5–3.4 mm long.

***Selected specimens (from 61 examined)*: Western Australia.** Mt Desmond, near Ravensthorpe, Oct 1963, *Aplin* 2691 (MEL, PERTH); S of Dongara, Eneabba road, Sep 1969, *Ashby* 3014 (PERTH); c. 8 miles (13 km) S of Jerramungup-Ravensthorpe road, along No.2 Rabbit Fence, toward Twertup Quarry, Nov 1968, *Canning* WA/68 7508 (CANB); 2 km S of Cockleshell Gully on Jurien Bay road, Sep 1982, *Corrick* 8041 (MEL, PERTH); Jarrah Road, South Perth, Sep 1980, *Cranfield* 2449 (PERTH); opposite Hale road on sporting complex site, Forrestfield, Nov 1977, *Cranfield* 222/77 (PERTH); Muchea, 6 km along road opposite the Brand Highway turnoff, Oct 1981, *Craven* 6950 (CANB); Diamond of the Desert Plain, Aug 1948, *Gardner* 9099 (PERTH); Tuttanning Reserve, SE of Pingelly, Oct 1977, *George* 14973 (PERTH); 0.5 miles (c. 0.8 km) S of 56 mile peg, Albany Highway, Dec 1960, *George* 2295 (PERTH); Mt Desmond, Oct 1960, *George* 1646 (PERTH); c. 5 km SE of Cockleshell Gully, on Cockleshell Gully road c. 10 km from junction with Jurien road, Sep 1988, *Henderson* H3139 (BRI); c. 5 km SE of Cockleshell Gully, on Cockleshell Gully road c. 10 km from junction with Jurien road, Sep 1988, *Henderson* H3138 (BRI); c. 12 km N of Eneabba, Aug 1976, *Hnatiuk* 760205 (CANB, PERTH); Brixton Road, Beckenham, 15 km E of Perth, Sep 1984, *Keighery* 7099 (PERTH); Melville Park, Dec 1897, *Morrison* (CANB, PERTH); 15 km WNW of Black Head, Jul 1974, *Newbey* 4253 (PERTH); 10 miles (c. 16 km) SW of Borden, Nov 1965, *Newbey* 1911 (PERTH); c. 1.4 km W of Brand Highway along main road to Jurien, Sep 1983, *Purdie* 5115 (CANB, MEL); Moore River National Park, Oct 1971, *Royce* 9462 (PERTH).

***Distribution and habitat*:** *Monotaxis grandiflora* var. *grandiflora* occurs from the Dongara - Three Springs area southeastward to the Stirling Ranges and to Mt Desmond, near Ravensthorpe in the east (Map 7). It is recorded as growing in open heath, mallee shrubland and *Banksia* woodland with heathy understorey or rarely in open eucalypt forest communities, on well drained sandy loam, clay loam, clay or gravelly soils.

***Phenology*:** Flowers have been collected from August to January, fruits from August to December and April.

7b. **Monotaxis grandiflora** var. **obtusifolia**

F.Muell. & Tate, Trans. & Proc. Roy. Soc. South Australia 16: 341 (1896); *Monotaxis grandiflora* var. *minor* Ewart, Proc. Roy. Soc. Victoria 22(1)(new

series): 17 (1909), *nom. illeg.* **Type:** Western Australia. near Gnarlbine, 12 Nov 1891, *R. Helms* (lecto, here chosen: MEL [MEL2066098]; isolecto: K, NSW).

Perennials to 20 cm high. Leaves with petiole up to 0.4 mm long; laminae lorate to linear, 2–10 mm long, 0.6–0.8(–1.3) mm wide, the apex obtuse or acute. Male flowers with calyx lobes ovate, 0.7–1.2 mm long and acute, and with petals ovate, 2.0–2.4 mm long. Female flowers with calyx lobes ovate to broadly ovate and 1.1–1.8 mm long with petals ovate or elliptic, 2.2–2.8 mm long.

***Selected specimens (from 35 examined)*: Western Australia.** 7 miles (c. 11 km) W of Kulja, 216 km NE of Perth, Aug 1963, *Aplin* 2570 (PERTH); 11 km W of Kulja, on road to Burakin, Aug 1963, *Aplin* 2570 (PERTH); 27 km N of Mt Ridley, Nov 1991, *Archer* 7119112 (MEL); 8 miles (c. 13 km) N of Wialki, Jul 1967, *Beard* 4723 (PERTH); 28 miles (c. 45 km) S of Coolgardie on Norseman road, Sep 1965, *Beauglehole* ACB13293 (MEL, PERTH); 64 km E of Southern Cross, Oct 1931, *Blackall* 939 (PERTH); 20.2 miles (c. 32.5 km) from Coolgardie towards Southern Cross, along Great Eastern Highway, Sep 1968, *Canning* WA/68 2441 (CANB); Yellowdine, Sep 1978, *Cranfield* 706 (PERTH); 15 km W of Mukinbudin on the Koorda road, Oct 1990, *Craven* 8635 & *Zich* (CANB); Burakin, Sep 1975, *Demarz* D5615 (PERTH); along State Vermin Fence No. 7, between 45 km and 65 km S of Great Western Highway, Nov 1985, *Dodd* 257 (PERTH); just SE of Buntine, on road to Wubin, Sep 1988, *Henderson* H3153 (BRI); 6 miles (c. 10 km) W of Cross Roads, Forrestania, Dec 1964, *Lullfitz* 4031 (PERTH); 135 km W of Salmon Gums and 25 km E of No.1 Rabbit Proof Fence, on Kumarl-Lake King road, Oct 1966, *Muir* 4420 (CANB, MEL); 5 km SSE of Walyahmonong Rock, c. 55 km NW of Bullfinch, Sep 1982, *Newbey* 9545 (CANB, PERTH); 11 km NNW of Southern Cross, Sep 1984 *Newbey* 10820 (PERTH); 21 km SW of 90 Mile Tank, Frank Hann National Park, Norseman-Lake King Road, Nov 1979, *Newbey* 6518 (PERTH); c. 34 km N of Widgiemooltha along Eyre Highway between Coolgardie and Widgiemooltha, Sep 1968, *Orchard* 1253 (CANB, PERTH); Kokardine Siding, Aug 1983, *Roberts* 152 (PERTH); 5.4 miles (c. 8.7 km) W of Belka, Sep 1987, *Smith* 934 (BRI, MEL).

***Distribution and habitat*:** *Monotaxis grandiflora* var. *obtusifolia* occurs in an area approximately bounded by Wubin, Widgiemooltha, Esperance and Narembeen (Map 8). It is recorded as growing in heathland, shrubland and open shrub mallee communities, on well drained deep yellow sandy or sandy loam soils on undulating plains, rarely on gravelly soils.

***Phenology*:** Flowers have been collected from July to November, fruits from September to December.

***Notes*:** *Monotaxis grandiflora* var. *obtusifolia* is distinguished from *M. grandiflora* var. *grandiflora* by its generally shorter leaves which lack a long apiculate point at the apex.

However, two specimens have been seen which are typical of *M. grandiflora* var. *obtusifolia* in aspect but they possess leaves terminated by an apiculum. These are *Henderson* H3153 (BRI) and *Wittwer* 1239 (PERTH).

8. Monotaxis paxii Grüning in A. Engler, Pflanzenr. H.58: 85/86 (1913). **Type citation:** 'Westaustralische Provinz: Coolgardie, Menzies, am Saume lichter Geholze, 375 m (Diels)' (holo: B (destroyed); lecto, here chosen: G. Grüning in A. Engler, Pflanzenr. H.58: 83, fig.14B (1913)).

Monotaxis sp. Ravensthorpe (M.A. Burgman 2154), Paczkowska & Chapman (2000).

***Illustration*:** G. Grüning (1913: 83, fig.14 B).

Glabrous, monoecious, diffuse herbaceous perennials to 20 cm high, with few to many stems arising from a rootstock. Stems sparingly branched, decumbent to erect, up to 1 mm across; young branchlets smooth or slightly striate when dried, pale green. Leaves shortly petiolate or sessile, alternate or subopposite or subwhorled distally on branchlets; stipules narrowly triangular, up to 0.5 mm long, with margins entire, red-brown, erect; petiole up to 0.5 mm long, plano-convex in transverse section; laminae lanceolate or narrowly elliptic, 3–15 mm long, 1–2 mm wide, with base cuneate to obtuse and apex acute with a short apiculum, flat or slightly concave, with margins entire, foveate adaxially and abaxially, concolorous, crustaceous and brown when dried; midrib obscure adaxially, prominent abaxially. Inflorescence sessile; bracts numerous; outer bracts broadly ovate, c. 0.9 mm long, with margins toothed, reddish

brown. Male flowers 3–6 per cyme; pedicels 1.1–2.3 mm long; calyx lobes ovate, 0.9–1.1 mm long, 0.5–0.6 mm wide, with apex acute and with margins erose, ± flat, yellow; petals ovate, 1.7–2.2 mm long including claw, 1.0–1.1 mm wide, with base shallowly cordate or auriculate, apex acute to obtuse and margins entire or erose, creamy white; glands c. 0.2 mm long, with terminal hairs up to 0.2 mm long; staminal filaments 1.1–1.2 mm long; anthers 0.1–0.2 mm long; connective tissue 0.3–0.4 mm long; rudimentary ovary present with 3 erect linear lobes c. 0.7 mm long. Female flowers 1–4 per cyme, pedicellate; pedicels 0.4–0.9 mm long; calyx lobes ovate, 1.1–1.5 mm long, 0.7–0.8 mm wide, with apex acute to shortly acuminate and margins erose, concavo-convex, of unknown colour when fresh; petals ovate, 2.4–2.5 mm long including claw, 1–1.2 mm wide, with base cuneate to truncate, apex acute and margins erose, ± flat, creamy-white with a reddish blush towards the margins; glands 5–10, 0.2–0.4 mm long, glabrous; ovary trigonal-globose, 1.4–1.5 mm across, 1.4–1.5 mm long; styles c. 1 mm long, 2-lobed; lobes c. four-fifths the length of style. Capsule globose, c. 3 mm long, 2.5–2.7 mm across, ± smooth. Seeds ellipsoid, slightly dorsi-ventrally flattened, 1.5–2 mm long, 1.1–1.3 mm wide, 0.9–1 mm deep; testa smooth, brown or reddish-brown; caruncle reniform in outline, 0.5–0.6 mm long, 0.9–1 mm across, ± white.

***Selected specimens (from 23 examined)*: Western Australia.** 54 miles (c. 87 km) E of Ravensthorpe, on road to Esperance, Oct 1963, *Aplin* 2662 (PERTH); 35.5 km due ENE of Muckinwobert Rock, 6.21 km NE of Melaleuca Road on West Point Road, Sep 1984, *Burgman* 3922 (PERTH); 19.4 km due SSE of Peak Eleanora, 12.76 km N of Rollands Road on Fields Road, Sep 1984, *Burgman* 3717 (PERTH); Thumb Peak Range, SW of Ravensthorpe, Oct 1965, *George* 7129 (PERTH); 23 km S of Cocklebiddy, Jul 1974, *George* 11865 (PERTH); 20 km NNE of Point Malcolm on escarpment, Sep 1976, *Hnatiuk* 761152 (PERTH); c. 8 km NW of Young River crossing on Ravensthorpe-Esperance main road, Sep 1968, *Jackson* 1294 (CANB, PERTH); c. 500 m W of western shore of Lake King, W of Lake King township, Oct 1995, *Lepschi* 2194 (BRI); 0.3 km ESE of Corner Road on Mills Road, c. 31.5 km NNW of mouth of Stokes Inlet, Oct 1997, *Lepschi* BJL3804 & *Fuhrer* (BRI); Frank Hann National Park, Oct 1978, *Monk* 400 (PERTH); 25 km W of Mt Maxwell, Sep 1974, *Newbey* 4345 (PERTH); 7 miles (c. 11 km) N of Scaddan, Oct 1974, *Newbey* 1400 (PERTH); Cape Le Grand National Park, E of Esperance, Oct 1969, *Royce* 8683 (PERTH); 21 km from Ravensthorpe towards Esperance, Sep 1983, *Taylor* & *Ollerenshaw* 2318 (CANB); S of Grasspatch (main road from Norseman to Esperance), Sep 1947, *Willis* (MEL); Fitzgerald River National Park, Oct 1970, *Wilson* 10171 (PERTH); Reserve W of Young River on main Ravensthorpe - Esperance Road, c. 80 km W of Esperance, Sep 1968, *Wilson* 7827 (PERTH); Tributary of Young River, c. 22 km N of Shoal Cape and 80 km W of Esperance, Sep 1968, *Wilson* 7801 (PERTH); 8 km S of Mt Ragged on track to Israelite Bay, Oct 1970, *Wilson* 10088 (PERTH); 7 miles (c. 11 km) N of Scaddan, Oct 1974, *Wittwer* W1400 (PERTH).

***Distribution and habitat*:** *Monotaxis paxii* is confined to the south-west of Western Australia where it occurs from the Thumb Peak Range and Lake King area eastwards to Cocklebiddy (Map 9). It is recorded as growing in heathland, shrubland and open shrub mallee communities, on shallow to deep sandy soils over limestone or clay.

***Phenology*:** Flowers and fruits have been collected from September and October, with one record for July.

***Typification*:** Grüning (1913) cited a single specimen 'Westaustralische Provinz: Coolgardie, Menzies, am Saume lichter Geholze, 375 m (Diels)' in the protologue of *Monotaxis paxii.* He clearly stated that he found this specimen in the Berlin Herbarium amongst specimens of *M. luteiflora.* No type material has been located at B but it is believed to have been destroyed during the Second World War. Searches for duplicates at other herbaria where duplicates may exist according to Stafleu and Cowan (1976), i.e. BM, MEL and CANB, have been unsuccessful. Grüning's description and illustration are clearly diagnostic and leave no doubt as to the application of the name. As there appears to be no extant holotype or isotype material available, the illustration in the protologue is here selected as lectotype, in accordance with Article 9.10 of the International Code of Botanical Nomenclature (ICBN) (Greuter *et al.* 2000). For the above reasons, nomination of an epitype is not considered necessary.

***Notes*:** *Monotaxis paxii* differs from other species of *Monotaxis* in having isolateral leaf morphology with stomata sunken on both surfaces.

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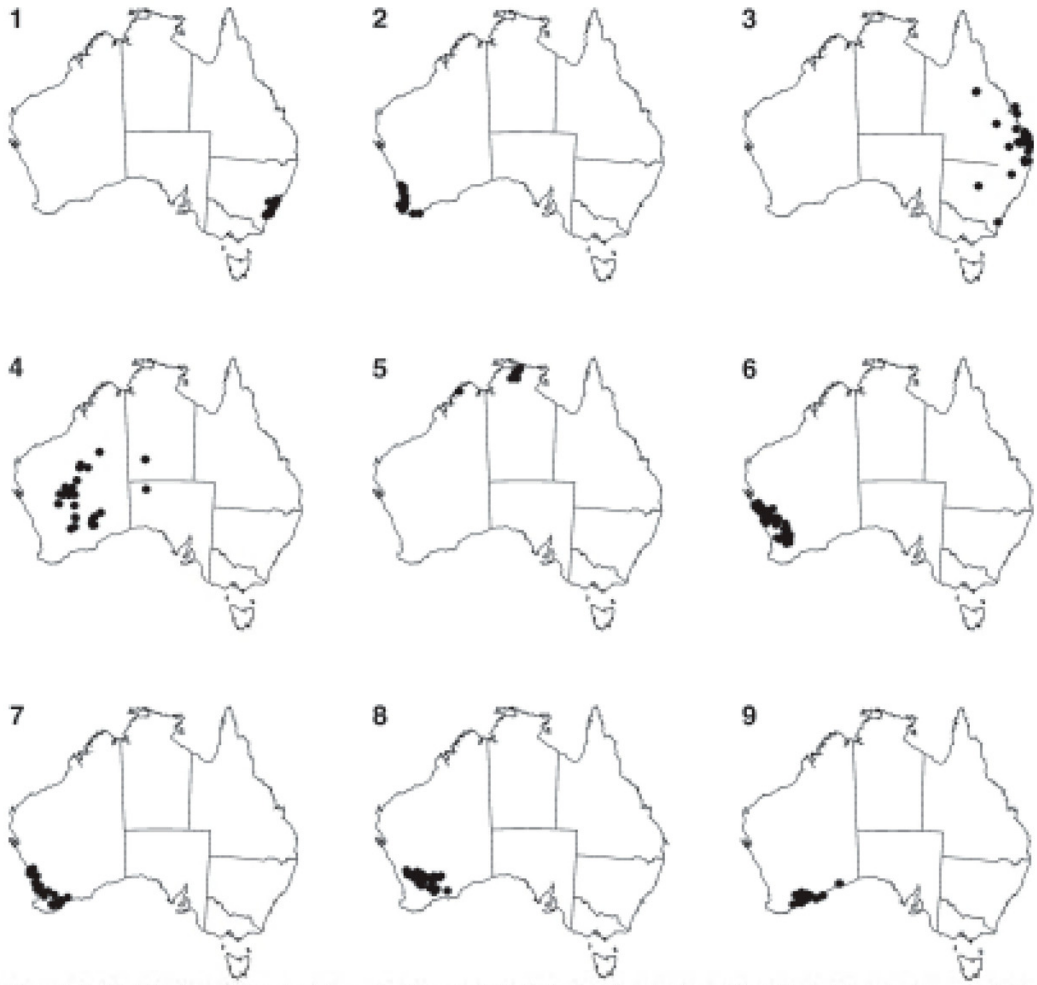

Maps 1–9, Distribution of *Monotaxis* taxa. **1.** *Monotaxis linifolia* **2.** *Monotaxis occidentalis* **3.** *Monotaxis macrophylla* **4.** *Monotaxis luteiflora* **5.** *Monotaxis tenuis* **6.** *Monotaxis bracteata* **7.** *Monotaxis grandiflora* var. *grandiflora* **8.** *Monotaxis grandiflora* var. *obtusifolia* **9.** *Monotaxis paxii*

Index to Scientific Names

Names in bold type are accepted names and those in light are synonyms, etc. The numbers refer to the number of the species accepted in the above taxonomic treatment.