



Flora of South Australia

5th Edition | Edited by Jürgen Kellermann

CHENOPODIACEAE¹

P.G. Wilson² (up-dated by R.J. Chinnock³)

Herbs or shrubs, glabrous or pubescent, sometimes glandular; leaves usually alternate, simple, often succulent, exstipulate, in the Salicornieae (samphires) opposite and reduced to small lobes at the apex of jointed internodes. **Inflorescence** of compact or open cymes or panicles, or reduced to solitary axillary flowers; flowers small, bisexual or unisexual; perianth of 1 whorl, 5-lobed, or reduced to 4–1 lobes; in fruit sometimes succulent or woody, often enlarged and developing wings, spines or tubercles; stamens opposite and equal in number to the perianth lobes or fewer, hypogynous or attached to the wall of the perianth; anthers bilocular, dehiscing by longitudinal slits; ovary superior (semi-inferior in *Beta*), unilocular; stigmas usually 2 or 3; ovule solitary, basal, campylotropous to amphitropous. **Fruit** with a membranous crustaceous or succulent pericarp; seed often lenticular; testa membranous to crustaceous; embryo straight, curved, horseshoe-shaped, annular or spiral; albumen (perisperm) absent to abundant. **Chenopods**.

Cosmopolitan with over 100 genera and 1,500 species; frequently found in saline environments.

Mabberley (2008) placed Chenopodiaceae in synonymy under Amaranthaceae. He stated that he broadly followed *The families and genera of vascular plants* published from 1991 onwards by Kubitzki *et al.*, but modified this classification by taking into account more recent findings resulting from molecular systematics published by the Angiosperm Phylogeny Group (1998, 2003) and P.F. Stevens' *Angiosperm Phylogeny Website* (2001–). Shepherd (2008) has drawn attention to the fact that the Angiosperm Phylogeny Group did not include all the data from relevant studies at the time and that the findings were in most cases based on relatively small numbers of genera and species using few gene regions, predominantly cpDNA. Furthermore she pointed out that various recent molecular phylogenetic studies in both groups since 2003 have not accepted this change. In view of the uncertainty of the monophyly of the groups and conflicting evidence, Chenopodiaceae is retained here as a distinct family. There appears to be a need for further more detailed molecular phylogenetic studies to be undertaken before this is resolved. This classification has also been adopted by the *Australian Plant Census* (www.anbg.gov.au/chab/apc).

Recent molecular phylogenies examined *Chenopodium* and the subfamily Chenopodioideae (Fuentes-Bazan *et al.* 2012a & b). While the monophyly of *Chenopodium* is problematic and requires further study, the authors' conclusion to subsume *Einadia* and *Rhagodia* into *Chenopodium* seems to be premature. They also resurrect the genera *Blitum* L. (including the Australian genus *Scleroblitum*) and *Oxybasis* Kar. & Kir., and establish a new genus *Chenopodiastrum* S.Fuentes, Uotila & Borsch. Statistical support for some of the clades in their papers is not very high and only two taxa from Australia and New Zealand were sampled in their analyses. Here we accept *Einadia* and *Rhagodia* as separate genera and do not follow the other changes proposed by Fuentes-Bazin *et al.*, but give the new names coined by these authors in synonymy.

Cultivars derived from *Beta vulgaris* L. provide beetroot, sugarbeet, etc., while *Spinacia oleracea* L. produces spinach.

Reference: Wilson (1984).

¹ This work can be cited as: Wilson, P.G. & Chinnock, R.J. (2013). Chenopodiaceae (version 1). In: Kellermann, J. (ed.), *Flora of South Australia* (ed. 5), 111 pp. (State Herbarium of South Australia: Adelaide). www.flora.sa.gov.au/ed5

² Western Australian Herbarium, Department of Environment and Conservation, Locked Bag 104, Bentley Delivery Centre, WA 6983, Australia.

³ State Herbarium of South Australia, PO Box 2732, Kent Town, SA 5071, Australia.

© Department of Environment, Water and Natural Resources, Government of South Australia. ISBN 978-1-922027-23-8 (PDF). Publication date: 15 Apr. 2013.



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Department of Environment,
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1. Plant with obvious leaves; branches not articulate
2. Leaves flat, often broad, if terete then with mealy hairs when young
 3. Plant glabrous; fruiting perianths hard, united in clusters; ovary semi-inferior 3. **Beta**
 - 3: Plant glabrous, mealy, pilose, or glandular; ovary superior
 4. Plant mealy when young; flowers unisexual; male flowers with a 5-lobed perianth and 5 stamens; female flowers lacking a perianth but surrounded by a pair of bracteoles that may be free or fused, often inflated or spongy..... 1. **Atriplex**
 - 4: Plant variously pubescent or glabrous; all flowers with a perianth, not surrounded by bracteoles
 5. Plants shrubby, predominantly dioecious; pericarp succulent..... 16. **Rhagodia**
 - 5: Plants herbaceous or weakly woody; flowers polygamous or bisexual; pericarp very rarely succulent
 6. Herb with a basal rosette of leaves; perianth-segments 4, cartilaginous in fruit..... 19. **Scleroblitum**
 - 6: Plants without a basal rosette
 7. Plants (at least some parts) with glandular or glandular-vesicular hairs 6. **Dysphania**
 - 7: Plants glabrous, pubescent or mealy
 8. Perianth-segments 5; stamens 1–3; seed horizontal; perennial herbs with mealy indumentum..... 7. **Einadia**
 - 8: Perianth-segments 1–5; stamens 1–5; seed horizontal or vertical; mostly annual herbs (rarely perennials), glabrous or with mealy indumentum
 9. Perianth-segments (in lateral flowers) 1; stamen 1; sparsely mealy herb..... 13. **Monolepis**
 - 9: Perianth-segments 3–5; stamens 1–5; herb or rarely perennial with mealy indumentum, or glabrous..... 4. **Chenopodium**
 - 2: Leaves narrow, flat or subterete; hairs (if present) simple, bifurcate or branched (neither glandular nor mealy)
 10. Flowers and fruits fused in axillary clusters of 2 or more 5. **Dissocarpus**
 - 10: Flowers and fruits solitary or if in pairs then not fused together
 11. Fruiting perianth without obvious appendages
 12. Flowers bibracteolate; embryo spirally coiled..... 21. **Suaeda**
 - 12: Flowers without bracteoles; embryo curved or annular
 13. Fruiting perianth succulent, berry-like, split longitudinally to the base..... 8. **Enchylaena**
 - 13: Fruiting perianth dry or, if succulent, not berry-like and not split to the base
 14. Fruiting perianth dry
 15. Fruiting perianth keeled and gibbous on one side..... 15. **Osteocarpum**
 - 15: Fruiting perianth not gibbous, segments triangular from above..... 2. **Bassia**
 - 14: Fruiting perianth dry or slightly succulent, ovoid to urceolate 23. **Threlkeldia**
 - 11: Fruiting perianth with 1 or more wings, spines or tubercles, not succulent
 16. Fruiting perianth with erect wing or wings
 17. Both horizontal and vertical wings present..... 11. **Maireana**
 - 17: Only vertical wing or wings present 15. **Osteocarpum**
 - 16: Fruiting perianth without erect wings
 18. Horizontal wing or wings present on the fruiting perianth
 19. Flowers subtended by a pair of prominent spinescent bracteoles; embryo spirally coiled..... 17. **Salsola**
 - 19: Bracteoles, if present, minute; embryo annular

20. Fruiting perianth hemispherical, glabrous; apex truncate extending into a hard narrow 5-angled wing (formerly *Sclerochlamys*) 20. **Sclerolaena**
- 20: Fruiting perianth lenticular to turbinate or globose, with 5 horizontal wings or a simple annular horizontal wing..... 11. **Maireana**
- 18: Spines or tubercles present on the fruiting perianth
21. Plant densely stellate- or dendritic-tomentose; leaves flattened 9. **Eremophea**
- 21: Plant with simple or bifurcate hairs (if dendritic then leaves terete) or glabrous
22. Perianth densely woolly; appendages in two series, 5 erect and 5 horizontal..... 10. **Eriochiton**
- 22: Perianth appendages in one series
23. Fruiting perianth hard, subglobular, glabrous, with c. 11 very short radiating spines arising from a narrow horizontal wing (formerly *Stelligera*) 20. **Sclerolaena**
- 23: Fruiting perianth glabrous or hairy, with 1–6 spines, tubercles, or other processes
24. Perianth appendages 3–5, soft, subcylindrical, woolly, arising from the base of the perianth lobes..... 12. **Malacocera**
- 24: Perianth appendages of spines or tubercles
25. Fruiting perianth cylindrical, with 5 short spines arising from the base of the perianth lobes; the spines sometimes united into an apical cup-shaped structure 14. **Neobassia**
- 25: Fruiting perianth variously shaped; spines or tubercles 1–6, arising from between the perianth lobes 20. **Sclerolaena**
- 1: Plant apparently leafless or with opposite very reduced leaves; branchlets made up of succulent internodes
26. Spike-like inflorescences terminal, cymules 5–13 flowered; perianth lobes 3–4, abaxial lobe present; seed distinctly papillose or with slender hairs 18. **Sarcocornia**
- 26: Spike-like inflorescences terminal and lateral; cymules 3 flowered, rarely 5–7 flowered and, if so, lateral spikes present; perianth lobes 2–3, abaxial lobe absent; seed smooth or variously ornamented but never papillose or with hairs..... 22. **Tecticornia**

1. ATRIPLEX L.

Sp. Pl. 2: 1052 (1753).

(Latin *atriplexum*, an orache.)

Haloxanthium Ulbr. in Engl. & Prantl, *Nat. Pflanzenfam.* ed 2, 16c: 521 (1934); *Seniella* Aellen, *Bot. Jahrb. Syst.* 68: 416 (1938); *Blackiella* Aellen, *Bot. Jahrb. Syst.* 68: 423 (1938).

Annual or perennial herbs or shrubs, monoecious or dioecious; indumentum of bladder-like hairs which may collapse to form a mealy or scaly covering; leaves mostly alternate, flat to semiterete, entire, dentate or lobed. **Flowers** unisexual, small, clustered, the clusters axillary, spicate or paniculate; male flowers without bracts or bracteoles; perianth deeply 5-lobed; stamens 5, filaments linear; female flowers: perianth absent and replaced by a pair of bracteoles which enlarge and cover the fruit; bracteoles sessile or stipitate, free or fused, in fruit herbaceous or woody or spongy, sometimes with appendages which may exceed the bracteoles; stigmas 2, slender. **Pericarp** membranous; seed erect, lenticular; testa crustaceous, coriaceous or membranous; embryo annular; perisperm central. **Saltbushes**.

Cosmopolitan with over 250 species, often halophytic.

The term 'bracteoles' refers to the fruiting bracteoles.

Variants of the European species, *A. hortensis* L., are grown for food and as an ornamental. Some species like *A. nummularia* are cultivated for stock food

1. Annuals or short-lived perennials, monoecious; fruiting bracteoles almost totally united, spongy or (in 1 species) dorsiventrally flattened and with broad vertical wings; appendages (other than wings) absent..... **Sect. II. SPONGIOCARPUS**

- 1: Annuals, perennials or shrubs; fruiting bracteoles free or united, not spongy though sometimes with spongy appendages; wings absent
- 2: Annuals with slender ribbed stems; leaves herbaceous, flat, venation open **Sect. I. TEUTLIOPSIS**
- 2: Perennial herbs or shrubs; leaves with closed dark-green reticulate venation
 - 3: Perennial herbs, monoecious; glomerules of male flowers axillary or spicate
..... **Sect. III. SEMIBACCATAE**
 - 3: Perennial herbs or shrubs, predominantly dioecious; glomerules of male flowers spicate or paniculate **Sect. IV. DIALYSEX**

Sect. I. TEUTLIOPSIS

- 1. Lower leaves lanceolate, entire to deeply serrate, if hastate then with forwardly directed basal lobes 4. **A. australisica**
- 1: Lower leaves triangular or hastate with spreading or slightly backwardly directed basal lobes 30. **A. prostrata**

Sect. II. SPONGIOPARPUS

- 1. Bracteoles globular, ellipsoid, or obovoid; wing-like appendages absent
 - 2. Leaves sessile or shortly petiolate; bracteoles broadly ellipsoid to globular, 4–6 (rarely to 8) mm long 37. **A. spongiosa**
 - 2: Leaves conspicuously petiolate; bracteoles globular to obovoid, 8–12 mm long 13. **A. holocarpa**
- 1: Bracteoles variously shaped, bearing 1 or 2 horizontal to vertical wings (sometimes very narrow)
 - 3. Tube small, obconical, 1–3 mm high, somewhat compressed
 - 4. Valves fan-shaped, appressed; appendages inflated, attached to the apex of the tube on each side 17. **A. kochiana**
 - 4: Valves minute or triangular and 1–2 mm long; appendages wing-like, horizontal, somewhat undulate
 - 5. Bracteoles scurfy-pubescent 27. **A. obconica**
 - 5: Bracteoles glabrous, glossy 22. **A. macropterocarpa**
 - 3: Tube prominent, 5–12 mm high, either compressed and bordered by decurrent wings or turbinate to globular without decurrent wings 20. **A. lindleyi**

Sect. III. SEMIBACCATAE

- 1. Bracteoles from half to nearly entirely united
 - 2. Bracteoles cylindrical or with a cylindrical tube
 - 3. Bracteoles 4–6-lobed at the apex; the lobes horn-like, fan-shaped, or reduced to small teeth 19. **A. limbata**
 - 3: Bracteoles acute to rounded or truncate
 - 4. Bracteoles with free broadly fan-shaped to reniform valves, often with recurved lobes 3. **A. angulata**
 - 4: Bracteoles fused to the apex; distal portion flattened to cylindrical, oblong or narrow-cuneate
 - 5. Bracteole apex flattened, rhomboid or cuneate, dentate, glossy when mature 16. **A. intermedia**
 - 5: Bracteole apex compressed or cylindrical, insignificant, scurfy 18. **A. leptocarpa**
 - 2: Bracteoles flattened to biconvex, without a cylindrical tube
 - 6. Bracteoles without dorsal appendages
 - 7. Bracteoles sessile (or appearing so)
 - 8. Bracteoles more or less deltoid, prominently reticulate, often red and succulent when fresh; plant prostrate or decumbent 36. **A. semibaccata**
 - 8: Bracteoles variously shaped, not succulent

9. Erect divaricately branched plant with deeply concave clasping leaves (NU region) 8. **A. cryptocarpa**
- 9: Prostrate to erect; leaves not clasping (widespread)
10. Plant prostrate; leaves 2–6 mm long; bracteoles 1–1.5 mm long 32. **A. pumilio**
- 10: Plant decumbent to erect; leaves and bracteoles longer than above
11. Bracteoles oblong, with a somewhat swollen tube..... 1. **A. acutibractea**
- 11: Bracteoles compressed and rhomboid to deltoid or swollen and rounded at the apex
12. Bracteoles swollen, rounded at the apex 24. **A. muelleri**
- 12: Bracteoles compressed, rhomboid to deltoid
13. Leaves coarsely serrate, sparsely scurfy above and below; bracteoles scurfy-pubescent 39. **A. suberecta**
- 13: Leaves sinuate-dentate to entire, scurfy below, glabrescent above 36. **A. semibaccata**
- 7: Bracteoles pedicellate
14. Leaves prominently petiolate, 20–40 mm long; bracteoles with fan-shaped or reniform valves 3. **A. angulata**
- 14: Leaves sessile or subsessile, 5–20 (rarely to 30) mm long
15. Bracteoles deltoid to rhomboid, flattened, reticulate; leaves glabrescent above..... 36. **A. semibaccata**
- 15: Bracteoles swollen at least in part
16. Bracteoles acute..... 1. **A. acutibractea**
- 16: Bracteoles obtuse to truncate, entire or toothed
17. Bracteoles turbinate or narrow-turbinate, c. 5 mm long..... 40. **A. turbinata**
- 17: Bracteoles rhomboid to deltoid or broad-deltoid
18. Bracteoles with a short thick pedicel and deltoid 3-toothed valves, in all 2–3 mm long 7. **A. crassipes**
- 18: Bracteoles shortly and narrowly pedicellate, broad- rhomboid to broad-deltoid, 2–3 mm long, denticulate or entire 31. **A. pseudocampanulata**
- 6: Bracteoles with dorsal appendages
19. Bracteole appendages numerous, verrucose or papillose
20. Leaves thick, linear to narrow-oblong, acute 29. **A. papillata**
- 20: Leaves thin, broad-obovate, sinuate-dentate, rounded..... 23. **A. morrisii**
- 19: Bracteole appendages 1–4, or few and flattened or inflated
21. Appendages tuberculate, papillose, or slender
22. Bracteoles with a short thick pedicel; valves flattened, deltoid, c. 2 mm long 7. **A. crassipes**
- 22: Bracteoles sessile, U-shaped, swollen, c. 1.5 mm long..... 11. **A. elachophylla**
- 21: Appendages inflated, foliaceous, or spiny
23. Bracteoles with a swollen base and narrow beak-like valves; appendage inflated 25. **A. nessorhina**
- 23: Bracteoles without a swollen base
24. Bracteoles equal; leaves with sinuate margins 31. **A. pseudocampanulata**
- 24: Bracteoles unequal
25. Appendages leaf-like 9. **A. eardleyae**
- 25: Appendages inflated, attached along each margin on one side of the tube..... 10. **A. eichleri**
- 1: Fruiting bracteoles free to near the base
26. Bracteoles fan-shaped to reniform, unequal 9. **A. eardleyae**

- 26: Bracteoles not as above
- 27: Bracteoles prominently lobed
- 28: Leaves congested, sessile, cordate 33. **A. quadrivalvata**
- 28: Leaves not congested, petiolate or narrowed at the base
- 29: Bracteoles with flat or inflated acutely lobed appendages 12. **A. fissivalvis**
- 29: Bracteoles without appendages 21. **A. lobativalvis**
- 27: Bracteoles entire or the margin sinuate or toothed
- 30: Bracteole appendages inflated, entire, more or less equal in size to the bracteoles 17. **A. kochiana**
- 30: Bracteole appendages small or absent
- 31: Leaves narrow-triangular, cordate at the base 6. **A. cordifolia**
- 31: Leaves narrow-oblong to broad-obovate, narrowed at the base
- 32: Bracteoles sessile, cordate, rounded, without appendages 14. **A. humifusa**
- 32: Bracteoles sessile or subsessile, acute or obtuse
- 33: Bracteoles with 1 or 2 tubercular appendages on each valve 36. **A. semibaccata**
- 33: Bracteoles either without appendages or with inflated appendages
- 34: Bracteoles prominently dentate, scurfy-tomentose; appendages basal, small and inflated 2. **A. acutiloba**
- 34: Bracteoles entire or with basal teeth, scurfy-tomentose to subglabrous; appendages basal or absent 41. **A. velutinella**

Sect. IV. DIALYSEX

1. Bracteoles slender-pedicellate, reniform or semicircular, entire
2. Bracteole appendages absent; leaves elliptic to broad-elliptic, 0.5–1 cm long, entire 38. **A. stipitata**
- 2: Bracteole appendages reniform, inflated, about half the width of the valve; leaves oblanceolate, c. 2 cm long, distantly toothed 34. **A. quinii**
- 1: Bracteoles with a thick pedicel or sessile to subsessile
3. Bracteoles with a bladder-like appendage 42. **A. vesicaria**
- 3: Bracteoles without appendages, or with 2 slender antler-like appendages
4. Leaves entire
5. Leaves cordate to deltoid; bracteoles broad-rhomboid to orbicular, c. 3 mm wide, biconvex, hard with little or no papery margin (MU region) 35. **A. rhagodioides**
- 5: Leaves elliptic (coastal)
6. Female flowers in terminal inflorescences; bracteoles cordate to deltoid, flat, without appendages 28. **A. paludosa**
- 6: Female flowers axillary; bracteoles ovoid to rhomboid, swollen in the centre, smooth or with verrucose appendages 5. **A. cinerea**
- 4: Leaves dentate or denticulate, deltoid to cordate, broad-elliptic or orbicular
7. Leaves rhomboid to orbicular, sinuate-dentate; bracteoles sessile, rhomboid to orbicular, papery all over or with a thickened base; valves appressed or reflexed, with entire or denticulate margins; shrub 1.5–3 m high, with ascending branches (inland) 26. **A. nummularia**
- 7: Leaves cordate to deltoid, dentate; bracteoles sessile, thickened all over or only at the base; divaricately branched shrubs
8. Bracteoles suborbicular, 6–10 mm wide; valves papery, slightly recurved, dentate, thickened in the centre or towards the base (LE, GT) 15. **A. incrassata**
- 8: Bracteoles broad-rhomboid to orbicular, c. 3 mm wide, biconvex, hard with little or no papery margin (MU region) 35. **A. rhagodioides**

1. **Atriplex acutibractea** R.H.Anderson, *Proc. Linn. Soc. N.S.W.* 55: 500 (1930), as *A. acutibractum* — **Illustr.:** A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 29 (1988).

Intricately branched rounded shrub c. 50 cm high, monoecious; leaves sessile to shortly petiolate; lamina broadly obovate to orbicular, flat or folded, 5–30 mm long, shallowly sinuate-dentate, scaly-tomentose on both surfaces or glabrescent above. **Flowers** in clusters, axillary or forming short interrupted spikes. **Fruiting** bracteoles oblong, swollen towards the base, fused except for the acute to acuminate apex, sessile or the lower third forming a slender or stout pedicel, in all 2–8 mm long; appendages conical, usually paired on one or both valves, sometimes lacking; Seed circular; radicle lateral, erect. **Fig. 1A.**

All intermediates between the extremes of both subspecies may be found; it is unclear how much of the variation is due to environment and how much to genetic factors.

1. Leaves more or less flat, c. 10 mm long or more; fruiting bracteoles 4–8 mm long, acuminate 1a. **A. acutibractea** subsp. **acutibractea**
1: Leaves folded, c.5 mm long; fruiting bracteoles 2–4 mm long, acute or 3-toothed 1b. **A. acutibractea** subsp. **karoniensis**

- 1a. **Atriplex acutibractea** subsp. **acutibractea** — *A. leptocarpa* var. *acuminata* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 46: 68 (1922); *A. acutibractea* subsp. *whyallensis* Aellen, *Bot. Jahrb. Syst.* 68: 359 (1938), *nom. illeg.* — **Illustr.:** *Pl. W. N.S.W.* 237 & fig. 44/1 (1982).

Leaves usually more or less flat, 10–30 mm long. **Fruiting** bracteoles 4–8 mm long, with a narrow to stout pedicel, acuminate. **Pl. 1A–C.**

S.A.: NW, LE, NU, GT, FR, EA, EP, MU, YP, SL; W.A.; N.S.W.; Vic. Flowers: all months, especially Jul.–Oct.

- 1b. **Atriplex acutibractea** subsp. **karoniensis** Aellen, *Bot. Jahrb. Syst.* 68: 360 (1937). — *A. fasciculiflora* Aellen, *Bot. Jahrb. Syst.* 71: 229 (1940); *A. spongivalvis* Aellen, *Trans. Roy. Soc. South Australia* 78: 155 (1955). — **Illustr.:** Aellen, *Trans. Roy. Soc. South Australia* 78: 155 (1955) .

Leaves more or less folded, 5–10 mm long. **Fruiting** bracteoles subsessile, swollen, oblong to narrow-deltoid, 2–4 mm long, truncate with a short central triangular lobe or minutely 3-toothed; appendages absent or represented by a pair of small tubercles on each bracteole.

S.A.: NU, FR, EP, NL, MU, YP, SL; W.A.; Vic. Flowers: as for the typical subspecies.

2. **Atriplex acutiloba** R.H.Anderson, *Proc. Linn. Soc. New South Wales* 59: 270 (1934). — *A. acutiloba* var. *velutinelliformis* Aellen, *Bot. Jahrb. Syst.* 68: 389 (1938). — **Illustr.:** R.H.Anderson, *op. cit.* 271, figs 1, 2 (1934).

Short-lived perennial c. 50 cm high, monoecious; leaves thin, petiolate, scurry to scurfy-tomentose on both surfaces; lamina broadly ovate to broadly elliptic, 2–4 cm long, acute, acutely lobed, base cuneate; petiole half the length of the lamina. **Flowers** mixed in clusters, both axillary and forming short disjunct spikes. **Fruiting** bracteoles sessile or subsessile, appressed, free to the base, broadly triangular, c. 5 mm long and wide (rarely to triangular), more or less scurfy-tomentose; margins prominently dentate; appendages small, semicircular, inflated, 0.5–1 mm wide, near the base of each bracteole; seed circular; radicle erect. **Fig. 1B.**

S.A.: LE, GT, FR, EA, EP, MU; N.S.W. Flowers: Aug.–Sep.

3. **Atriplex angulata** Benth., *Fl. Austral.* 5: 174 (1870) — *A. angulata* var. *campanulatiformis* Aellen, *Bot. Jahrb. Syst.* 68: 364 (1937).

Rounded annual or shortly-lived perennial to 30 cm high, monoecious; leaves thin or leathery, scurry on both surfaces, broadly obovate to rhomboid, narrowed at the base into a petiole about half the length of the lamina, in all 2–4 cm long; apex rounded; margin entire to sinuate-dentate. **Male** flowers in compact glomerules forming short interrupted spikes; female flowers in axillary clusters. **Fruiting** bracteoles pedicellate; lower half fused, campanulate to cylindrical; sometimes thickened; upper half free, fan-shaped to reniform, herbaceous, nerved, pedicel slender or thickened and continuous with the tube, in all to 10 mm long and wide at the apex; seed circular; radicle erect, prominently projecting. **Fan (or angular) saltbush. Fig. 1C, Pl. 1D–E.**

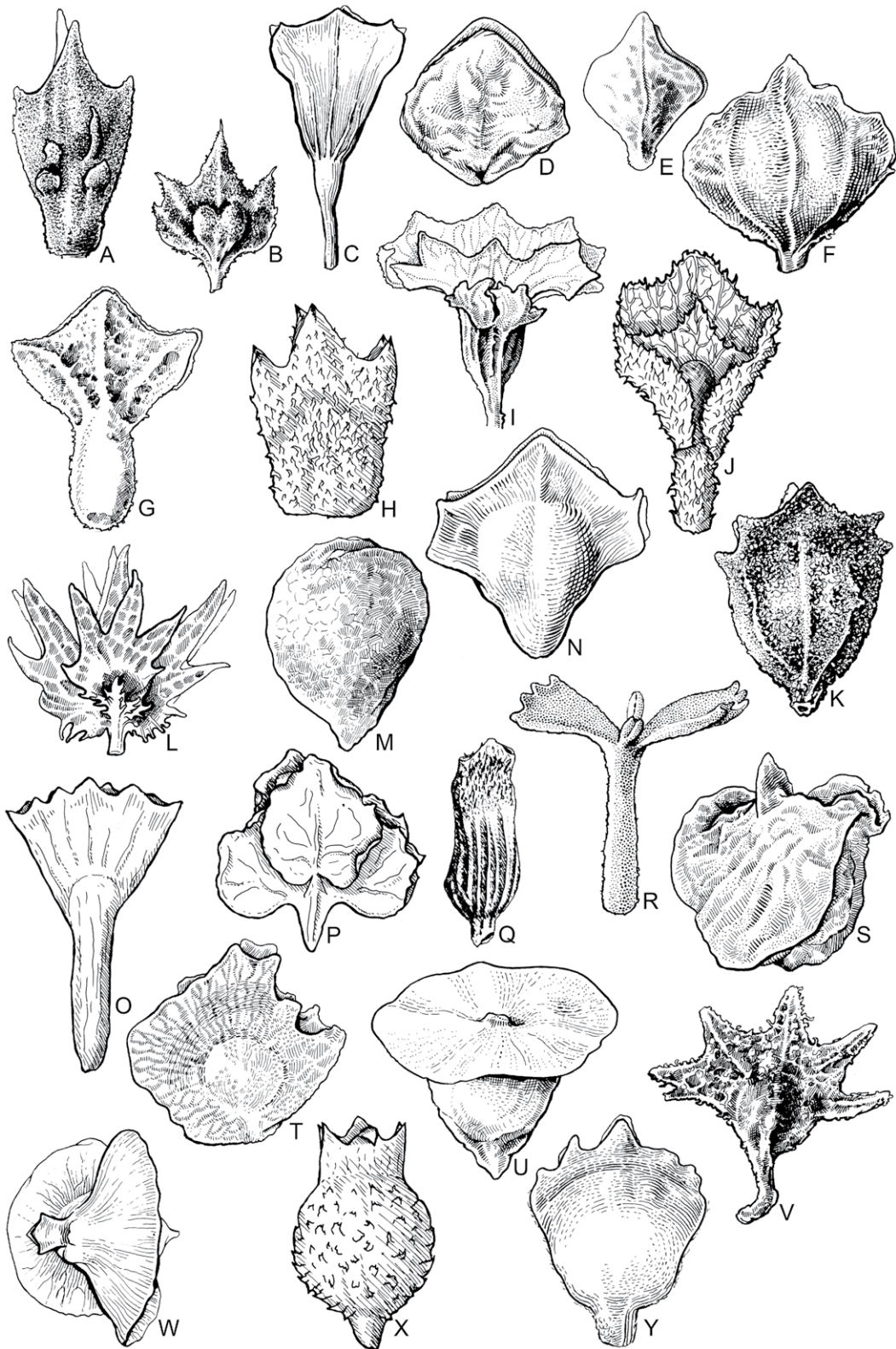


Fig. 1. *Atriplex* fruits: A, *A. acutibractea*; B, *A. acutiloba*; C, *A. angulata*; D, *A. australasica*; E, *A. cinerea*; F, *A. cordifolia*; G, *A. crassipes*; H, *A. cryptocarpa*; I, *A. eardleyae*; J, *A. eichleri*; K, *A. elachophylla*; L, *A. fissivalvis*; M, *A. holocarpa*; N, *A. incrassata*; O, *A. intermedia*; P, *A. kochiana*; Q, *A. leptocarpa*; R, *A. limbata*; S, *A. lindleyi* subsp. *lindleyi*; T, *A. lindleyi* subsp. *conduplicata*; U, *A. lindleyi* subsp. *inflata*; V, *A. lobativalvis*; W, *A. macroptercarpa*; X, *A. morrisii*; Y, *A. muelleri*. Illustrations reproduced from *Flora of Central Australia* 57, Fig. 82 (1981), *Flora of Australia* 4: 92–93, Fig. 20–21 (1984), and *Flora of South Australia* 1: 242, Fig. 150 (1986).

S.A.: NW, LE, GT, FR, EA, EP, MU; N.T.; Qld; N.S.W.; Vic. Flowers: mainly Jul.–Oct.

This species varies greatly in the shape and texture of the bracteole and leaf. In some areas it evidently intergrades with any of *A. pseudocampanulata*, *A. intermedia*, *A. turbinata* and *A. crassipes*.

4. **Atriplex australasica** Moq., *Chenop. Monogr. Enum.* 59 (1840).

Spreading to erect annual c. 1 m high, monoecious; branches quadrangular, almost glabrous; lower leaves lanceolate, base cuneate, margin entire to deeply serrate, often hastate with forwardly directed lobes, 5–10 mm long including a petiole of c. 10 mm. **Flowers** mixed, spiciform, paniculate with the flowers in at first continuous and later in disjunct clusters. **Fruiting** bracteoles deltoid, acute, 3–4 mm long and wide, united in the lower half or free to the base, entire or with 1 or 2 teeth, smooth or with warty protuberances, becoming black and thickened with age; seeds of 2 types, brown and black, orbicular; radicle basal, horizontal. **Native orache. Fig. 1D, Pl. 1F–I.**

S.A.: MU, YP, SL, ?KI, SE; N.S.W.; Vic.; Tas. Found in wet brackish situations, often coastal. Flowers: Jan.–Apr.

(Rare status in S.A.)

5. **Atriplex cinerea** Poir.in Lam., *Encycl. Suppl.* 1, 2: 471 (1811). — *A. cinerea* subsp. *globulosa* Aellen, *Bot. Jahrb. Syst.* 68: 394 (1938). — **Illustr.:** G.R.Cochrane *et al.*, *Fl. Pl. Victoria*, fig. 294 (1968).

Spreading to erect shrub to 1.5 m high, dioecious or monoecious; leaves thin, shortly petiolate, narrow-elliptic to elliptic or ovate, 2.5–4 cm long, entire, with a scurfy sheen on both surfaces. **Male** flowers in dense glomerules 5–7 (rarely to 10) mm diam., forming interrupted or continuous spikes or panicles; female flowers in clusters axillary to the upper foliage leaves. **Fruiting** bracteoles subsessile or shortly pedicellate; pedicel turbinate, hard; bracteoles ovoid (rarely) to broadly deltoid or rhomboid, 6–10 mm long and wide, united towards the base, often hard and swollen in the centre, thin and entire on the margin, smooth or with a verrucose appendage on one or both sides; seed circular; radicle lateral, erect. **Grey (or coast) saltbush, barilla. Fig. 1E, Pl. 1J–L.**

S.A.: NU, EP, NL, YP, SL, KI, SE; W.A.; N.S.W.; Vic.; Tas. Flowers: all months, especially June–Dec.

6. **Atriplex cordifolia** J.M.Black, *Trans. Roy. Soc. South Australia* 69: 309 (1945).

Annual or short-lived perennial c. 30 cm high, branching from the base, monoecious; leaves sessile, triangular to narrow-triangular or ovate, cordate, acute, 5–20 mm long, entire to sinuate-dentate in the lower half, scaly-tomentose, or forming a grey punctate sheen with age. **Flowers** in axillary glomerules, the upper ones male and female, the lower female. **Fruiting** bracteoles minutely pedicellate, free to the base, rhomboid-triangular, 2–3 mm high and wide, 3-nerved. **Fig. 1F**

S.A.: LE, GT, EA; ?N.S.W. Found usually in gypseous or saline soil. Flowers: all months.

7. **Atriplex crassipes** J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 42: 171 (1918) var. **crassipes**. — *A. crassipes* var. *inappendiculata* Aellen, *Bot. Jahrb. Syst.* 71: 232 (1940), *nom. illeg.*; *A. rosea* var. *stipitata* F.Muell., *Rep. Pl. Babbage's Exped.* 20 (1859); *A. muelleri* var. *stipitata* (F.Muell.) Aellen, *Bot. Jahrb. Syst.* 68: 370 (1938).

Decumbent to erect rounded herb to 30 cm high, monoecious; leaves sessile or shortly petiolate, scurfy-tomentose on both surfaces, ovate to elliptic, 7–15 mm long, thin, obtuse, entire, cuneate to truncate at the base. **Flowers** in axillary glomerules. **Fruiting** bracteoles like a duck's foot; pedicel thick, 1–1.5 mm long; tube deltoid, flattened, united in the lower half, shortly 3-toothed at the apex, c. 2 mm long, prominently nerved and reticulate, smooth; seed circular; radicle lateral. **Fig. 1G.**

S.A.: LE; N.T.; Qld; N.S.W. Flowers: all months.

This species is closely related to *A. pseudocampanulata* with which it intergrades.

8. **Atriplex cryptocarpa** Aellen, *Bot. Jahrb. Syst.* 71: 228 (1940). — **Illustr.:** Aellen, *Bot. Jahrb. Syst.* 229, figs A1, A2 (1940).

Divaricately branched shrub c. 50 cm high, monoecious; leaves sessile, erect, deeply concave and partially clasping the branch; frequently congested on the dwarf lateral shoots; lamina broadly ovate, 4–8 mm long, apex acute and often recurved, base rounded or cordate, margin entire or with 2–4 teeth, scaly or with a grey sheen, sometimes glabrous with age. **Male** flowers in axillary glomerules towards the apex of the branches; female flowers axillary,

solitary, obscured by the subtending leaf. **Fruiting** bracteoles sessile, united except at the apex, oblong; apex 3-toothed; base rounded; in all c. 2.5 mm long, 1.5 mm wide. **Fig. 1H, Pl. 2A.**

S.A.: NU (growing in shallow depressions on the limestone plain), GT; W.A. Flowers: Jul.–Oct.

9. **Atriplex eardleyae** Aellen, *Candollea* 12: 153 (1949). — *A. campanulata* Benth., *Fl. Austral.* 5: 177 (1870), *nom. illeg. non* J.Woods (1850).

Decumbent to erect perennial herb to 30 cm high, monoecious; leaves sessile, elliptic to orbicular, c. 10 mm long, entire; base cuneate and passing into a short petiole or subsessile. **Male** flowers in small glomerules in the distal leaf axils usually with a few female flowers; female flowers in scattered glomerules along the branches. **Fruiting** bracteoles with a compressed narrow-campanulate to deltoid tube c. 1–2 mm long, which expands into appressed fan-shaped to reniform reticulate sinuate valves more or less equal in length to the tube, the adaxial valve slightly shorter than the abaxial; tube with a pair of small leaf-like appendages on the adaxial surface near the base or these sometimes lacking; pedicel slender or stout, shorter than to slightly exceeding the length of the tube. **Small saltbush. Fig. 1I.**

S.A.: LE, NU, GT, FR, EA, EP, MU, NL, YP; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers: all months.

10. **Atriplex eichleri** Aellen in H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 111, fig. 378A (1965). — *A. campanulata* var. *adnata* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 42: 172 (1918).

Decumbent to erect annual or short-lived perennial to 20 cm high, monoecious; leaves elliptic to broadly elliptic, 10–15 mm long, subsessile, entire to faintly sinuate-dentate, scaly-tomentose on both surfaces. **Male** flowers in small glomerules in the distal leaf axils usually mixed with some female flowers; female flowers in scattered axillary glomerules. **Fruiting** bracteoles appressed, flat, c. 5 mm long, prominently reticulate with age, fused in the lower two-thirds into a campanulate tube, broadly triangular above; the adaxial limb considerably shorter than the abaxial; appendages paired, inflated, attached along the margins of the adaxial bracteole; pedicel 0.5–1 mm long. **Fig. 1J.**

S.A.: LE, FR, EA. Flowers: Aug.–Nov.

(Rare status in S.A.)

11. **Atriplex elachophylla** F.Muell., *Fragm.* 7: 8 (1869). — *A. varia* Ewart & O.B.Davies, *Fl. N. Territory* 94, t. 11 (1917). — **Illustr.:** *Pl. W. N.S.W.* 238 (1982).

Erect perennial to 50 cm high; leaves varying from narrow-elliptic to elliptic, subsessile and 2.5–5 mm long to obovate and 10–40 mm long, entire to strongly sinuate-dentate; upper surface glabrescent, lower surface scurfy to scaly. **Male** flowers in small glomerules 2–3 mm diam., in terminal axils; female flowers in scattered axillary clusters. **Fruiting** bracteoles sessile, united into a swollen campanulate tube 1.5–2.5 mm long, or rarely the tube narrow-deltoid and passing into a short pedicel; apex truncate to rounded, entire or 3-toothed; appendages small and tooth-like, 1–4 on each face, or absent. **Fig. 1K.**

S.A.: NW, LE; W.A.; N.T.; Qld; N.S.W. Flowers: May–Nov. (few records).

12. **Atriplex fissivalvis** F.Muell., *Fragm.* 9: 123 (1875). — *Haloxanthium fissivalve* (F.Muell.) Ulbr., *Nat. Pflanzenfam.* ed. 2, 16c: 521 (1934). — **Illustr.:** *Pl. W. N.S.W.* 239 (1982).

Open annual herb 10–30 cm high, branching from the base, monoecious; leaves thin, ovate to suborbicular, obtuse, entire or sinuate, scaly-tomentose, lamina 10–20 mm long, petiole 5–10 mm long. **Flowers** in glomerules in the axils of leaves including the basal leaves. **Fruiting** bracteoles sessile, flat, broadly deltoid, c. 4 mm high and wide, glossy, prominently nerved, deeply divided into 3–5 major narrow lanceolate lobes and smaller basal teeth, appendages basally attached, either flat or somewhat inflated and similar in shape to the bracteoles but somewhat small; seed broadly elliptic, transversely positioned; radicle directed tangentially from the vertical. **Gibber saltbush. Fig. 1L.**

S.A.: LE, GT, FR, EP; N.T.; Qld, N.S.W. Flowers: probably mainly May–Oct.

13. **Atriplex holocarpa** F.Muell., *Rep. Pl. Babbage's Exped.* 19 (1859). — *Senniella spongiosa* var. *holocarpa* (F.Muell.) Aellen, *Bot. Jahrb. Syst.* 68: 418 (1938); *Senniella spongiosa* var. *xylocarpa* Aellen, *Bot. Jahrb. Syst.* 68: 422 (1938); *A. spongiosa* var. *holocarpa* (F.Muell.) J.M.Black, *Fl. S. Austral.* ed. 2, 2: 300 (1948). — **Illustr.:** *Pl. W. N.S.W.* 239 & fig. 44/9 (1982); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 33 (1988).

Rounded annual or short-lived perennial herb to 30 cm high, monoecious; leaves thin (rarely leathery) scurfy on both surfaces; lamina deltoid to narrow-rhomboid, 15–30 mm long, apex acute, base obtuse, margin sinuate to serrate; petiole more or less half the length of the lamina. **Flowers** in axillary glomerules. **Fruiting** bracteoles sessile, fused, globular to obovoid, 8–12 mm long, shortly apiculate, inflated; epidermal covering thin, scurfy or eventually glabrous, supported on a network of fibrous veins; utricle cavity compressed-elliptic in the centre of the bracteoles, with a thin woody wall; seed erect, broadly elliptic; radicle lateral, erect. **Pop saltbush. Fig. 1M, Pl. 2B–C.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, SL; All mainland States. Often found on flood plains or sandy flats. Flowers: June–Oct.

Very similar to and often growing with *A. spongiosa*.

14. **Atriplex humifusa** Paul G.Wilson in A.S.George (ed.), *Fl. Austral.* 4: 323 (1984) — *Atriplex* sp. (nr. *semibaccata* R.Br.) Paul G. Wilson in J.P.Jessop, *Fl. Central Austral.* 55 (1981) — **Illustr.:** J.P.Jessop, *op. cit.* fig. 82 (11) (1981).

Rounded annual or shortly-lived perennial to 30 cm high, monoecious; leaves thin, subsessile or shortly petiolate, elliptic, ovate to obovate, 8–30 mm long, apex obtuse to acute, margin entire to repand and sparsely, bluntly dentate, upper and lower surface glabrescent, or lower surface scurfy. **Male** flowers in small glomerules 2–3 mm diam. in distal axils or forming small spikes; female flowers in axillary clusters. **Fruiting** subsessile, thin, flat, deltoid to cordate, acute or obtuse, 4–6 mm long and wide, free to base, entire or sparsely denticulate, reticulate, scurfy. Seed transversely elliptic; radicle ascending.

S.A.: LE; N.T.; Qld.

The mature fruits are reported as pink to red.

(Vulnerable status in S.A.)

15. **Atriplex incrassata** F.Muell., *Rep. Pl. Babbage's Exped.* 1858 20 (1859). — *A. cinerea* subsp. *incrassata* (F.Muell.) Aellen, *Bot. Jahrb. Syst.* 68:398 (1938).

Intricately branched shrub to 1 m high, dioecious; leaves ovate-deltoid, sinuate-dentate, truncate or slightly cuneate at the base, with a thin scaly covering on both surfaces; lamina 15–20 mm long; petiole 2–3 mm long. **Male** flowers in disjunct or continuous glomerules c. 5 mm wide and forming slender spikes or panicles; female flowers in dense disjunct glomerules arranged in open leafy panicles. **Fruiting** bracteoles subsessile, orbicular to obtusely deltoid, c. 10 mm long and wide; valves smooth, entire or bluntly denticulate, free to near the base, hard, ultimately thickened and convex except for the papery reflexed margin; seed with a lateral erect radicle. **Oodnadatta saltbush. Fig. 1N, Pl. 2E–G.**

S.A.: LE, GT, FR (Lake Weatherstone); N.T. Flowers: Apr.–June.

Atriplex nummularia subsp. *omissa* has been confused with *A. incrassata* in S.A.

16. **Atriplex intermedia** R.H.Anderson, *Proc. Linn. Soc. New South Wales* 5: 598 (1930).

Sprawling annual or short-lived perennial to 30 cm high, monoecious; leaves thin, sessile or shortly petiolate, elliptic to obovate, 10–20 mm long, obtuse, entire to slightly sinuate-dentate, scurfy on both surfaces. **Male** flowers in glomerules in the terminal axils; female flowers in axillary clusters **Fruiting** bracteole with a spongy cylindrical pedicel c. 3 mm long, continuous with the short thickened tube from which arise the appressed coarsely reticulate rhomboid lobes c. 3–4 mm long, with a toothed margin, the whole glossy when mature; seed circular; radicle erect, prominently projecting. **Fig. 1O.**

S.A.: LE, GT, EA; N.T.; Qld; N.S.W. Flowers: Jul.–Oct.

17. **Atriplex kochiana** Maiden, *Trans. & Proc. Roy. Soc. South Australia* 21: 87 (1897).

Erect rounded annual or short-lived perennial to 40 cm high, monoecious; leaves thin, with a scaly sheen on both surfaces; lamina very broadly obovate, base cuneate; petiole slightly winged, more or less half the length of the lamina. **Male** flowers in glomerules forming continuous or disjunct slender spikes; female flowers in axillary clusters. **Fruiting** bracteoles sessile or minutely stipitate, united towards the base into a compressed broadly turbinate tube 0.5–1.5 mm high and 1.5–2.5 mm wide at the apex, expanding above into thin appressed prominently veined fan-shaped valves with sinuate margins, 5–8 mm wide and 2.5 mm high; appendages inflated, compressed, ovate to orbicular, cordate at the base, equal to or exceeding the valves, attached at the apex of the tube of each bracteole by a short stipe; seed depressed-orbicular; radicle lateral, erect. **Fig. 1P.**

S.A.: LE, GT, FR. Flowers: May–Sep.

(Vulnerable status in S.A.)

18. **Atriplex leptocarpa** F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 74 (1858). — *A. leptocarpa* var. *armata* Aellen, *Bot Jahrb. Syst.* 68: 362, *nom. illeg.*; *A. leptocarpa* var. *inermis* Aellen, *op.cit.* 361; *A. leptocarpa* f. *minor* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 55: 499 (1930); *A. leptocarpa* var. *minor* (R.H.Anderson) J.M.Black, *Fl. S. Austral.* ed. 2: 299 (1948); *A. sturtii* S.W.L.Jacobs, *Telopea* 2: 453 (1983). — **Illustr.:** F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 3 (1889); *Pl. W. N.S.W.* 240 (1982).

Decumbent annual or short-lived perennial with slender branches, monoecious; leaves narrow-elliptic to narrow-oblongate or rhomboid; remotely dentate to entire, 10–30 mm long, scaly on both surfaces. **Male** flowers in axillary glomerules or in short terminal spikes; perianth glabrous; female flowers clustered in the leaf axils. **Fruiting** bracteoles fused to the apex, cylindrical to urceolate (sometimes compressed when young) flattened distally, seemingly sessile or with a short slender pedicel (this often developing a spongy cylindrical sheath with age continuous with the bracteoles), in all 4–6 mm long; basal portion often thickened and sometimes tuberculate; distal portion herbaceous and more or less flattened, strongly nerved; apex truncate to acute, often shortly 3-toothed; seed circular to ovate; radicle lateral, slightly exerted. **Slender-fruited saltbush. Fig. 1Q, 2O.**

S.A.: LE, NU, GT, EP (Yudnapinna), NL, MU, SL (Two Wells); *W.A.; N.T., Qld; N.S.W.; Vic. Flowers: probably all months.

Although Jacobs (1983) recognised *A. sturtii* (= *A. leptocarpa* var. *minor*), I have found that this taxon grades with both *A. leptocarpa* and *A. turbinata* and is therefore not maintained.

19. **Atriplex limbata** Benth., *Fl. Austral.* 5: 178 (1870). — *A. limbata* var. *sexifida* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 38: 462 (1914).

Erect perennial branching near the base, c. 30 cm high, monoecious; leaves rhomboid or circular and c. 10 mm long to narrow-elliptic or narrow-obovate and c. 40 mm long, including a petiole one-third of the length of the lamina, sinuate to entire, scaly-tomentose on both surfaces. **Male** flowers in glomerules c. 5 mm diam., in the upper leaf axils or forming slender interrupted spikes; female flowers in axillary glomerules. **Fruiting** bracteoles united (except at the apex where closely appressed) to form a hard cylindrical tube 1.5–3 mm long, passing into a slender or thick pedicel from half as long to as long as the tube; apex rounded, apiculate, with a pair of lateral erect or spreading horn-like lobes or these reduced to small teeth; appendages terminal, flat, spreading, fan-shaped, 1–3 mm long, crenulate or lobed or divided into 2; seed ellipsoid, erect, with an erect radicle. **Spreading saltbush. Fig. 1R.**

S.A.: NW, LE, GT, FR, EA, EP, MU; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers: probably all months.

20. **Atriplex lindleyi** Moq. in A.DC., *Prodr.* 13(2): 100 (1849). — *A. halimoides* Lind. in T.Mitch., *Three Exped. Austral.* 1: 282 (1838), *nom. illeg. non* Tineo (1827).

Annual or short-lived perennial c. 30 cm high, monoecious; leaves thin, narrow-obovate to rhomboid-orbicular, acute or obtuse to rounded, cuneate at the base, in all c. 20 mm long, margin coarsely sinuate-dentate to entire. **Male** flowers in small glomerules towards the branch apices; female flowers in scattered axillary clusters. **Fruiting** bracteoles apparently sessile, united except near the apex, strongly dorsiventrally flattened to spongy-turbinate or subglobose, variously winged around the apex or with opposite erect circular wing-like appendages, in all 5–18 mm long and wide, prominently or minutely apiculate due to the free triangular bracteole apices 1–2 mm high; seed

circular; radicle basal, horizontal. **Baldoo, eastern flat-top saltbush** (not applicable to all subspecies).

This species is extremely variable in the shape of its leaves and of its fruiting bracteoles. The type variant approaches subsp. *conduplicata* in having a pair of dorsal and ventral wings. At the other extreme (represented by the type of subsp. *inflata*) the bracteoles are subglobose and have almost no wing. Hybridisation probably occurs between the subspecies.

- 1: Fruiting bracteoles subglobose, wingless or almost so; leaves narrow, acute..... 20b. **A. lindleyi** subsp. **inflata**
1. Fruiting bracteoles more or less turbinate to strongly dorsiventrally compressed; upper surface or lateral margins produced into spreading or ascending wings
2. Fruiting bracteoles dorsiventrally flattened, broadly elliptic to orbicular in outline due to the opposite wing-like appendages that unite to form a winged tube; leaves rounded..... 20a. **A. lindleyi** subsp. **conduplicata**
- 2: Fruiting bracteoles spongy; wing-like appendages not passing to the base
3. Upper surface of the bracteoles produced into a dorsal and a ventral wing, leaves acute to obtuse..... 20c. **A. lindleyi** subsp. **lindleyi**
- 3: Upper surface of the bracteoles produced into an erect dorsal and ventral wing and a pair of smaller spreading lateral lobes; leaves obtuse to rounded.....
..... 20d. **A. lindleyi** subsp. **quadripartita**

20a. **Atriplex lindleyi** subsp. **conduplicata** (F.Muell.) Paul G.Wilson in A.S.George (ed.), *Fl. Austral.* 4: 323 (1984). — *A. conduplicata* F.Muell., *Australas. J. Pharm.* 1: 429 (1886); *A. halimoides* var. *conduplicata* (F.Muell.) F.Muell. & Tate, *Trans. & Proc. Roy. Soc. South Australia* 16: 345 (1896); *Blackiella conduplicata* (F.Muell.) Aellen, *Bot. Jahrb. Syst.* 68: 424 (1938); ?*B. conduplicata* var. *phyllocarpa* Aellen, *Bot. Jahrb. Syst.* 68: 425 (1938). — **Illustr.:** *Pl. W. N.S.W.* 238 (1982).

Leaves obovate to rhomboid-orbicular, in all 20–40 mm long, apex obtuse to rounded. **Fruiting** bracteoles slightly spongy, covered with a scaly sheen, united almost to the apex, broadly elliptic to orbicular in outline due to the opposite erect circular appendages that unite in the middle to form a winged tube and pedicel, in all 5–18 mm long and wide; upper surface of the bracteoles rounded and surmounted by the prominent free oblong-triangular apices which do not exceed the winged appendages. **Fig. 1T, Pl. 2H.**

S.A.: NW, LE, GT, FR, EA, EP; N.T.; Qld; N.S.W.; Vic. Flowers: Flowering: Apr.–Oct.

20b. **Atriplex lindleyi** subsp. **inflata** (F.Muell.) Paul G.Wilson in A.S.George (ed.), *Fl. Austral.* 4: 323 (1984). — *A. inflata* F. Muell., *Trans. & Proc. Philos Inst. Victoria* 2: 75 (1858); *Blackiella inflata* (F. Muell.) Aellen, *Bot. Jahrb. Syst.* 68: 426 (1938). — **Illustr.:** *Pl. W. N.S.W.* fig. 44/13 (1982), as *A. lindleyi*.

Leaves elliptic to narrow-elliptic, acute, remotely sinuate-dentate. **Fruiting** perianth spongy, subglobose, c. 8 mm long and wide; base rounded to obtuse; upper surface flat but curved laterally, with the margins sometimes produced into a narrow slightly inflated wing; free apex of bracteoles narrow-triangular, c. 1 mm high. **Fig. 1U.**

S.A.: NW, LE, GT, FR, EA, EP, NL, MU, YP; W.A.; N.T.; N.S.W.; Vic. Flowers: Flowering: Apr.–Oct.

20c. **Atriplex lindleyi** subsp. **lindleyi** — E.R.Rotherham *et al.*, *Fl. Pl. N.S.W. South. Queensl.* fig. 441 (1975); *Pl. W. N.S.W.* fig. 44/4 (1982), as *A. conduplicata*.

Leaves oblanceolate to narrow-obovate, acute, entire to dentate. **Fruiting** bracteoles turbinate, somewhat dorsiventrally compressed; upper surface curved; wing variable, surrounding the apex of the tube as a pair of lobes, dorsal and ventral, which are somewhat decurrent down the tube when this is compressed. **Fig. 1S.**

S.A.: LE, GT, FR, EA, EP, NL, MU; Qld; N.S.W.; Vic. Flowers: Flowering: Apr.–Oct.

20d. **Atriplex lindleyi** subsp. **quadripartita** Paul G.Wilson in A.S.George (ed.), *Fl. Austral.* 4: 324 (1984). — *A. lindleyi* var. *quadripartita* J.M.Black, *Fl. S. Austral.* ed. 2, 2: 300 (1948), *nom. inval.*

Leaves broadly obovate to rhomboid, coarsely dentate; apex obtuse to rounded. **Fruiting** bracteoles with an

obconical slightly compressed spongy tube c. 5 mm long; wing deeply 4-lobed, dorsal and ventral lobes c. 5 mm long, erect and rounded, lateral lobes smaller, spreading.

S.A.: LE, GT, FR, EA, EP (Cariewerloo); N.S.W. Flowers: Apr.–Oct.

21. **Atriplex lobativalvis** F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 6 (1889) & *Victorian Naturalist* 9: 187 (1893). — *A. lobativalvis* var. *biarcuata* Aellen, *Bot. Jahrb. Syst.* 68: 408 (1938).

Prostrate herb with branches to 20 cm long, monoecious; leaves small, sessile or shortly petiolate, sparsely to moderately scurfy on both surfaces; lamina ovate to broadly elliptic or rhomboid (the broader leaves sessile), 5–10 mm long, remotely sinuate-dentate. **Flowers** in axillary clusters. **Fruiting** bracteoles scurfy, sessile or slender-pedicellate, rhomboid to fan-shaped, 2–3 mm long and wide; basal half united into a deltoid tube prominently keeled on either side; distal half free, herbaceous, deeply divided into 5 or rarely 3 narrowly triangular lobes; seed circular, prominently biconvex corresponding to the keels of the bracteoles; radicle lateral, erect. **Fig. 1V.**

S.A.: NW, LE, GT, EA; N.T.; Qld; N.S.W. Found in wet situations on heavy soil. Flowers: all months.

22. **Atriplex macropteroarpa** (Aellen) H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 113 (1965). — *Blackiella macropteroarpa* Aellen, *Bot. Jahrb. Syst.* 68: 427 (1938).

Annual herb to 30 cm high; leaves obovate to orbicular-rhomboid, c. 15–25 mm long, scaly on both surfaces, apex rounded, base cuneate and narrowed into a petiole about half the length of the lamina, margin sinuate-dentate. **Male** flowers in terminal glomerules or forming disjunct spikes or panicles; female flowers in scattered axillary glomerules. **Fruiting** bracteoles sessile, united to near the apex, glabrous; tube turbinate, with a rounded base, 2–4 mm long, spongy, passing upwards into a pair of horizontal wing-like entire slightly spongy auriculate appendages 5–8 mm wide, the margins of which are decurrent down the tube; apex of the tube rounded, its centre apiculate, with minute narrow-triangular terminal lobes; seeds with a basal horizontal radicle. **Fig. 1W.**

S.A.: LE, GT, FR, EP; W.A.; Qld; N.S.W. Flowers: Apr.–Nov.

23. **Atriplex morrisii** R.H.Anderson, *Proc. Linn. Soc. New South Wales* 55: 504, t. 18, figs 1, 2 (1930). — *Morrisiella morrisii* (R.H.Anderson) Aellen, *Bot. Jahrb. Syst.* 68: 423 (1938).

Erect rounded annual or short-lived perennial to 30 cm high, monoecious; leaves broadly obovate, sinuate-dentate, scurfy or scaly on both surfaces, apex rounded, base cuneate and passing into a short petiole, in all 10–25 mm long. **Flowers** axillary; male flowers mixed with a few female, in glomerules in distal axils; perianth scurfy; female flowers in scattered clusters of 1–3. **Fruiting** bracteoles shortly pedicellate, broadly oblong, c. 5 mm long, fused to the apex and bearing on each side a rugulose spongy appendage over the lower two-thirds of the bracteole; apical portion flat, 3-toothed; seed orbicular; radicle lateral, erect. **Fig. 1X.**

S.A.: LE, NU, FR; N.T.; Qld; N.S.W. Flowers: Oct.–Feb.

(Vulnerable status in S.A.)

24. **Atriplex muelleri** Benth., *Fl. Austral.* 5: 175 (1870). — **Illustr.:** F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 7 (1889).

Spreading to erect herb branching from the base, to 30 cm high; leaves thin, broadly obovoid, apex rounded, base cuneate and passing into a petiole half the length of the lamina, in all 15–30 mm long, margin undulate to sinuately lobed, upper surface glabrescent, lower surface scaly. **Male** flowers clustered in terminal axils; female flowers in scattered axillary clusters. **Fruiting** bracteoles sessile or almost so, bluntly deltoid to circular, swollen, hard, smooth, c. 3 mm long and wide at the apex, connate except at the rounded apex, valves herbaceous, forming a narrow denticulate margin around the apex of the bracteole; appendages absent; seed circular, radicle lateral, erect. **Muellers (or annual) saltbush. Fig. 1Y.**

S.A.: LE (far north-east); W.A.; N.T.; Qld; N.S.W. Flowers: not available.

25. **Atriplex nessorhina** S.W.L.Jacobs, *Telopea* 2: 453 (1983). — **Illustr.:** *Pl. W. N.S.W.* fig. 44/33 (1982), as *Atriplex* sp. (donald duck saltbush).

Rounded annual or short-lived perennial herb to 30 cm high, monoecious; leaves thin, with a scaly sheen on each side, very narrow-oblong to oblanceolate, 1.5–5 cm long, acute to obtuse, entire or remotely dentate, narrowed at the base to an indefinite petiole. **Flowers** in clusters, axillary and spicate, the glomerules well separated, terminal glomerules mixed male and female, the lower ones female. **Fruiting** bracteoles sessile, 5–10 mm long; upper half free, flat, 3-lobed, central lobe very narrow-oblong, acute, 3–5 mm long, lateral lobes erect, slender, acute, c. 1 mm long; basal half fused and covered on each side by a swollen inverted U-shaped appendage, spiny or entire; seed circular; radicle lateral, erect. **Donald Duck saltbush. Fig. 2A.**

S.A.: GT, EP (Lake Gilles); Qld; N.S.W. Found in saline areas or on surrounding dunes. Flowers: all months.

26. **Atriplex nummularia** Lindl. in T.Mitch., *J. Exped. Trop. Australia* 64 (1848). — **Illustr.:** *Pl. W. N.S.W.* 241, 242 (1982); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 109 (1988).

Erect shrub to 3 m high, predominantly dioecious; leaves broad-elliptic to ovate or obovate, obtuse, denticulate to coarsely dentate, smooth, grey-green; lamina 2–4 cm long, petiole 0.5–1 cm long. **Male** flowers in disjunct glomerules c. 6 mm diam., arranged in panicles; female flowers in compact clusters arranged in panicles c. 20 cm long. **Fruiting** bracteoles sessile; valves free, orbicular to rhomboid, 5–15 × 5–11 mm, entire or denticulate, rounded at the apex, cuneate to cordate at the base, papery or thickened towards the base around the seed; appendages absent. **Old-man saltbush.**

A. nummularia is a very polymorphic species and many specimens in the State Herbarium have not been identified to subspecies due to apparent intergrading and the difficulty in identifying them. *A. incrassata* and *A. rhagodioides* are closely related.

This species has become widely planted as a fodder plant in Australia and overseas. It is also used to rehabilitate, or stabilise, saline soils.

1. Bracteoles thickened and woody towards the base; margins appressed or slightly spreading
 2. Bracteoles orbicular; base truncate or cordate..... 26a. **A. nummularia** subsp. **nummularia**
 2. Bracteoles almost rhomboid; base cuneate..... 26b. **A. nummularia** subsp. **omissa**
- 1: Bracteoles not thickened; margins prominently reflexed..... 26c. **A. nummularia** subsp. **spathulata**

- 26a. **Atriplex nummularia** subsp. **nummularia** — *A. nummularia* subsp. *erosa* Aellen, *Bot. Jahrb. Syst.* 68: 379, fig. 2, G5, 377 (1937); *A. nummularia* subsp. *omissa* Aellen, *Op. cit.* 379. — **Illustr.:** F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 56 (2003).

Shrub 2–3 m high; lower branches decumbent; leaves broad-elliptic; lamina 3–4 cm long and wide; petiole to 1 cm long. **Fruiting bracteoles** variable but with the valves appressed or slightly spreading. **Fig. 2B, Pl. 2I–J.**

S.A.: NW, LE, GT, FR, EA, NL, EP, MU, YP; NT; Qld; N.S.W.; Vic. Flowers: all months.

- 26b. **Atriplex nummularia** subsp. **omissa** Aellen, *Bot. Jahrb. Syst.* 68: 379 (1937).

Shrub to 2 m high; lower branches decumbent; leaves elliptic, rhomboid or orbicular, acute or obtuse, sparsely serrate; lamina mostly 1–2 × 0.8–3 cm; petiole 2–15 mm long. **Fruiting bracteoles** rhomboid, obtuse or rounded, cuneate at the base, 8–10 × 3–11 mm, thickened and woody towards the base, minutely denticulate on the margin.

S.A.: LE; N.T; Vic; N.S.W.; Qld. Flowers: all months.

This taxon has been confused with *A. incrassata*; its status in S.A. is uncertain.

- 26b. **Atriplex nummularia** subsp. **spathulata** Aellen, *Bot. Jahrb. Syst.* 68: 380 (1937).

Erect shrub to 1.5 m high; leaves elliptic to obovate, coarsely sinuate-dentate, 1.5–2 cm long, grading at the base into an indistinct petiole. **Fruiting** bracteoles orbicular, entire or denticulate, the margins prominently reflexed.

S.A.: NU; W.A. Flowers: all months.

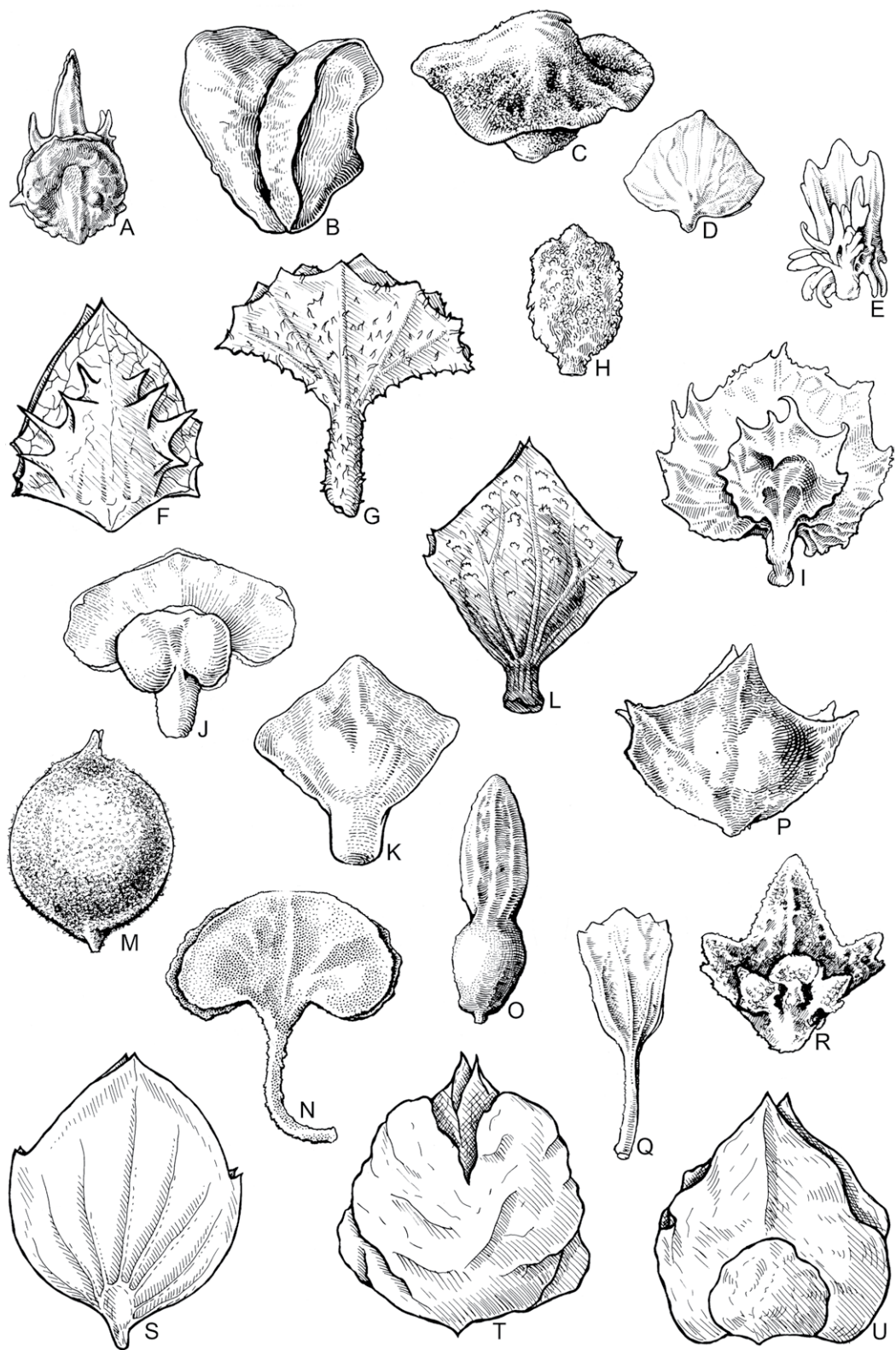


Fig. 2. *Atriplex* fruits. A, *A. nessorhina*; B, *A. nummularia* subsp. *nummularia*; C, *A. obconica*; D, *A. paludosa* subsp. *cordata*; E, *A. papillata*; F, *A. prostrata*; G, *A. pseudocampanulata*; H, *A. pumilio*; I, *A. quadrivalvata* var. *quadrivalvata*; J, *A. quinii*; K, *A. rhagoides*; L, *A. semibaccata*; M, *A. spongiosa*; N, *A. stipitata*; O, *A. leptocarpa*; P, *A. suberecta*; Q, *A. turbinata*; R, *A. velutinella*; S–U, *A. vesicaria*. Illustration reproduced from *Flora of Central Australia* 57, Fig. 82 (1981), *Flora of Australia* 4: 92–93, Fig. 20–21 (1984), and *Flora of South Australia* 1: 242, Fig. 150 (1986).

27. ***Atriplex obconica*** Paul G. Wilson in A.S. George (ed.), *Fl. Austral.* 4: 324 (1984).

Rounded annual or short-lived perennial c. 30 cm high, monoecious; leaves petiolate, thin, with a thin scurfy indumentum (or developing a silvery sheen); lamina broadly obovate to rhomboid, 10–15 mm long, rounded at the apex, sinuate on the margin; petiole about half the length of and grading into the lamina. **Flowers** in mixed axillary clusters. **Fruiting** bracteoles fused, subcampanulate, seemingly sessile, scurfy-pubescent; tube compressed-obconical, c. 3 mm long, slightly inflated, fibrous, the upper half with a compressed spherical cavity

enclosing the utricle; wing more or less horizontal to undulate, reticulate, almost circular and sinuate on the margin or divided into semicircular halves, in all 5–8 mm diam.; apex flat and continuous with the wings or produced in the center into a narrowly triangular 2-lobed tip to 2 mm long; seed circular; radicle basal, horizontal. **Fig. 2C.**

S.A.: NW, LE, GT, FR. Often found along drainage channels in subsaline soils. Flowers: all months.

28. **Atriplex paludosa** R.Br., *Prodr.* 406 (1810).

Decumbent or erect shrub to 1 m high, predominantly dioecious; leaves narrow-elliptic to orbicular, acute or obtuse, attenuate at the base, entire; lamina 1–4 cm × 2–15 mm; petiole 2–4 mm long. **Male** flowers in disjunct glomerules c. 2 mm diam., forming panicles 6–25 cm long; female flowers in congested panicles c. 15 cm long. **Fruiting** bracteoles sessile or with a slender or cylindrical pedicel 1–3 mm long; valves free, orbicular to triangular, obtuse to acute, attenuate to cordate at the base, 7–12 mm long and wide, entire or with a prominent antrorse tooth on either margin above the widest point, or rarely denticulate; appendages absent (rarely present in subsp. *paludosa*). **Marsh saltbush.**

1. Decumbent shrub; leaves glabrous above..... 28b. **A. paludosa** subsp. **paludosa**

1: Erect shrub; leaves scaly all over..... 28a. **A. paludosa** subsp. **cordata**

28a. **Atriplex paludosa** subsp. **cordata** (Benth.) Aellen, *Bot. Jahrb. Syst.* 68: 405 (1938). — *A. paludosa* var. *cordata* Benth., *Fl. Austral.* 5: 170 (1870). ?*A. reniformis* R.Br., *Prodr.* 406 (1810); ?*A. paludosa* var. *acuticordata* Aellen, *op. cit.* 404 (1938); ?*A. paludosa* var. *cordivalvis* Aellen, *op. cit.* 404 (1938); *Pachypharynx acuminata* Aellen, *op. cit.* 430 (1938).

Erect shrub; leaves very narrow-elliptic, acute, entire, scaly all over; lamina 15–25 × 2–4 mm; petiole c. 2 mm long. **Fruiting** bracteoles sessile or occasionally with a slender pedicel to 3 mm long; valves orbicular to triangular, 7–10 × 8–12 mm, acute, truncate to cordate at the base, entire or tridentate; appendages absent. **Fig. 2D, Pl. 3A–D.**

S.A.: NU, EP, NL, MU, YP, SL, KI, SE; W.A. Often found on coastal stable dunes but also inland in the MU region. Flowers: all months.

28b. **Atriplex paludosa** subsp. **paludosa**

Decumbent shrub to 3 m diam.; leaves narrow-elliptic, acute, entire, glabrous above, white-scaly below; lamina 15–30 × 2–8 mm; petiole 2–3 mm long. **Fruiting** bracteoles sessile; valves somewhat fleshy, triangular, acute, to 1 cm long and wide, truncate or slightly cordate at the base, entire or with 2 antrorse lobes above the widest point (tridentate); appendages absent or rarely paired. **Marsh saltbush.**

S.A.: SL, SE; Vic.; Tas. Found on the landward edges of coastal salt marshes. Flowers: all months.

29. **Atriplex papillata** J.H.Willis, *Victorian Naturalist* 73: 152 (1957). — **Illustr.:** *Fl. Victoria* 3: 139, fig. 27t (1996).

Prostrate to spreading annual or short-lived perennial herb to 20 cm high, monoecious; branches slender; leaves thick, elliptic to narrow-elliptic, sessile, 10–20 mm long, incurved, with a densely grey-scaly indumentum below, sparsely scurfy above. **Male** flowers (with 1 or 2 female) in terminal axillary glomerules; female flowers in axillary clusters of 2–4. **Fruiting** bracteoles densely scurfy, sessile, broad-oblong, 1–4 mm long, fused to near the apex; lower half bearing numerous prominent soft papilliform appendages; upper half smooth and flat, shortly three-toothed; seed circular; radicle lateral, erect. **Coral saltbush. Fig. 2E.**

S.A.: EA, MU (extreme east near the Murray River); N.S.W.; Vic. Found in strongly saline soil. Flowers: Mar.–June. (Endangered status in S.A.)

30. ***Atriplex prostrata** Boucher ex DC. in Lam. & DC., *Fl. Franç.* ed. 3, 3: 387 (1805). — *A. hastata* var. *salina* Wallr. ex Gren. in Gren. & Godron, *Fl. France* 3: 12 (1855). — **Illustr.:** S.Ross-Craig, *Dram. Brit. Pl.* 25: pl. 25 (1968) as *A. hastata*.

Prostrate to erect annual herb c. 50 cm high, monoecious; branches angular; leaves petiolate, opposite below, alternate above, scurfy to glabrous; lower leaves triangular to hastate, lamina 1.5–5 rarely to 8 cm long, basal

lobes (if present) spreading or slightly backwards-pointing, margin entire or sparsely dentate, apex obtuse to acute; upper leaves triangular to narrow-ovate, decreasing in size upwards. **Flowers** mixed, clustered, forming panicle inflorescences. **Fruiting** bracteoles sessile, ovate to more often triangular or rhombic, free to the base, 3–6 mm long, entire to dentate, not thickened, smooth or tuberculate on the back, often turning black with age; seed circular; radicle basal, horizontal. **Hastate orache, mat saltbush. Fig. 2F, Pl. 4J.**

S.A.: *FR, *EP, *NL, *MU, *YP, *SL, *KI, *SE; *W.A.; *N.S.W.; *Vic.; *Tas. Native to Europe. Found in wet somewhat saline situations, particularly creek margins and estuaries. Flowers: all months.

A polymorphic species not easily distinguishable from some variants of *A. patula* L. and *A. australasica* Moq.

31. **Atriplex pseudocampanulata** Aellen, *Bot. Jahrb. Syst.* 68: 365 (1937). — **Illustr.:** *Pl. W. N.S.W.* 243 (1982).

Spreading to rounded herb to 30 cm high, monoecious; leaves sessile, elliptic, c. 10 mm long, entire or sinuate, cuneate to rounded or truncate at the base, scurfy-tomentose on both surfaces. **Flowers** in axillary clusters. **Fruiting** bracteoles pedicellate, compressed, broadly rhomboid to broadly deltoid, united in the lower half, reticulate and herbaceous towards the apex, 2–3 × 3–4 mm, often with small inflated or foliaceous tubercles on one face near the base, valves equal or almost so, slightly dentate to entire; pedicel c. 1 mm long, often thickened at maturity; seed circular; radicle lateral. **Mealy saltbush. Fig. 2G.**

S.A.: NW, LE, GT, FR, EA, MU; N.T.; Qld; N.S.W.; Vic. Flowers: Mar.–June. In Vic. the species is native to the Murray River floodplain, but also naturalising in other parts of the State.

32. **Atriplex pumilio** R.Br., *Prodr.* 406 (1810). — *A. decumbens* R.Br. ex Schultes in Roemer & Schultes, *Syst. Veg.* 6: 289 (1820). *A. prostrata* R.Br., *Prodr.* 406 (1810), *nom. illeg. non* Boucher ex DC. (1805).. — **Illustr.:** *Fl. Victoria* 3: 139, fig. 27i (1996).

Prostrate to decumbent perennial, monoecious; leaves very shortly petiolate, elliptic to circular, 2–6 mm long, with a scaly sheen on both surfaces. **Flowers** in glomerules; male glomerules terminal or in distal leaf axils on the principal branchlets; female glomerules scattered along branches or on dwarf lateral shoots, sometimes reduced to 1 flower. **Fruiting** bracteoles broadly oblong-elliptic, convex, obtuse or rounded at the apex, 1–1.5 mm long, sessile or minutely pedicellate, valves united except at the apex. **Mat saltbush. Fig. 2H.**

S.A.: NU, FR, EA, EP, NL, MU, YP; W.A.; Qld; N.S.W.; Vic. Flowers: all months.

33. **Atriplex quadrivalvata** Diels in Diels & E.Pritzel, *Bot. Jahrb. Syst.* 35: 182 (1904). — *Haloxanthium quadrivalvatum* (Diels) Ulbr., *Nat. Pflanzenfam.* ed. 2, 16c: 521 (1934).

Annual or short-lived perennial c. 20 cm high, branching from near the base, monoecious; leaves, inflorescence and young branches covered with white globular to tubular vesicular hairs; leaves broadly ovate, 5–10 mm long, entire, rounded to cordate at the base, sessile or very shortly petiolate, crowded towards the branch apices. **Flowers** in axillary glomerules, containing 1 male and several female. **Fruiting** bracteoles cordate to orbicular, c. 4 mm long and wide, spinulose on the margin, sessile or almost so; appendages attached near the base of each bracteole, similar in shape to but half as wide as the valves or absent; seed with a lateral erect radicle.

1. Fruiting bracteoles with a flat orbicular appendage 33a. **A. quadrivalvata** var. **quadrivalvata**
 1: Fruiting bracteoles without appendages 33b. **A. quadrivalvata** var. **sessilifolia**

33a. **Atriplex quadrivalvata** var. **quadrivalvata**

Fruiting bracteoles with an appendage near the base similar in shape to but about half as wide as the valves. **Fig. 2I.**

S.A.: NW, LE, GT; W.A.; N.T. Flowers: May–Oct.

- 33b. **Atriplex quadrivalvata** var. **sessilifolia** (Ising) Ising, *Trans. Roy. Soc. South Australia* 81: 166 (1958). — *A. sessilifolia* Ising, *Trans. Roy. Soc. South Australia* 78: 111 (1955).

Fruiting bracteoles without appendages.

S.A.: NW, LE. Flowers: May–Oct.

This variety appears to hybridise or intergrade with the typical one.

34. **Atriplex quinii** F.Muell., *Victorian Naturalist* 5: 96 (1888). — **Illustr.:** F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 12 (1889); *Pl. W. N.S.W.* 245 (1982).

Rounded perennial herb c. 20 cm high, monoecious; leaves thin, narrow-obovate to narrow-oblongate, obtuse, 20–30 mm long, entire, scalloped or coarsely toothed towards the apex, covered with a grey scaly sheen on both surfaces. **Male** flowers in glomerules c. 2 mm diam., forming short interrupted spikes or panicles; female flowers in axillary clusters. **Fruiting** bracteoles thin, reniform, c. 6 mm high, c. 10 mm wide, entire, free to the very short deltoid tube, with a swollen reniform appendage c. 5 mm wide, attached at the base of each bracteole; pedicel short, cylindrical to narrow-obconic, 2–4 mm long; seed with an erect radicle. **Fig. 2J, Pl. 3E–F.**

S.A.: NW, LE, GT; W.A.; N.T.; Qld; N.S.W. In rocky soils or slopes of hills. Flowers: all months especially July–Sep.

35. **Atriplex rhagodioides** F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 74 (1858). — *A. cinerea* subsp. *rhagodioides* (F.Muell.) Aellen, *Bot. Jahrb. Syst.* 68: 398 (1938).

Rounded shrub 1.5–3 m high, dioecious; leaves shortly petiolate, thin, deltoid (or with rounded sides), sometimes very shortly hastate, entire or rarely slightly undulate, lamina 15–20 mm long, a pale bluish grey, with a scaly sheen on both surfaces. **Male** flowers in disjunct or continuous glomerules 2–3 mm diam., forming divaricately branched terminal panicles which usually bear a few female flowers towards their base; female flowers in clusters in the axils of the small distal leaves or paniculate. **Fruiting** bracteoles sessile, leathery, rhomboid to fan-shaped, c. 3 mm long and wide, united only at the thickened base, entire or crenulate, eventually hard and much thickened all over, becoming ellipsoid to broadly rhomboid, smooth; seed circular, with an erect radicle. **River saltbush, silver saltbush. Fig. 2K, Pl. 3G–I.**

S.A.: MU; N.S.W.; Vic.; (along Murray River). Usually on river banks or flats. Flowers: Nov.–Mar.

This species should possibly be treated as forming part of the polymorphic species, *A. nummularia*.

36. **Atriplex semibaccata** R.Br., *Prodr.* 406 (1810). — **Illustr.:** *Pl. W. N.S.W.* 245 (1982).

Prostrate or decumbent perennial herb with slender spreading branches arising from a woody tap root, monoecious; leaves thin, oblong-elliptic, obtuse, shortly petiolate, 1–2 cm long, almost glabrous above, scaly beneath, margin sinuate-dentate to entire. **Male** flowers in small glomerules in distal axils; female flowers in scattered axillary clusters. **Fruiting** bracteoles minutely pedicellate, rhomboid, 2–5 mm long and wide, acute, red and succulent when ripe, glabrous; margin entire or with 1–4 small teeth; appendages absent; seed with an ascending radicle. **Berry saltbush, creeping saltbush. Fig. 2L, Pl. 3J–L.**

S.A.: LE, NU, FR, EA, EP, NL, MU, YP, SL; W.A.; Qld; N.S.W.; Vic.; *?Tas. Widespread in northern Australia. Introduced for grazing in Tas. and in many parts of the mainland; usually found in heavy soil (sometimes slightly saline). This species has become widespread and weedy in the south western states of the U.S.A. including California, New Mexico, Arizona and Texas and also in the Hawaiian islands. In America it is known as Australian saltbush. Flowers: all months.

37. **Atriplex spongiosa** F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 74 (1858). — *A. holocarpa* var. *spongiosa* (F.Muell.) Maiden & Betche, *Census N.S.W. Pl.* 68 (1916); *Senniella spongiosa* (F.Muell.) Aellen, *Bot. Jahrb. Syst.* 68: 417 (1937); *Senniella spongiosa* var. *amoena* Aellen, *Bot. Jahrb. Syst.* 68: 420 (1938). — **Illustr.:** *Pl. W. N.S.W.* fig. 44/27 (1982).

Rounded annual or short-lived perennial to 30 cm high, monoecious; leaves elliptic, broadly elliptic or ovate, 1–2 cm long, acute to obtuse, entire to sinuate-dentate (or rarely deeply serrate), narrowed at the base into a short petiole or sessile, scurfy on both surfaces. **Flowers** of both sexes present in axillary glomerules. **Fruiting** bracteoles sessile, fused, broadly ellipsoid to globular, 4–6 (rarely to 8) mm long, shortly apiculate, inflated; epidermal covering thin, loosely scurfy, supported on a network of fibrous veins; utricle in the centre of the bracteoles, cavity compressed-elliptic with a thin woody wall; seed erect, broadly elliptic; radicle lateral, erect. **Pop saltbush. Fig. 2M, Pl. 2B, D.**

S.A.: LE, NU, GT FR, EA, EP; N.T.; Qld; N.S.W. Found in somewhat saline soil. Flowers: May–Sep.

Very similar to and often growing with *A. holocarpa*.

38. ***Atriplex stipitata*** Benth., *Fl. Austral.* 5: 168 (1870). — **Illustr.:** *Pl. W. N.S.W.* 245, fig. 44/28 (1982); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 57 (2003).

Erect shrub to 1 m high, predominantly dioecious; leaves narrow-elliptic to orbicular, entire, obtuse or rounded at the apex, sometimes conduplicate and recurved when dry with a scaly sheen on both surfaces; lamina 7–25 mm long; petiole 2–3 mm long. **Male** flowers in small disjunct glomerules forming spikes or panicles; female flowers in well-spaced clusters forming slender spikes. **Fruiting** bracteoles on a slender pedicel to 10 mm long; valves reniform, cordate, to 5 × 10 mm, thin, appressed, joined at the base to form a compressed turbinate tube, appendages absent; seed with a lateral erect radicle. **Bitter saltbush, mallee (or kidney) saltbush.** **Fig. 2N, Pl. 4A–C.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers: all months.

39. ***Atriplex suberecta*** I.Verd., *Bothalia* 6: 418 (1954). — **Illustr.:** I.Verd., *Bothalia* 419, fig. 2; *Pl. W. N.S.W.* 245 (1982).

Prostrate, to sprawling herb branching from the base, to 60 cm high, monoecious; leaves thin, narrowly to broadly rhomboid, 15–30 mm long, coarsely serrate, shortly petiolate; upper surface glabrescent, lower surface somewhat scurry. **Male** flowers in subterminal clusters; female flowers in axillary clusters. **Fruiting** bracteoles shortly pedicellate the pedicel sometimes thickening with age; bracteoles rhomboid, acute, c. 2–5 mm long, more or less flat or convex, connate in the lower half, thin or somewhat thickened with age, scurfy-pubescent; margin entire in the lower half, 2–4-toothed in the upper half; seed circular; radicle lateral, erect. **Lagoon saltbush.** **Fig. 2P, Pl. 4D–E.**

S.A.: NW, LE, GT, FR, EA, EP, NL, MU, YP, SL, KI, SE; W.A.; N.S.W.; Vic.; Tas. Found around lakes or dams, also coastal. Flowers: all months.

This species is often weedy frequently occurring in open disturbed areas

40. ***Atriplex turbinata*** (R.H.Anderson) Aellen, *Bot. Jahrb. Syst.* 68: 356 (1937). — *A. leptocarpa* forma *turbinata* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 55: 499 (1930); *A. leptocarpa*. var. *turbinata* (R.H.Anderson) J.M.Black, *Fl. S. Austral.* ed. 2, 2: 299 (1948).

Rounded annual or short-lived perennial to 30 cm high, monoecious; leaves thin, scurfy on both surfaces, sessile, elliptic to obovate, c. 10 (rarely to 30) mm long, obtuse, entire or weakly sinuate-dentate, cuneate at the base. **Male** flowers in glomerules in terminal axils; female flowers in axillary clusters. **Fruiting** bracteoles pedicellate, turbinate to narrow-turbinate, lower two-thirds united into a flattened narrowly deltoid tube 2–3 mm long, upper third of free appressed semicircular herbaceous reticulate lobes shortly 3-toothed; pedicel slender or thickened, more or less equal in length to the tube; seed circular; radicle erect, prominently projecting. **Fig. 2Q.**

S.A.: LE, GT, EA; N.T.; Qld; N.S.W. Occurrences outside S.A. are reported to be intergrades with *A. angulata*, *A. crassipes*, *A. sturtii* and *A. intermedia*. Flowers: Dec.–Mar.

41. ***Atriplex velutinella*** F.Muell., *Rep. Pl. Babbage's Exped.* 20 (1859). — *A. velutinella* forma *appendiculata* Aellen, *Bot. Jahrb. Syst.* 68: 381 (1937). — **Illustr.:** F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 5 (1889); *Pl. W. N.S.W.* 246 (1982).

Erect short-lived perennial to 1 m high, monoecious; thinly lepidote to scaly-tomentose all over; leaves sessile, thin, broadly elliptic to broadly ovate, 1–3 cm long, sinuate to bluntly toothed or sinuate-lobed, acute to obtuse, base cuneate to rounded. **Flowers** in mixed clusters, axillary or forming interrupted spikes. **Fruiting** bracteoles sessile or shortly pedicellate, appressed, free except at the short broadly cuneate base, narrowly to broadly triangular, 4–8 mm long, entire or toothed at the base, almost glabrous to tomentose, smooth or with 1 or 2 tubercles on either side near the base; seed circular; radicle erect. **Sandhill saltbush.** **Fig. 2R, Pl. 4F.**

S.A.: NW, LE, NU, GT, FR, EA, EP; N.T.; Qld; N.S.W. Found usually around dams, creeks or bores in saline soil. Flowers: all months, especially Jul.–Dec.

This species is similar to *A. acutiloba* and specimens intermediate between the 2 have been collected. It evidently hybridises with *A. acutibractea* in eastern S.A. In north-eastern S.A., where the distribution of *A. velutinella* coincides with that of *A. cordifolia*, plants intermediate in morphology between the 2 species may be found.

42. **Atriplex vesicaria** Heward ex Benth., *Fl. Austral.* 5: 172 (1870). — *A. vesicaria* subsp. *appendiculata* (Benth.) Parr-Smith, *Fl. Austral.* 4: 320 (1984); *A. paludosa* var. *appendiculata* Benth., *Fl. Austral.* 5: 170 (1870); *A. vesicaria* subsp. *callicola* Parr-Smith, *op. cit.* 320; *A. vesicaria* subsp. *macrocystidia* Parr-Smith, *op. cit.* 321; *A. vesicaria* subsp. *sphaerocarpa* Parr-Smith, *op. cit.* 321; *A. vesicaria* subsp. *variabilis* Parr-Smith, *op. cit.* 321. — **Illustr.:** G.R.Cochrane et al., *Fl. Pl. Victoria & Tasmania* fig. 180 (1980); *Pl. W. N.S.W.* 246 (1982); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 111 (1988); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 58 (2003).

Erect or decumbent shrub to 1 m high, predominantly dioecious; leaves elliptic to oblong or obovate, acute, obtuse or rounded, usually entire, attenuate at the base, sparsely to densely scaly; lamina 5–25 × 3–15 mm. **Male** flowers in disjunct or contiguous glomerules, arranged in a terminal spike or panicle 2–4 cm long; female flowers 2 to many in the upper axils. **Fruiting** bracteoles sessile or with a pedicel 1–3 mm long; valves free or fused to above the seed, orbicular to ovate-triangular or rhomboid, obtuse to mucronate, 4–13 mm long and wide, entire or dentate towards the apex, cuneate to cordate at the base; appendages thin-walled and bladder-like, attached to the base of the valves or fused to one another below the bracteoles or to the bracteole margin, sometimes absent. **Bladder saltbush. Fig. 2S–U, Pl. 4G–I.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A., N.T., Qld; N.S.W., Vic.

In 1984, Parr-Smith recognised eight subspecies in *A. vesicaria* (see: P.G.Wilson, *Fl. Austral.* 4: 122–126) and of these 5 were recorded for South Australia namely subsp. *appendiculata*, subsp. *callicola*, subsp. *macrocystidea*, subsp. *sphaerocarpa* and subsp. *variabilis*. With perhaps the exception of subsp. *appendiculata* all the subspecies overlap in distribution and appear to intergrade. It is not uncommon to find considerable variation in leaves and in the fruiting bracteoles especially bladderly appendages within populations.

2. BASSIA All.

Mélanges Philos. Math. Soc. Roy. Turin 3: 177, t. 4, fig. 2 (1766).

(Names after Ferdinando Bassi (1710–1774), Italian naturalist and curator of the botanical gardens at Bologna.)

Annual or perennial herbs or shrubs; leaves alternate, simple, linear to oblong, small. **Flowers** bisexual, sessile, solitary or clustered in axils of leaved or bracts forming a spicate inflorescence; perianth cup-shaped, 5-lobed; stamens 5; style short with 2 stigmas. **Fruiting** perianth accrescent, chartaceous, smooth or with up to 5 horizontal spines or wings, developing on back of lobes; pericarp membranous, seed usually horizontal.

1. ***Bassia scoparia** (L.) A.J. Scott, *Feddes Repert.* 89(2–3): 108 (1978). — *Chenopodium scoparia* L., *Sp. Pl.* 1: 221 (1753); *Kochia scoparia* (L.) Schrader, *Neuers J. Bot.* 3: 85 (1809). — **Illustr.:** A.B.Graf, *Exotica* 1: 777 (1982), as *Kochia scoparia trichophylla*; V.H.Heywood et al., *Fl. Pl. World* 96, as *Kochia scoparia*.

Bright green compact shrub to 0.6 m tall, usually turning intense red at maturity; stems straw-coloured, finely pubescent; leaves linear, flat, thin and non-fleshy, twisting when dry, entire, 20–55 × 1–1.5 mm (in S.A. material), pubescent at least on lower surface, margins with long hairs. **Fruiting** perianth small, c. 2 mm diam., distinctly star-shaped from above with 5 thick triangular radiating lobes (wings not observed in Australian material), seed dark blackish-brown, 1–2 mm long, wedge-shaped.

S.A.: *FR, *EP, *NL, *MU; *W.A.; *?Qld; *Tas. The species is probably native to south-eastern Russia, but naturalised throughout central, eastern and southern Europe, Asia and North America.

Broader leaf forms ranging from 3–5 mm have been noted in interstate collections from W.A. and Tas. The form widely cultivated in Australia as an ornamental is referable to forma *trichophylla* (Voss) S.L.Welsh, *Utah Fl.* Ed. 3, 113 (2003). Although this species is reported to have membranous wings, 1–1.5 mm wide, these were not developed on fruiting material seen from Australia. It is a declared weed in all states and territories of Australia, except Vic.

(Proclaimed S.A. plant.)

3. BETA L.

Sp. Pl. 1: 222 (1753).

(The Latin name for the beet.)

Annual, biennial or perennial herbs, glabrous; leaves flat, entire.

Flowers bisexual, in small clusters forming a slender spike; clusters subtended by a bract and a pair of bracteoles; perianth 5-lobed; stamens 5; ovary semi-inferior, adnate to the perianth tube; stigmas 2 or 3, sessile, ovate, papillose on the inner surface. **Fruit** with a hard apex which eventually falls away as an operculum; seed horizontal; testa crustaceous; embryo almost annular; perisperm abundant, central.

About 7 species from Europe and Asia one of which is adventive in Australia.

1. ***Beta vulgaris** L., *Sp. Pl.* 1: 222 (1753), subsp. **maritima** (L.) Thell., *Fl. Adv. Montpellier* 189 (1912). — *B. maritima* L., *Sp. Pl.* ed. 2, 1: 322 (1762); *B. vulgaris* var. *maritima* (L.) Moq., *Chenop. Monogr. Enum.* 15 (1840). — **Illustr.:** *Fl. Victoria* 3: 187, fig 33A, B (1996).

Biennial herb with a slender tap root; stems decumbent; leaves rosetted and cauline, glossy, often tinged with red; lamina ovate, c. 5 cm long; petiole slender, half to equalling the length of the lamina. **Flowers** in clusters of 3 or 4, green; perianth lobes narrow-oblong. **Fruiting** perianths indurated, united in clusters and deciduous as a whole; pericarp hard. **Beet.** **Fig. 3, Pl. 4K.**

S.A.: *FR, *YP, *SL, *KI; *N.S.W.; *Vic.; *Tas. Native to Europe. A coastal species. Flowers: mainly Nov.–Feb. Cultivars derived from different subspecies of *B. vulgaris* are known as beetroot, sugarbeet, Swiss chard, etc.



Fig. 3. *Beta vulgaris*. A, inflorescence; B, upper leaf; C, lower leaf; D, fruits. Illustration by G.R.M. Dashorst, reproduced from *Flora of South Australia* 1: 254, Fig. 152 (1986).

4. CHENOPODIUM L.

Sp. Pl. 1: 218 (1753).

(Greek *chen*, goose; *podos*, little foot.)

Oxybasis Kar. & Kir., *Bull. Soc. Imp. Naturalistes Moscou* 1841: 738 (1841). *Chenopodiastrium* S.Fuentes, Uotila & Borsch, *Willdenowia* 42: 14 (2012).

Annual or perennial herbs, occasionally weak shrubs, mealy with minute sessile vesicular hairs which may form a scaly covering, or glabrous; leaves alternate, flat, entire or dissected. **Flowers** small, usually clustered, axillary or paniculate, bisexual or unisexual; perianth 3–5-lobed, sometimes hardened in fruit; stamens 1–5, free or united at the base into a saucer-shaped disk; stigmas 2 or 3. **Pericarp** membranous or rarely succulent; seed lenticular to subglobular, horizontal to vertical; testa crustaceous; embryo annular to horseshoe-shaped. **Goosefoot.**

A cosmopolitan genus of over 70 species; 15 are recorded from Australia of which 9 are considered endemic.

The group of species possessing glandular indumentation, included in *Chenopodium* in the 4th edition of *Fl. S Austral.* (1986), are now treated under *Dysphania*.

1. Perennial shrubs at least woody at base
 2. Fruit dry
 3. Spinescent shrub; leaves leathery, spatulate, to 3 cm long..... 9. **C. nitrariaceum**
 3. Unarmed soft-wooded shrub; leaves papery, oblong-elliptic to hastate, to 4 cm long 2. **C. auricomum**
 2. Fruit succulent
 4. Stigmas strongly penicillate..... 6. **C. gaudichaudianum**
 4. Stigmas papillose..... 3. **C. curvispicatum**

1: Herbs

5: Leaves variously toothed

6: Seed deeply sculptured..... 5. **C. erosum**

6: Seed smooth or minutely pitted

7: Perianth glabrous; seed horizontal or erect; perianth 3–5-lobed..... 7. **C. glaucum**

7: Perianth mealy; seed horizontal; perianth 5-lobed

8: Seed sharply keeled, finely pitted, dull; pericarp persistent 8. **C. murale**

8: Seed bluntly keeled, smooth to striate or weakly furrowed; pericarp readily detached

9: Leaves considerably longer than broad, usually more than 3 cm long..... 1. **C. album**

9: Leaves about as long as broad, usually less than 3 cm long..... 10. **C. opulifolium**

5: Leaves entire or lobed

10: Plant smelling of rotting fish

11: Perianth-segments united to near the apex 11. **C. vulvaria**

11: Perianth-segments free except near the base..... 4. **C. desertorum**

10: Plant not smelling of rotting fish

12: Erect annual; leaves mostly over 3 cm long, with a thin mealy indumentum; panicle large..... 1. **C. album**

12: Prostrate to erect, predominantly perennial; leaves usually under 2 cm long, entire; panicle to 5 cm long..... 4. **C. desertorum**

1. ***Chenopodium album** L., *Sp. Pl.* 1: 219 (1753). — *C. probstii* Aellen in Probst, *Mitt. Naturf. Ges. Solothurn* 20(8): 56 (1928). — **Illustr.:** S.Ross-Craig, *Dram. Brit. Pl.* 25: t. 15 (1968); *Pl. W. N.S.W.*, 259 (1982).

Perennial herb c. 1 m high, strongly aromatic; branches glabrous or almost so; leaves elliptic to narrow-elliptic, coarsely serrate or incised, narrowed at the base into a short petiole, in all c. 10 cm long; undersurface with sessile globular oil-filled hairs. **Flowers** in small glomerules forming leafy or leafless panicles; terminal flower of each glomerule bisexual; perianth deeply 5-lobed, glabrous; stamens 5; ovary pubescent above with shortly stipitate geniculate hairs; lateral flowers female. **Fruiting** perianth depressed, shortly 5-toothed; pericarp free; seed horizontal or oblique, obtusely lenticular, c. 1 mm diam., smooth, glossy; embryo horseshoe-shaped. **Fat hen, white goosefoot, blue weed. Fig. 4A–B, Pl. 5A–D.**

S.A.: *GT, *FR, *EP, *NL, *MU, *YP, *SL, *KI, *SE; All States (naturalised). Native of tropical America. Frequently found in disturbed situations. Flowers: mainly Jan.–July.

A variable species in which numerous infraspecific taxa have been described. *Chenopodium probstii* is recognised by some recent European authors as distinct and native to North America.

2. **Chenopodium auricomum** Lindl., T.Mitch., *J. Exped. Trop. Australia* 94 (1848). — **Illustr.:** *Pl. W. N.S.W.* 259 (1982); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 62 (2003).

Softwooded bluish-grey shrub to 2 m high; leaves with slender petioles c. 1 cm long; lamina oblong-elliptic to hastate, 2–4 (rarely to 6) cm long; basal lobes and apex rounded; upper surface glabrescent; lower surface with a thin mealy grey to very pale-yellow indumentum. **Inflorescence** a broad panicle c. 10 cm long, with ovoid to cylindrical branches; axis villous with tubular hairs; flowers bisexual, sessile, depressed-globular, c. 1 mm diam.; perianth united in the lower half, pubescent with irregularly shaped tubular and vesicular hairs; lobes imbricate, broadly obovate, ciliolate; stamens 5; disk absent. **Fruit** enveloped by the perianth; pericarp free, papery, white; seed usually horizontal, lenticular, c. 1.5 mm diam., with a rounded margin; testa minutely reticulate. **Golden goosefoot, Queensland bluebush. Pl. 5E–F.**

S.A.: NW, LE, GT, FR, EA, MU; W.A.; N.T.; Qld; N.S.W. Found in heavy soil subject to periodic water logging. Flowers: probably all months, especially May–Oct.

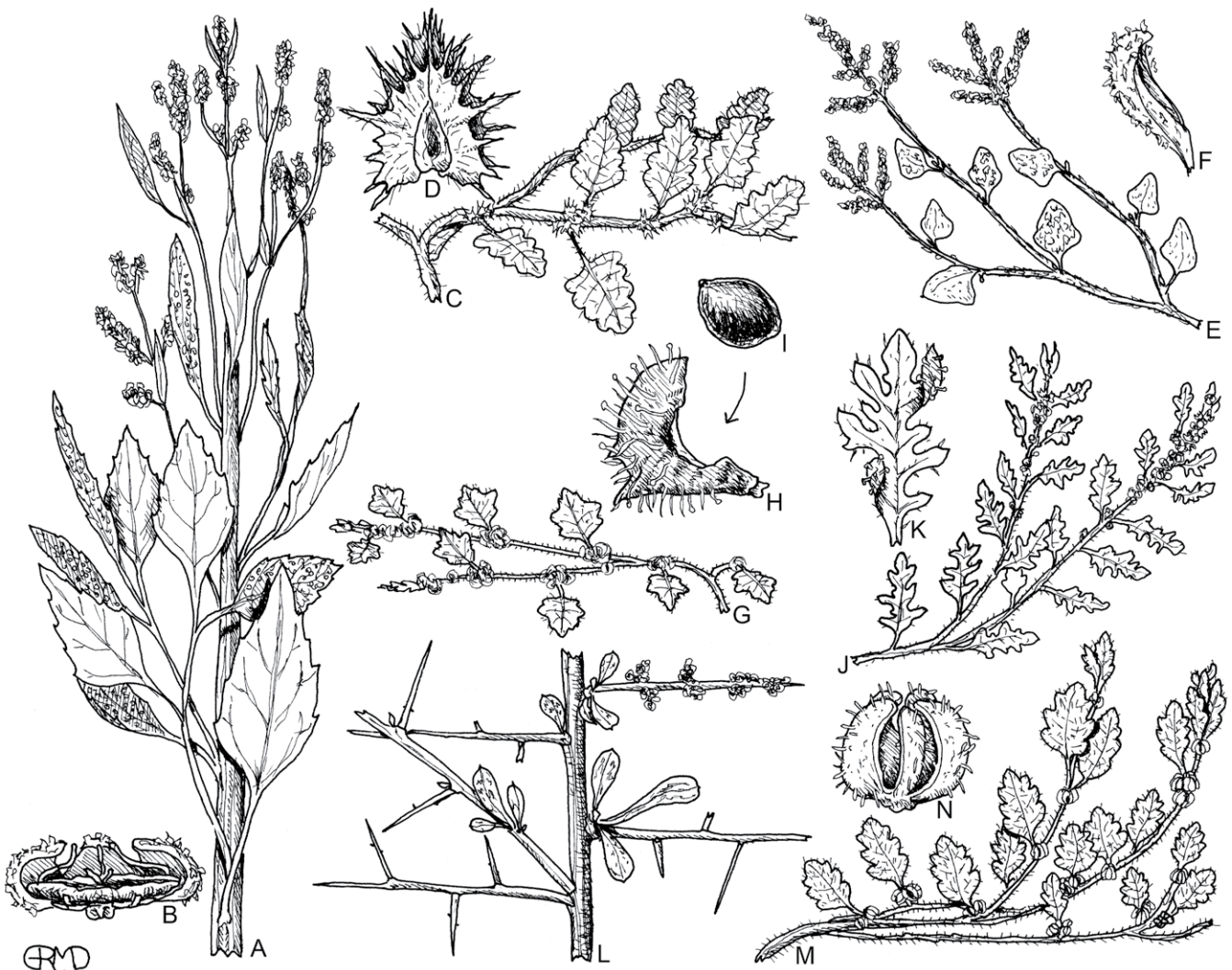


Fig. 4. A–B. *Chenopodium album*: A, branch; B, fruit. C–D. *Dysphania cristata*: C, twig; D, fruiting perianth. E–F. *C. desertorum* subsp. *desertorum*: E, twig; F, fruiting perianth segment. G–I. *Dysphania melanocarpa*: G, twig; H, fruiting perianth segment; I, seed. J–K. *D. multifida*: J, twig, K, leaf; L. *C. nitariaceum*, part of branch; M–N. *D. pumilio*: M, branchlet; N, fruiting perianth. Illustrations by G.R.M. Dashorst, from Flora of South Australia 1: 257, Fig. 153 (1986).

3. ***Chenopodium curvispicatum*** Paul G. Wilson, *Nuytsia* 4: 159 (1983). — *Rhagodia spinescens* var. *deltophylla* auct. non F. Muell.: J.M. Black, *Fl. S. Austral.* 2: 287 (1948), partly — **Illustr.:** *Pl. W. N.S.W.* 277 (1982), as *Rhagodia gaudichaudiana*.

Weak intricately branched shrub to 1 m high; branches frequently curved downwards; leaves opposite or subopposite, with slender petioles; lamina deltoid to hastate, with rounded angles, 1–1.5 cm long and wide, densely mealy with rounded white vesicular hairs. **Inflorescence** a drooping pyramidal panicle 2–5 cm long; flowers polygamo-monoecious, sessile or shortly pedicellate, globular, c. 2 mm diam.; perianth 5-lobed, densely covered with white stipitate vesicular hairs; stamens 5, united into a sparsely hairy disk; stigmas 2, slender, papillose. **Fruiting** perianth at first closed but eventually opened out and c. 5 mm diam., hard, often red above; pericarp succulent, red (orange on drying); seed lenticular, with a rounded margin, c. 1.5 mm diam.; testa prominently reticulate with a honeycomb matrix, black. **Pl. 5G–H.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP; W.A.; N.S.W.; Vic. Usually found in light calcareous soil. Flowers: Feb.–Oct.

Easily grown from seed, but can become weedy.

4. ***Chenopodium desertorum*** (J.M. Black) J.M. Black, *Fl. S. Austral.* 2: 181 (1924). — *C. microphyllum* var. *desertorum* J.M. Black, *Trans. & Proc. Roy. Soc. S. Austral.* 46: 566 (1922).

Annual or perennial herbs, prostrate to erect, branching from the base, mealy, smelling of rotten fish; leaves opposite or alternate, subsessile or prominently petiolate; lamina elliptic, deltoid, hastate or orbicular, 5–20 mm

long. **Inflorescence** of small cymes aggregated into narrow or broad panicles; flowers sessile, depressed-globular, 1–2 mm diam.; terminal flowers male or bisexual; lateral flowers female; perianth-segments 5, shortly united at the base, densely mealy outside; stamens 5, united into a circular disk which is sparsely pubescent within. **Fruit** enveloped by the perianth; pericarp membranous to succulent; seed horizontal, lenticular, with a rounded margin, 1–1.5 mm diam., testa almost smooth to slightly rugulose or striate, black.

1. Perianth covered with glistening irregularly shaped vesicular hairs..... 4b. **C. desertorum** subsp. **desertorum**
- 1: Perianth covered with dull grey to white vesicular hairs
 2. Plant prostrate to recumbent; leaves up to 10 mm long; flowers c. 1 mm diam., in short inflorescences..... 4c. **C. desertorum** subsp. **microphyllum**
 - 2: Plant erect; leaves 5–20 mm long; flowers 1–2 mm diam., inflorescence usually exceeding the terminal leaves
 3. Branches slender, straight and rigid; leaves small (to 10 mm long), orbicular to obovate, sparsely mealy; flowers small (c. 1 mm diam.) sparsely to moderately covered with sessile vesicular hairs 4d. **C. desertorum** subsp. **rectum**
 - 3: Branches straight or flexuose; leaves various, densely mealy (at least below); flowers with globular or branched often stipitate hairs 4a. **C. desertorum** subsp. **anidiophyllum**

- 4a. **Chenopodium desertorum** subsp. **anidiophyllum** (Aellen) Paul G.Wilson, *Nuytsia* 4: 155 (1983). — *C. anidiophyllum* Aellen, *Candollea* 8: 9 (1939). — **Illustr.:** *Pl. W. N.S.W.* 259 (1982).

Erect perennial c. 20 cm high, with slender branches; leaves with slender petioles; lamina ovate to broadly elliptic, deltoid or subreniform, 10–20 mm long, mealy below, glabrescent above. **Inflorescence** equal to or greatly exceeding the terminal leaves; flowers c. 1.5 mm diam.; perianth with simple or branched white vesicular hairs. **Fruiting** pericarp membranous to succulent (wrinkled and orange when dry); seed c. 1.5 mm diam. **Mallee goosefoot.**

S.A.: NW, LE, NU, GT, FR, EA, EP; W.A.; N.T.; Qld; N.S.W. Flowers: May–Nov.

- 4b. **Chenopodium desertorum** (J.M.Black) J.M.Black subsp. **desertorum**

Erect rounded much branched herb to 20 cm high; leaves densely covered when young with colourless glistening transparent branched vesicular hairs; lamina deltoid to orbicular, 3–8 mm long. **Inflorescence** congested or lax, narrow-pyramidal or slender, exceeding the terminal leaves; flowers 1.5–2 mm diam., perianth with a felty indumentum of glistening vesicular hairs. **Seed** c. 1.5 mm diam. **Desert or frosted goosefoot. Fig. 4E–F, Pl. 5I–J.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers: probably all months.

- 4c. **Chenopodium desertorum** subsp. **microphyllum** Paul G.Wilson, *Nuytsia* 4: 154 (1983). — *C. microphyllum* F. Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 74 (1858), *nom. illeg. non* Thunb. (1794); *C. pseudomicrophyllum* Aellen, *Candollea* 8: 8 (1939); *C. cochlearifolium* Aellen, *Candollea* 8: 10 (1939). — **Illustr.:** *Pl. W. N.S.W.* 262 (1982), as *C. pseudomicrophyllum*.

Intricately branched prostrate to decumbent perennial; leaves shortly petiolate; lamina elliptic to orbicular, 5–10 mm long, white-mealy below, glabrescent above. **Inflorescence** short, scarcely exceeding the terminal leaves; flowers c. 1 mm diam., perianth covered with white vesicular hairs. **Seed** c. 1 mm diam. **Small-leaved goosefoot. Pl. 5K–L.**

S.A.: FR, EP, NL, MU, YP, SL, SE; W.A.; Qld; N.S.W.; Vic. Flowers: probably all months.

- 4d. **Chenopodium desertorum** subsp. **rectum** Paul G.Wilson, *Nuytsia* 4: 158 (1983). — **Illustr.:** *Pl. W. N.S.W.* 262 (1982), as *C. pseudomicrophyllum*.

Erect perennial to 40cm high; branches slender, straight, spreading, leaves with slender petioles; lamina broadly

elliptic to broadly obovate or orbicular, 5–10 mm long, when dry often leathery and with a red margin, sparsely mealy below, glabrescent above. **Inflorescence** slender, equal to the terminal leaves; flowers c. 1 mm diam., perianth sparsely to moderately mealy with small grey vesicular hairs. **Fruiting** pericarp membranous to slightly succulent; seed c. 1 mm diam.

S.A.: NW, NU, GT, EP, MU; W.A.; N.T.; N.S.W.; Vic. Usually found on deep sand. Flowers: probably all months.

5. **Chenopodium erosum** R.Br., *Prodr.* 407 (1810).

Erect annual to 1.5 m high; leaves papery; lamina triangular to ovate, 3–15 × 1.5–10 cm, acuminate, base somewhat truncate, margin deeply incised, lower surface sparsely mealy; petiole one-third to half of the length of the lamina. **Inflorescence** of compact terminal and axillary pedunculate cymes, becoming open with age; flowers bisexual and female; perianth-segments 5, obovate, shortly united at the base, sparsely mealy when young; stamens 5, glabrous, disk absent. **Fruiting** pericarp membranous, dull, adherent; seed horizontal, lenticular, c. 1.5 mm diam., rounded on the margin; testa black, glossy, deeply sculptured with radial striations; seed eventually falling free from the perianth.

S.A.: YP, KI; Qld; N.S.W.; Vic.; Tas. New Zealand. Occurs in damp disturbed areas such as margins of forests and river banks. Flowers: Feb. (1 record).

(Rare status in S.A.)

6. **Chenopodium gaudichaudianum** (Moq.) Paul G.Wilson, *Nuytsia* 4: 160 (1983). — *Rhagodia gaudichaudiana* Moq., *Chenop. Monogr. Enum.* 11 (1840).

Scrambling shrub to 2 m high; leaves alternate, with slender petioles; lamina deltoid to narrow-hastate, 5–15 mm long, densely mealy with cream-coloured vesicular hairs. **Inflorescence** a pyramidal panicle 5–10 cm long, with distinct clusters of flowers; branches and main axis flexuose; flowers polygamo-monoecious, subsessile, depressed-globular, c. 1.5 mm diam. at anthesis, enlarging to 3.5 mm in fruit, eventually spreading and c. 7 mm wide; perianth 5-lobed, densely mealy outside with vesicular hairs; stamens 5, united at the base into a puberulent disk; stigmas 2, delicate, strongly penicillate. **Fruit** a berry; pericarp usually succulent, orange to red; seed lenticular, with a rounded margin, c. 1.4 mm diam., testa deeply reticulate with a rough surface, a dark reddish-brown. **Pl. 6A–B.**

S.A.: NW, LE, NU, GT, EP; W.A. Occurring in sand or clay soil, often slightly saline. Flowers: Sep.–Nov.

The illustration labelled as *Rhagodia gaudichaudiana* in *Pl. W. N.S.W.* 277 (1982), is *C. curvispicatum*.

7. ***Chenopodium glaucum** L., *Sp. Pl.* 1: 220 (1753). — *Oxybasis glauca* (L.) S.Fuentes, Uotila & Borsch, *Willdenowia* 42: 15 (2012). *C. ambiguum* R.Br., *Prodr.* 407 (1810).

Prostrate to erect annual to 0.5 m high, branching from the base; leaves slightly fleshy; lamina elliptic to deltoid, 1–3 cm long, entire or sinuate-lobed, obtuse, passing into a petiole about half the length of the lamina, glabrous above, densely mealy below. **Inflorescence** of compact glomerules arranged in paniculate cymes; flowers glabrous; perianth glabrous; terminal flowers bisexual with perianth-segments 3 or 4 rarely 5, free, stamens 1–4 rarely 5, seed horizontal; lateral flowers female or bisexual with perianth-segments 3 rarely 4, stamens 0 or 1, seed erect. **Pericarp** thin, free or almost so, somewhat green; seed discoid, with a rounded margin, c. 1 mm diam.; testa reticulate, smooth or finely pitted, reddish-brown to black; embryo circular. **Glaucous goosefoot. Pl. 6C–G.**

S.A.: *FR, *EA, *EP, *NL, *MU, *YP, *SL, *KI, *SE; *W.A.; *N.S.W.; *Vic.; *Tas. Cosmopolitan; occurs in muddy eutrophic conditions both inland and coastal. Flowers: Dec.–May.

Wilson (1984) notes that this is a polymorphic species in Australian and may include both native and introduced elements.

8. ***Chenopodium murale** L., *Sp. Pl.* 1: 219 (1753). — *Chenopodiastrum murale* (L.) S.Fuentes, Uotila & Borsch, *Willdenowia* 42: 14 (2012). — **Illustr.:** S.Ross-Craig, *Draw. Brit. Pl.* 25: t. 17 (1968); *Pl. W. N.S.W.* 261 (1982).

Erect much branched annual to 1 m high, sparsely mealy, sometimes foetid when crushed; leaves petiolate;

lamina broadly triangular to ovate, 2–8 cm long, thin, acute, coarsely dentate with slightly incurved teeth, mealy when young. **Inflorescence** of compact cymes in rather open panicles, axillary and terminal; flowers bisexual or female; perianth-segments 5, united towards the base, prominently keeled, sparsely mealy outside; stamens 5. **Pericarp** prominently papillose, persistent; seed horizontal, lenticular, 1–1.5 mm diam., prominently keeled; testa glossy, minutely pitted; embryo circular; seed shed with the surrounding perianth. **Nettle-leaved goosefoot, green fat hen, sowbane. Pl. 6H–K.**

S.A.: *NW, *LE, *NU, *GT, *FR, *EA, *EP, *NL, *MU, *YP, *SL, *KI, *SE; *W.A.; *N.T.; *Qld; *N.S.W.; *Vic.; *Tas. Native to southern Europe and Asia, now cosmopolitan. A weed of agricultural lands and disturbed areas. Flowers: probably all months.

9. **Chenopodium nitrariaceum** (F.Muell.) F.Muell. ex Benth., *Fl. Austral.* 5: 158 (1870). — *Rbagodia nitrariacea* F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 72 (1858). — **Illustr.:** *Pl. W. N.S.W.* 261 (1982); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 63 (2003).

Divaricately branched spinescent shrub c. 2 m high; leaves alternate, frequently clustered; lamina spatulate, with a rounded apex, passing at the base into a short petiole, in all 10–30 mm long, thick, sparsely mealy with minute scaly hairs. **Inflorescence** a terminal spinescent panicle to 15 cm long or reduced to a short spike; flowers polygamous, clustered; perianth depressed-globular to turbinate, 1.5–2 mm diam., 5-lobed, pubescent with small branched tubular hairs; stamens 5; disk absent; ovary pubescent above, stigmas 2, slender. **Fruit** enveloped by the perianth, dry; pericarp membranous, white, free, pubescent above; seed horizontal to vertical, depressed-globular to subreniform, c. 1 mm diam., testa punctate, reddish-brown to black, glossy; embryo horseshoe-shaped to annular. **Nitre goosefoot. Fig. 4L, Pl. 6L–M**

S.A.: NW, LE, GT, FR, EA, EP, NL, MU, YP (Broughton River), SL; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers: mainly Mar.–Oct.

10. ***Chenopodium opulifolium** Schrad. ex W.D.J.Koch & Ziz, *Cat. Pl.* 6 (1814). — **Illustr.:** R.W.Butcher & F.E.Strudwick, *Further Ill. Brit. Pl.* fig. 301 (1946).

Very similar to *C. album*, it differs from the latter in having long-petiolate 3-lobed rhombic leaves 2–3 cm long and wide, strongly mealy below, and in having keeled strongly mealy perianth-segments.

S.A.: *NL, *SE. Native to Europe and North Africa. Flowers: Mar. (1 record).

11. ***Chenopodium vulvaria** L., *Sp. Pl.* 1: 220 (1753). — **Illustr.:** S.Ross-Craig, *Draw. Brit. Pl.* 25: t. 14 (1968).

Spreading annual, branching from the base, with a strong fish-like smell; leaves: lamina, ovate to broadly ovate or trullate, 1–2 cm long, entire, subglabrous above, mealy below; petiole slender, about half the length of the lamina. **Inflorescence** of dense clusters of flowers forming compact axillary and terminal panicles 1–2 cm long; flowers bisexual and female; perianth subglobular, shortly 5-lobed, enlarging with and enveloping the fruit, densely mealy; stamens 5, glabrous, united into a cup-shaped disk at the base. **Pericarp** membranous, papillose, somewhat adherent; seed horizontal, lenticular, with an obvious keel, 1–2 mm diam.; testa radially lineate. **Stinking goosefoot.**

S.A.: *SL, *SE; *N.S.W.; *Vic.; *Tas. Native to the Northern Hemisphere. In Australia a weed of agriculture. Flowers: Mar. (1 record).

5. DISSOCARPUS F.Muell.

Trans. & Proc. Philos. Inst. Victoria 2: 75 (1858).

(Greek *dissos*, double, and *carpos*, fruit, referring to the paired fruits of the type.)

Woolly perennials with a woody base; hairs simple; leaves alternate, linear to narrow-obovate, fleshy. **Flowers** 2-many in a leaf axil, fused together and sessile, without individual bracts, bisexual; perianth cup-shaped, woolly or villous; lobes 5, erect; stamens 5; ovary glabrous; style slender. **Fruiting** perianths woody, firmly united together in an axillary cluster and deciduous as a whole; spines present or absent, where present arising opposite the perianth lobes (or from the fused bases of the perianth); pericarp crustaceous above; seed horizontal, with an ascending radicle; perisperm central.

4 species endemic to Australia. Flowering times are not provided; fruits can be found at all times of the year.

- 1. Fruiting perianths 2 or 3 in axillary clusters, united by their bases; spines apparently absent..... 1. **D. biflorus**
- 1: Fruiting perianths 8–16, forming a hard woolly ball; spines prominent
 - 2. Perianth tube emergent from the woody ball-like infructescence; spines irregular, often flattened 2. **D. fontinalis**
 - 2: Perianth tube sunk into the woody infructescence; spines regularly 5, one opposite each perianth lobe
 - 3. Leaves narrow-oblongate, flat, 3.5–6 mm wide 3. **D. latifolius**
 - 3: Leaves linear, terete to ± flat, 1–2.5 mm wide 4. **D. paradoxus**

1. **Dissocarpus biflorus** F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 75 (1858) — *Sclerolaena biflora* R.Br., *Prodr.* 410 (1810); *Bassia biflora* (R.Br.) F.Muell., *Syst. Census Austral. Pl.* 30 (1882).

Perennial c. 25 cm high; branches woolly; leaves slender, semiterete, 5–10 mm long, woolly. **Flowers** 2 or 3 (in S.A.), united into a small woolly ball. **Fruiting** perianths united in their lower half into a globular to slightly cylindrical thick-walled woody infructescence 6–10 mm diam. and deciduous as a whole; base rounded, deeply concave; covered in a woolly or villous indumentum; upper half of the perianths cylindrical, c. 3 mm long including the 5 incurved lobes, woody; spines absent or if present arising from and resembling the perianth lobes; infructescence freely shed when mature.

- 1. Fruiting perianth woolly..... 1a. **D. biflorus** var. **biflorus**
- 1: Fruiting perianth covered with long villous hairs..... 1b. **D. biflorus** var. **villosus**

1a. **Dissocarpus biflorus** F.Muell. var. **biflorus** — *Bassia biflora* var. *cephalocarpa* auct. non (F.Muell.) R.H.Anderson: J.M.Black, *Fl. S. Austral.* ed. 2, 2: 307 (1948); *D. biflorus* var. *cephalocarpus* auct. non (F.Muell.) A.J.Scott: T.S.Henshall in Jessop, *Fl. Central Austral.* 65 (1981), S.A. localities. — **Illustr.:** *Pl. W. N.S.W.* 248, 253, fig. 46/6 (1982), as *Bassia biflora* var. *biflora*; *Fl Austral.* 4: 227, fig 40F–H (1984); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 158 (2003).

Connate fruiting perianths 2 or 3, divaricate, covered with a thin to loose woolly indumentum; fused portion globular to shortly cylindrical; base rounded, deeply concave; in all 6–10 mm wide. **Twin-horned copperburr, bassia.** **Fig. 5A–D, Pl. 7A–C.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; N.T., N.S.W., Vic. In heavy slightly saline soil.

1b. **Dissocarpus biflorus** var. **villosus** (Ising) A.J.Scott, *Feddes Repert.* 89: 119 (1978). — *Bassia biflora* var. *villosa* Ising, *Trans. Roy. Soc. South Australia* 88: 75 (1964).

Connate fruiting perianths 2, divaricate, densely covered with villous hairs.

S.A.: NW, LE, GT, EP.

2. **Dissocarpus fontinalis** Paul G. Wilson, *Fl. Austral.* 4: 325 (1984). — **Illustr.:** *Fl Austral.* 4: 227, fig 40A–B (1984).

Rounded perennial to 60 cm high; branches slender, closely woolly; leaves slender, semiterete, c. 10 mm long, woolly. **Flowers** connate in groups of 8–12 in dense axillary woolly clusters; perianth narrow-cylindrical, the upper third divided into erect narrowly triangular lobes.

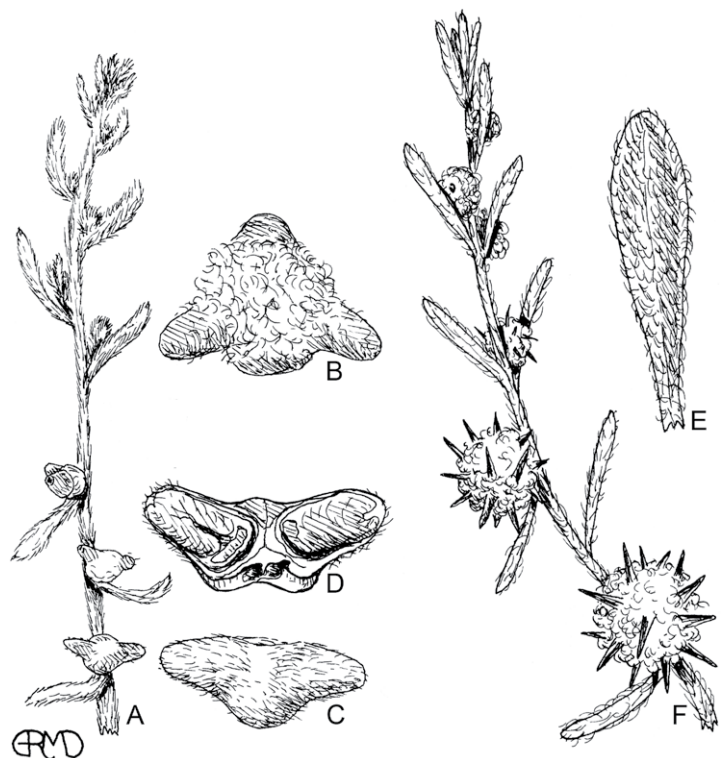


Fig. 5. A–D, *Dissocarpus biflorus* var. *biflorus*: A, twig; B, C, fruits; D, opened fruit. **E–F. *D. paradoxus*:** E, branchlets with infructescences; F, leaf. Illustrations by G.R.M.Dashorst, from *Flora of South Australia* 1: 260, Fig. 154 (1986).

Infructescence a persistent woody ball from which emerge the narrowly cylindrical upper portions of the perianth and between them irregularly shaped flattened or spine-like emergences to 3 mm long, all covered with a thick floccose indumentum, in all c. 15 mm diam. **Pl. 7D–F.**

S.A.: LE, FR, EA; Qld; N.S.W.

3. **Dissocarpus latifolius** (J.M.Black) Paul G.Wilson, *Fl. Austral.* 4: 326 (1984). — *Bassia paradoxa* var. *latifolia* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 46: 567 (1922); *D. paradoxus* var. *latifolius* (J.M.Black) Ulbr., *Nat. Pflanzenfam.* ed. 2, 16c: 533 (1934). — **Illustr.:** *Fl Austral.* 4: 227, fig 40C–E (1984).

Rounded perennial similar to *D. paradoxus* but more densely woolly all over; leaves oblanceolate, c. 20 × 6 mm, obtuse, succulent.

S.A.: LE; Qld; N.S.W.

4. **Dissocarpus paradoxus** (R.Br.) F.Muell. ex Ulbr., *Nat. Pflanzenfam.* ed. 2, 16c: 533 (1934). — *Sclerolaena paradoxa* R.Br., *Prodr.* 410 (1810); *Bassia paradoxa* (R.Br.) F.Muell., *Syst. Census Austral. Pl.* 30 (1882). — **Illustr.:** *Pl. W. N.S.W.* 255, 253, fig. 46/24 (1982), as *Bassia paradoxa* var. *paradoxa*; F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 159 (2003).

Erect or decumbent rounded much branched shrub to 50 cm high; branches woolly; leaves semiterete, slender, 5–15 × 1–2.5 mm. **Flowers** connate in groups of 8–16 in dense woolly axillary glomerules. **Infructescence** a persistent densely woolly ball, 10–15 mm diam.; fruiting perianths fused in the lower two-thirds into a woody spherical mass; lobes emergent, erect; spines 5, slender, 3–6 mm long, erect or spreading, hard at first, woolly, arising at the base of each lobe. **Ball bindyi, curious saltbush, cannon-ball, hard-head bassia. Fig. 5E–F, Pl. 7G–L.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP; W.A.; N.T.; Qld; N.S.W.; Vic.

6. DYSPHANIA R.Br.

Prodr. 411 (1810).

(Greek *dysphanes*, scarcely visible; referring to the very small flowers.)

Annual or perennial herbs with subsessile glands or simple or glandular-tipped hairs; aromatic; leaves alternate, simple, entire or variously dissected. **Inflorescence** of compact clusters of flowers axillary, spicoid or paniculate in arrangement; flowers ebracteate, small, bisexual or rarely unisexual; perianth of 1–5 segments, free or variously united; segments variable in form, ovate to oblong, distinctly keeled or cuculate, and often inflated or spongy; stamens 1–5, connate basally or ± distinct or fused to form a saucer-shaped disk; ovary superior, stigmas 1–3. **Pericarp** thin, membranous; seed globular to ellipsoid or laterally compressed; horizontal or vertical; testa crustaceous, smooth to rugose; embryo annular or incompletely annular, surrounding copious farinose endosperm.

About 32 species worldwide; tropics, subtropics and warm temperate zones; 16 species in Australia.

1. Perianth-segments 1–4

2. Flowers in axillary clusters

3. Perianth-segments united at the base and shed with the seed enclosed..... 3. **D. glomulifera**

3: Perianth-segments free; seed and perianth-segments shed separately

4. Seed strongly flattened laterally (usually slightly twisted), more or less obovate;
pericarp almost smooth 8. **D. platycarpa**

4: Seed ellipsoid, obovoid, or lenticular; pericarp smooth or glandular-papillate..... 3. **D. glomulifera**

2: Flowers in spike-like inflorescences

5. Perianth segments 1–3

6. Perianth-segments free, rounded or inconspicuously keeled on the back..... 7. **D. plantaginella**

6: Perianth-segments united into a hard cup-shaped tube in the lower half,
prominently (and horizontally) keeled..... 11. **D. simulans**

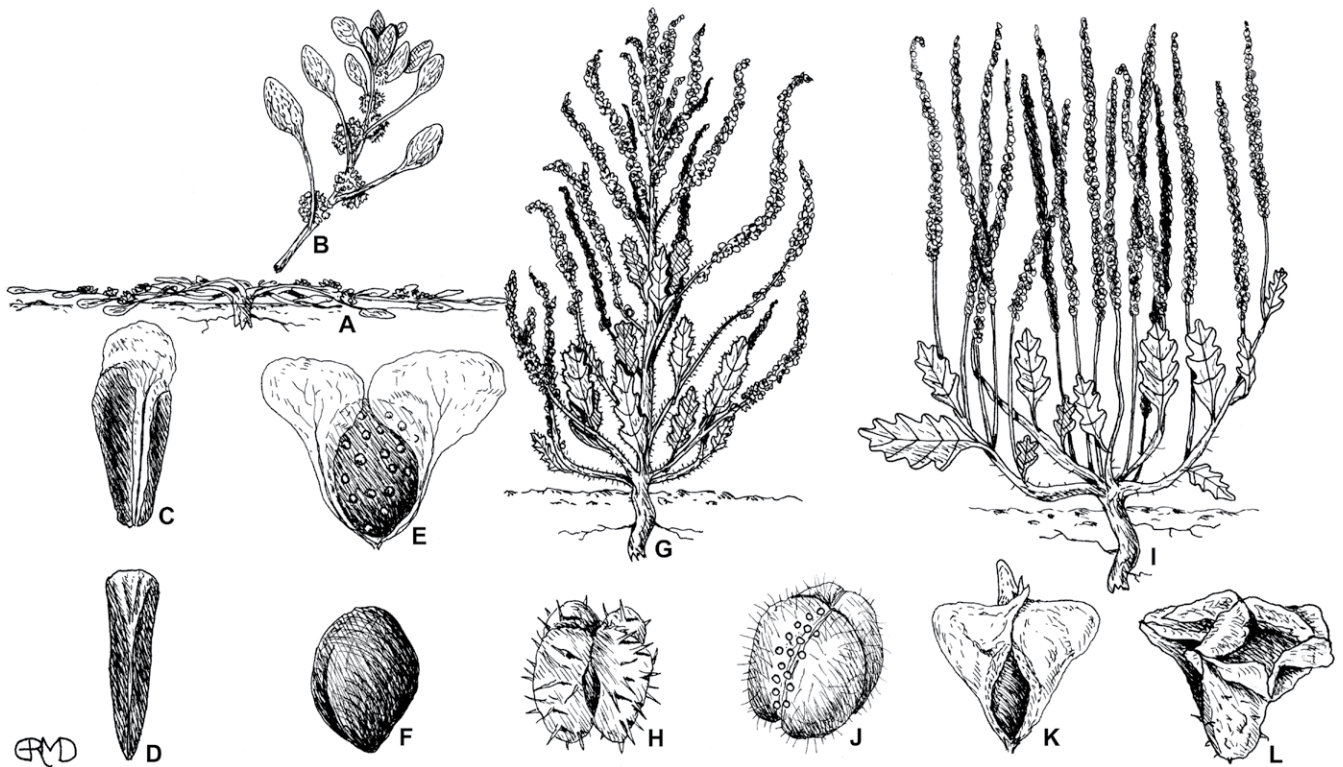


Fig. 6. A–C, *Dysphania platycarpa*: A, plant; B, twig; C, fruit; D, seed. E, *D. glomulifera* subsp. *eremea*, fruit. F, *D. glomulifera* subsp. *glomulifera*, fruit. G–H, *D. rhadinostachya*: G, plant; H, fruiting perianth. I–J, *D. kalpari*: I, plant; J, fruiting perianth; K, *D. plantaginella*, fruiting perianth. L, *D. simulans*, fruiting perianth. Illustrations of G.R.M. Dashorst, from *Flora of South Australia* 1: 262, Fig. 155 (1986).

- 5: Perianth segments 4
 - 7. Plant prostrate or decumbent, with several stems arising from the base; seed glossy, compressed-globular; inflorescence slender, spicate 4. *D. kalpari*
 - 7: Plant erect, with one main stem; seed dull (rarely glossy), almost globular; inflorescence paniculate..... 10. *D. rhadinostachya*
- 1: Perianth-segments 5
 - 8. Stamens 1 or 2; seeds lenticular, erect; leaves simple
 - 9. Perianth-segments strongly crested
 - 10. Perianth rostrate at the apex; perianth-segments free 2. *D. cristata*
 - 10: Perianth truncate at the apex; perianth-segments united..... 12. *D. truncata*
 - 9: Perianth-segments rounded to acute on the back
 - 11. Perianth-segments firmly united in the lower half, completely covering the fruit, usually black..... 5. *D. melanocarpa*
 - 11: Perianth-segments free to near the base, not completely covering the fruit, white 9. *D. pumilio*
 - 8: Stamens 5; seed horizontal to erect; leaves simple or pinnatisect
 - 12. Leaves serrate; seed horizontal to oblique 1. *D. ambrosioides*
 - 12: Leaves pinnatisect; seed erect 6. *D. multifida*

1. **Dysphania ambrosioides* (L.) Mosyakin & Clemants, *Ukrayins'k. Bot. Zhurn.*, n.s. 59: 382 (2002). — *Chenopodium ambrosioides* L., *Sp. Pl.* 1: 219 (1753). *C. anthelminticum* L., *Sp. Pl.* 1: 220 (1753); *C. ambrosioides* var. *anthelminticum* (L.) A.Gray, *Manual* ed. 5, 408 (1867); *D. anthelmintica* (L.) Mosyakin & Clemants, *Ukrayins'k. Bot. Zhurn.*, n.s. 59: 382 (2002). — **Illustr.**: *Fl. Austral.* 4: 136, fig. 23A–E (1984).

Perennial herb c. 1 m high, strongly aromatic; branches glabrous or almost so; leaves elliptic to narrow-elliptic, coarsely serrate or incised, narrowed at the base into a short petiole, in all c. 10 cm long; undersurface with sessile globular oil-filled hairs. **Flowers** in small glomerules forming leafy or leafless particles; terminal flower of each glomerule bisexual; perianth deeply 5-lobed, glabrous; stamens 5; ovary pubescent above with shortly stipitate geniculate hairs; lateral flowers female. **Fruiting** perianth depressed, shortly 5-toothed; pericarp free; seed

horizontal or oblique, obtusely lenticular, c. 1 mm diam., smooth, glossy; embryo horseshoe-shaped. **Mexican tea.**

S.A.: *EP, *MU, *SL, *SE; *W.A.; *Qld; *N.S.W.; *Vic. Frequently found in disturbed situations. Native of tropical America. Flowers: Flowering: Mar.–Aug.

This is the source of Mexican tea.

2. **Dysphania cristata** (F.Muell.) Mosyakin & Clemants, *Ukrayins'k. Bot. Zhurn., n.s.* 59: 382 (2002). — *Blitum cristatum* F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 73 (1858); *Chenopodium cristatum* (F.Muell.) F.Muell., *Fragm.* 7: 11 (1869). — **Illustr.:** *Fl. Austral.* 4: 136, fig. 24H (1984), fruit.

Prostrate to ascending annual branching from the base, aromatic; stems pilosulose with both slender and sessile to shortly stipitate gland-tipped hairs; leaves elliptic to broadly elliptic, entire to coarsely toothed, sparsely puberulous; lamina c. 10 mm long; petiole slender, c. 5 mm long. **Flowers** in dense axillary clusters; perianth-segments 5, erect, acuminate; stamen 0 or 1. **Fruiting** perianth spherical in outline, c. 2 mm diam., strongly 5-winged, white; perianth-segments free to the base, cartilaginous, semi-orbicular, rostrate, completely enclosing the fruit; pericarp membranous, adherent; seed erect, lenticular, c. 0.5 mm diam. **Crested goosefoot, crested crumbweed. Fig. 4C–D.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.T.; Qld; N.S.W.; Vic. Adventive in North America. Frequently in red soils. Flowers: Mar.–Oct.

This species frequently hybridises with *D. pumilio* and *D. melanocarpa*.

3. **Dysphania glomulifera** (Nees) Paul G.Wilson, *Nuytsia* 4: 183 (1983). — *Atriplex glomulifera* Nees, *Pl. Preiss.* 1: 634 (1845); *D. myriocephala* Benth., *Fl. Austral.* 5: 165 (1870); *Chenopodium myriocephalum* (Benth.) Aellen, *Bot. Jahrb. Syst.* 63: 488 (1930). — **Illustr.:** *Pl. W. N.S.W.* 264 (1982).

Prostrate to erect annual or short-lived perennial to 15 cm high, branching from the base, sparsely covered with sessile or stipitate gland-tipped hairs; leaves narrow- to broad-elliptic, entire; lamina c. 5 mm long; petiole slender, about half the length of the lamina. **Flowers** in dense axillary glomerules; terminal flower of each glomerule bisexual; perianth-segments 3, obovate, hooded, c. 0.7 mm long, green, fleshy except for the scarious margin, glabrous or almost so, free or shortly united at the base; stamens 2; style 1 or 2; lateral flowers of each glomerule female; perianth-segments 1 or 2, with a white bladderly hooded limb and a filamentous to linear claw. **Fruiting** perianth segments 0.7–1 mm long; limb inflated, covering the fruit; pericarp dull, adherent, minutely punctulate, papillate, or granulate; seed erect, bluntly ellipsoid or compressed-obovoid, c. 0.5 mm long; embryo slightly curved on the dorsal-lateral margin beneath the embryo groove; radicle inferior. **Red crumbweed.**

1. Seed compressed-obovoid to bluntly lenticular; pericarp smooth or rarely papillate..... 3b. **D. glomulifera** subsp. **glomulifera**

- 1: Seed ellipsoid; pericarp granulate 3a. **D. glomulifera** subsp. **eremaea**

- 3a. **Dysphania glomulifera** subsp. **eremaea** Paul G.Wilson, *Nuytsia* 4: 184 (1983). — *D. benthamiana* Domin, *Biblioth. Bot.* 89: 657 (1926). *D. littoralis* auct. non R.Br.: J.M.Black, *Fl. S. Austral.* ed. 2, 2: 293 (1948). — **Illustr.:** *Pl. W. N.S.W.* 264 (1982).

Lateral flowers of the glomerules: perianth-segments 2; claws narrow-oblong, sometimes united at the base; limbs strongly inflated. **Seed** bluntly ellipsoid; pericarp granulate; fruit usually shed while surrounded by the perianth-segments. **Fig. 6E.**

S.A.: NW, LE, GT, FR, EA, MU; W.A.; N.T.; Qld; N.S.W. Often found near fresh water in sand. Flowers: recorded mainly Mar.–June, Aug., Sep.

- 3b. **Dysphania glomulifera** (Nees) Paul G.Wilson subsp. **glomulifera**

Lateral flowers of the glomerules: perianth-segments 1, rarely 2; claws filiform to linear, readily separating from the pedicel. **Seed** broadly compressed-obovoid to bluntly lenticular; pericarp smooth or minutely punctulate; fruit and perianth-segments shed separately. **Fig. 6F, Pl. 8A.**

S.A.: FR, EA, NL, MU, SL, KI; W.A.; Qld; N.S.W.; Vic. Found principally along banks of rivers and muddy areas but also recorded from forests, hillsides and as an agricultural weed. Flowers: recorded Mar.–May, Aug., Sep.

4. **Dysphania kalpari** Paul G.Wilson, *Nuytsia* 4: 195 (1983). — **Illustr.:** *Pl. W. N.S.W.* 262 (1982), as *Chenopodium rbadinostachyum*.

Prostrate to decumbent annual with several stems arising from the base, moderately pilose with sessile or shortly stipitate glandular hairs and larger simple hairs, aromatic; leaves elliptic, deeply undulate; lamina 1–5 cm long; petiole half the length of the lamina. **Inflorescence** of erect slender spikes to 15 cm long, composed of 5–7-flowered clusters; flowers bisexual and female; perianth-segments 4, erect, obovate, c. 1 mm long, united below, rounded on the back, hirtellous; stamen 0 or 1; styles 2. **Seed** vertical, compressed-spherical, with rounded margins, c. 0.5 mm diam.; testa glossy; embryo semicircular, basal; radicle and cotyledons superior; infructescence breaking up at the apex of the pedicels, with the seed enclosed in the perianth. **Kalpari. Fig. 6I–J, Pl. 8B.**

S.A.: NW, LE; W.A.; N.T.; Qld; N.S.W. Usually found on loam flats and red sand plains, often associated with mulga (*Acacia aneura*). Flowers: May–Sep.

5. **Dysphania melanocarpa** (J.M.Black) Mosyakin & Clemants, *J. Bot. Res. Inst. Texas* 2: 427 (2008). — *Chenopodium carinatum* var. *melanocarpum* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 46: 566 (1922); *C. melanocarpum* (J.M.Black) J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 58: 173 (1934). *Chenopodium carinatum* f. *leucocarpum* Aellen *Verh. Naturf. Ges. Basel* 44: 313 (1933); *C. melanocarpum* f. *leucocarpum* (Aellen) Paul G.Wilson, *Nuytsia* 4: 76 (1983); *Dysphania melanocarpa* f. *leucocarpa* (Aellen) Paul G.Wilson, *Nuytsia* 18: 270 (2008). — **Illustr.:** *Pl. W. N.S.W.* 260 (1982).

Prostrate annual branching from the base, aromatic; stems pilosulose with both slender and sessile to stipitate gland tipped hairs; leaves broadly elliptic, bluntly lobed to entire, glandular-puberulent below over the veins; lamina c. 15 mm long; petiole slender, c. 7 mm long. **Flowers** in dense axillary clusters; perianth-segments 5, erect; stamen 0 or 1. **Fruiting** perianth bluntly stellate in cross-section, c. 1 mm long, crustaceous, black or pale-fawn, firmly united below, completely covering the fruit; perianth-segments strongly and bluntly keeled, sparsely and minutely hairy; pericarp diaphanous, adherent; seed erect, lenticular, c. 0.5 mm long. **Black crumb-weed. Fig. 4G–I.**

S.A.: NW, LE, NU, GT, FR, EA, EP, MU; W.A.; N.T.; Qld; N.S.W.

This species frequently hybridises with *D. pumilio* and *D. cristata*. Forma *melanocarpa*, recognised by previous authors, is no longer accepted.

6. ***Dysphania multifida** (L.) Mosyakin & Clemants, *Ukrayins'ke. Bot. Zhurn., n.s.* 59: 382 (2002). — *Chenopodium multifidum* L., *Sp. Pl.* 1: 220 (1753). — **Illustr.:** *Pl. W. N.S.W.* 260 (1982).

Perennial herb, prostrate to erect and 1 m high, aromatic; branches with cottony hairs; leaves pinnatisect, to 6 × 3 cm, segments linear, with recurved margins; undersurface densely covered with pale-yellow glandular hairs, sparsely cottony. **Flowers** in glomerules arranged in spicate panicles; bisexual flower: perianth hemispherical, shortly 5-lobed; stamens 5; ovary pubescent above with amber-coloured geniculate glandular hairs; female flower: perianth obovoid (pouch-like), minutely lobed; fruiting perianth c. 2.5 mm long, coriaceous, reticulate. **Pericarp** free, membranous; seed erect, lenticular, with a rounded margin; testa reddish-brown, glossy; embryo horseshoe-shaped. **Scented goosefoot. Fig. 4J–K.**

S.A.: *EP, *NL, *MU, *YP, *SL; *W.A.; *Qld; *N.S.W.; *Vic. Native to South America. Found in coastal sand and other disturbed areas. Flowers: Dec.–Jul.

7. **Dysphania plantaginella** F.Muell., *Fragm.* 1: 61 (1858). — *Chenopodium plantaginellum* (F.Muell.) Aellen, *Bot. Jahrb. Syst.* 63: 487 (1930). — **Illustr.:** F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 160 (2003).

Annual with several prostrate to ascending stems arising from the base; leaves elliptic to broadly elliptic, entire, with sessile glandular hairs; lamina 1–2 cm long, passing into a short petiole. **Inflorescence** of slender erect spikes composed of dense globular clusters; flowers with slender pedicels 0.3–0.5 mm long; terminal flower of the clusters bisexual; perianth-segments 3, free but persistent on the pedicel, with a strongly inflated limb that

has a rounded to spreading keel, ciliolate otherwise glabrous; stamen solitary; style solitary; lateral flowers of the cluster female otherwise similar to the terminal flower. **Pericarp** smooth, adherent; seed ellipsoid, erect, c. 0.5 mm long; embryo lateral and basal; radicle inferior; infructescence breaking up at the base of the pedicels to release the seed enclosed within the 3 perianth segments. **Fig. 6K.**

S.A.: NW, LE, GT, FR, EA, EP; W.A.; N.T.; Qld; N.S.W. Usually found in sand, either coastal or on the margins of waterholes and inland salt lakes. Flowers: recorded Jan.–Apr., Aug., Sep.

8. **Dysphania platycarpa** Paul G.Wilson, *Nuytsia* 4: 187 (1983).

Prostrate annual to 20 cm diam., with many stems arising from the base, sparsely pilosulose with simple or glandular hairs; leaves elliptic, obtuse, almost glabrous; lamina 5–10 mm long; petiole more or less equal to the lamina. **Inflorescence** of axillary glomerules c. 2.5 mm diam. in fruit; terminal flower of each glomerule bisexual; perianth-segments 3, free, prominently hooded, with a filiform claw; stamens 2; styles 2, very short; lateral flowers female; perianth-segments 1 or 2, in fruit with a white inflated limb and filamentous claw, in all c. 0.7 mm long. **Pericarp** adherent, minutely granulate; seed erect, obovate to deltoid, flat, c. 0.4 mm long, slightly twisted or with sunken faces; embryo lateral, radicle inferior; infructescence breaking up into separate perianth-segments and fruits. **Fig. 6A–C.**

S.A.: LE, NU, GT, EA; W.A.; N.T.; Qld; N.S.W. Found in clay by freshwater. Flowers: Jan.–Aug.

9. **Dysphania pumilio** (R.Br.) Mosyakin & Clemants, *Ukrayins'ke. Bot. Zhurn., n.s.* 59: 382 (2002). — *Chenopodium pumilio* R.Br., *Prodr.* 407 (1810). *C. pumilio* var. *oblongifolium* J.M.Black, *Fl. S. Austral.* ed. 2, 2: 289 (1948), *nom. inval.*; *C. carinatum* *auct. non* R.Br.: J.M.Black, *Fl. S. Austral.* 2: 180 (1924). — **Illustr.:** *Pl. W. N.S.W.* 262 (1982).

Low spreading or erect annual or short-lived perennial, aromatic; leaves sparsely pilosulose with simple and gland-tipped hairs; lamina narrow- or broad-elliptic to ovate, 10–20 mm long, obtuse, entire to sinuate or obtusely lobed; petiole slender, about half the length of the lamina. **Flowers** in compact axillary glomerules, subsessile or pedicellate, c. 0.5 mm high; perianth-segments 5, erect, united towards the base, thin, sparsely pilosulose towards the apex; stamen 0 or 1; fruiting perianth globular, c. 1 mm high, crustaceous, white; perianth-segments erect, narrowly boat-shaped. **Pericarp** membranous, adherent; seed erect, lenticular, c. 0.5 mm long; fruit dispersed within the perianth. **Clammy goosefoot, small crumbweed. Fig. 4M–N, Pl. 8C–F.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL, KI, SE; All States (naturalised in Tas). Commonly occurring as a weed of agriculture. Flowers: mainly Jan.–May.

This species frequently hybridises with *D. melanocarpa* and *D. cristata*.

10. **Dysphania rhadinostachya** (F.Muell.) A.J.Scott subsp. **rhadinostachya**, *Bot. Jahrb. Syst.* 100: 218 (1978). — *Chenopodium rhadinostachyum* F.Muell., *S. Sci. Rec.* 2: 98 (1882). — **Illustr.:** K.A.Williams, *Native Pl. Queensl.* 2: 117 (1984).

Erect annual to 30 cm high, with a single main stem, copiously branched above the base, pilose all over with short glandular and larger simple hairs, aromatic; leaves elliptic, undulate or obtusely lobed; lamina 10–20 mm long; petiole somewhat shorter. **Inflorescence** of paniculately arranged spikes composed of compact 3–7-flowered clusters; flowers bisexual and female; perianth-segments 4, erect, c. 1 mm long, hooded, united below, sometimes horizontally keeled, glabrous to hirsute, inflated in fruit; stamen 0 or 1; styles 2. **Pericarp** dull, somewhat adherent; seed subglobular, horizontal to erect, 0.5 mm diam.; embryo semicircular, radicle superior. Infructescence breaking up at the apex of the pedicels with the seed enclosed in the perianth. **Green crumbweed. Fig. 6G–H.**

S.A.: NW, LE; W.A.; N.T.; Qld. Usually found on rocky slopes in skeletal soil. Flowers: Aug.–Sep.

11. **Dysphania simulans** F.Muell. & Tate, *Trans. & Proc. Roy. Soc. S. Austral.* 8: 71 (1886). — *Chenopodium simulans* (F.Muell. & Tate) F.Muell. & Tate, *Syst. Census Austral. Pl.* ed. 2, 50 (1889); *C. osbornianum* Aellen, *Bot. Jahrb. Syst.* 63: 488 (1930).

Annual 10–30 cm high, with several decumbent to ascending branches arising from its base and from below the inflorescences, pubescent with simple hairs on the branches, sessile glandular hairs on the leaves and perianth; leaves soon deciduous; lamina elliptic, 1–2 cm long, obtuse to acuminate, with 2–4 pairs of prominent obtuse

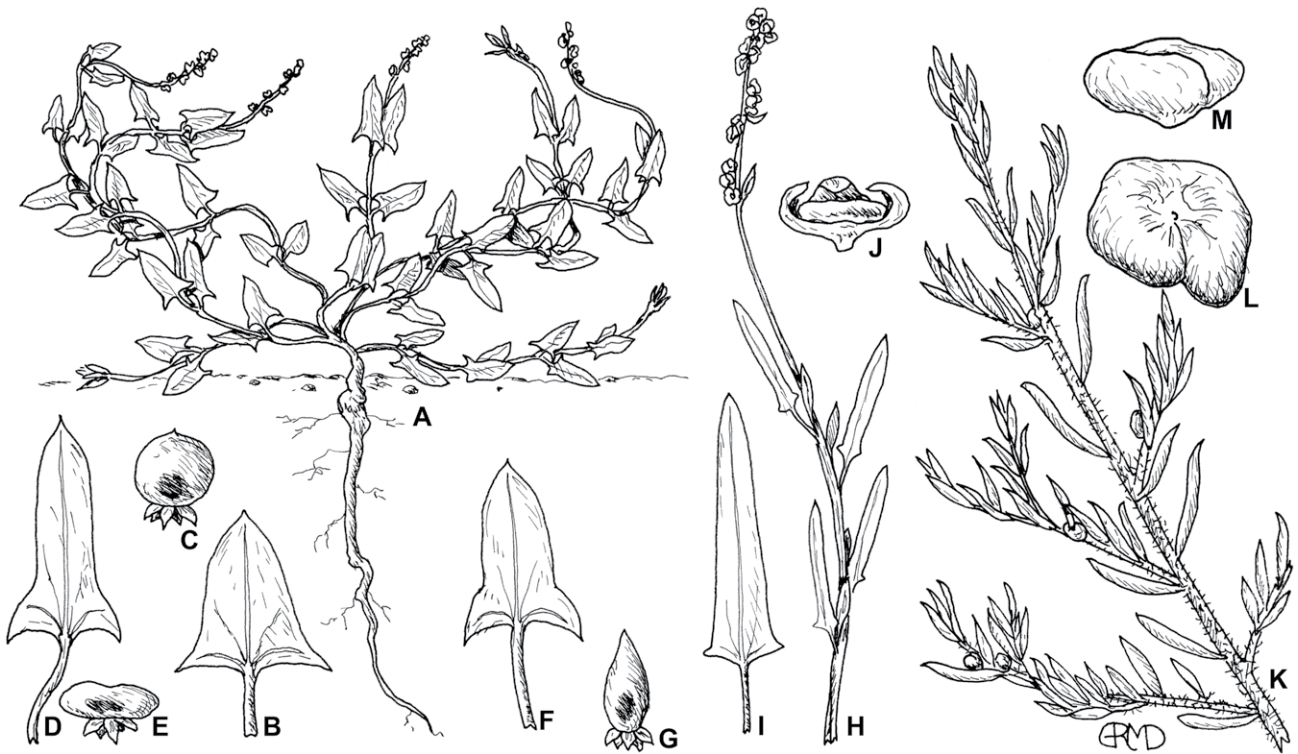


Fig. 7. A–C, *Einadia nutans* subsp. *nutans*: A, plant; B, leaf; C, fruit. D–E, *E. nutans* subsp. *eremea*: D, leaf; E, fruit. F–G, *E. nutans* subsp. *oxycarpa*: F, leaf; G, fruit. H–J, *E. polygonoides*: H, twig; I, leaf; J, fruit. K–M, *Enchylaena tomentosa* var. *tomentosa*: K, branch; L–M, fruits. Illustration by G.R.M. Dashorst, from Flora of South Australia 1: 264, Fig. 165 (1986).

lobes; petiole somewhat shorter than the lamina. **Inflorescence** an erect narrow-cylindrical spike 5–25 cm long, c. 4 mm diam., sessile at points of branching of the stem, composed of densely arranged 7-flowered cymes; terminal flower of the cyme bisexual; perianth-segments 3, hooded, c. 1 mm long, united in the lower half into an indurated strongly papillose cup-shaped tube; stamen solitary; styles 2; lateral flowers female otherwise similar to, although smaller than, the terminal flower. **Fruiting perianth** cartilaginous, firmly attached; perianth-segment limbs with horizontal hyaline wings; seed erect, broadly pear-shaped, c. 0.6 mm long; embryo vertical; radicle superior; infructescence tardily breaking up into separate perianths and enclosed seeds. **Erect crumbweed**. **Fig. 6L.**

S.A.: NW, LE, GT, EA, EP (Lake Gilles); W.A.; N.T.; Qld; N.S.W.; Vic. Flowers: Dec.–May.

12. **Dysphania truncata** (Paul G.Wilson) Mosyakin & Clemants, *J. Bot. Res. Inst. Texas* 2: 427 (2008). — *Chenopodium truncatum* Paul G.Wilson, *Nuytsia* 4: 177 (1983).

Prostrate to ascending annual branching from the base, aromatic; stems pilosulose with slender and sessile to shortly stipitate gland-tipped hairs; leaves elliptic, obtuse, entire to slightly undulate, glandular-puberulent all over and pilosulose below along the veins; lamina c. 10 mm long; petiole slender, c. 5 mm long. **Flowers** in compact axillary clusters; perianth-segments 5, erect, united to near the apex; stamen 0 or 1. **Fruiting perianth** cartilaginous, white or black, in side view very broadly triangular, flat above (or the lobes ascending), c. 2 mm wide; perianth-segments firmly united to the apex, toothed or lacerate on the margins, not rostrate; pericarp membranous, adherent; seed erect, lenticular, c. 0.7 mm diam.

S.A.: NW, LE, GT, FR, EA, MU; N.T., Qld (south-west section); N.S.W. (western section). Usually in deep red sand. Flowers: Jul.–Aug.

7. EINADIA Raf.

Fl. Tellur. 4: 121 (1838).

(Greek *ein*, one; *andros*, male; referring to the solitary stamen.)

Herbaceous or weakly woody perennials; leaves opposite or alternate, linear to broad-hastate, mealy when young. **Flowers** small, in clusters arranged in racemose or open panicles; pedicels constricted at the apex; terminal flower of each cluster bisexual; lateral flowers female, without staminodes; perianth-segments 5 (rarely 4); stamens 1–3,

glabrous; disk absent; ovary glabrous; stigmas 2, slender. **Fruit** with the pericarp either membranous or succulent, not enveloped by the perianth; seed horizontal, lenticular, with a rounded margin; embryo annular; perisperm central and copious.

6 species, 4 endemic to Australia and 2 to New Zealand.

Reference: Wilson (1983)

- 1. Fruit succulent; perianth-segments oblong, often fleshy in fruit; leaves linear to broad-triangular, sometimes hastate, grey to green..... 1. **E. nutans**
- 1: Fruit dry; perianth-segments in fruit with a hard circular (often black) limb; leaves narrowly oblong-elliptic to narrow-hastate; grey-green..... 2. **E. polygonoides**

- 1. **Einadia nutans** (R.Br.) A.J.Scott, *Feddes Repert.* 89: 3 (1978). — *Rbagodia nutans* R.Br., *Prodr.* 408 (1810); *Chenopodium nutans* (R.Br.) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012). — **Illustr.:** K.A.W.Williams, *Native Pl. Queensl.* 2: 117 (1984) .

Scrambling perennial with a woolly base; leaves opposite or alternate; lamina linear to broadly triangular, entire, rounded to truncate or hastate at the base, 10–20 (rarely to 40) mm long, moderately mealy when young, abruptly petiolate. **Inflorescence** a narrow panicle 2–4 cm long; perianth depressed-globular, 0.7–1.5 cm diam., mealy to glabrescent; perianth-segments oblong, enlarging and becoming red and fleshy in fruit; stamens 0–2 (rarely 3). **Pericarp** succulent, c. 4 mm diam.; seed 1–1.5 mm diam.; testa rugulose to areolate-reticulate, black. **Climbing saltbush, nodding saltbush.**

A polymorphic species. The following subspecies represent the principal variants.

- 1. Leaves narrow-sagittate, subcoriaceous; seed c. 1.5 mm diam. (central Australia)... 1a. **E. nutans** subsp. **eremaea**
- 1: Leaves narrow- to broad-hastate or deltoid, thin; seed c. 1 mm diam.
 - 2. Leaves narrow-hastate; berry ovoid..... 1c. **E. nutans** subsp. **oxycarpa**
 - 2: Leaves variable; berry depressed-globular..... 1b. **E. nutans** subsp. **nutans**

- 1a. **Einadia nutans** subsp. **eremaea** Paul G.Wilson, *Nuytsia* 4: 204 (1983). — *Chenopodium nutans* subsp. *eremaea* (Paul G.Wilson) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012).

Scrambling perennial to 1 m high; leaves grey; lamina somewhat leathery, narrow-triangular, sagittate, 15–40 mm long; inflorescence paniculate. **Flowers** sessile. **Fruits** sessile; berry depressed-globular; seed c. 1.5 mm diam.; testa strongly sculptured. **Fig. 7D–E, Pl. 8G.**

S.A.: NW, LE, GT, FR, EA; W.A.; N.T.; Qld; N.S.W. Usually found growing in sand. Flowers: probably all months, especially May–Nov.

- 1b. **Einadia nutans** (R.Br.) A.J.Scott subsp. **nutans**

Leaves thin, hastate to deltoid and shortly lobed at the base. **Inflorescence** slender or branched at the base. **Fruits** sessile or pedicellate; berry depressed-globular; seed variably reticulate, c. 1 mm diam. **Fig. 7A–C, Pl. 8H–I.**

S.A.: NW, LE, GT, FR, EA, EP, NL, MU, YP, SL, KI, SE; W.A.; N.T.; Qld; N.S.W.; Vic.; Tas. Usually found in loam or heavy soil. Flowers: all months, especially May–Nov.

- 1c. **Einadia nutans** subsp. **oxycarpa** (Gauba) Paul G.Wilson, *Nuytsia* 4: 203 (1983). — *Rbagodia nutans* var. *oxycarpa* Gauba, *Victorian Naturalist* 65: 167 (1948); *Chenopodium nutans* subsp. *oxycarpa* (Gauba) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012). — **Illustr.:** *Pl. W. N.S.W.* 278 (1982).

Scrambling subshrub to 1 m high; leaves somewhat leathery, narrow-hastate, acute, c. 15 mm long; basal lobes narrow, acute. **Inflorescence** branched; flowers and fruits sessile. **Fruiting** perianth fleshy and reflexed, red; berry ovoid, c. 4 mm long; seed horizontal to erect, c. 1 mm diam.; testa moderately reticulate. **Fig. 7F–G.**

S.A.: ?NW, ?GT, EA, EP, MU; N.S.W. Flowers: May–Sep.

The identity of specimens from NW and GT needs to be confirmed.

2. ***Einadia polygonoides** (Murr) Paul G.Wilson, *Nuytsia* 4: 212 (1983). — *C. triangulare* var. *polygonoides* Murr, *Bull. Herb. Boissier* 4: 994 (1904); *C. triangulare* subsp. *polygonoides* (Murr) Murr, *Allg. Bot. Z. Syst.* 16: 56 (1910); *C. polygonoides* (Murr) Aellen, *Mitt. Naturf. Ges. Solothurn* 20, 8: 213 (1928). *Chenopodium triangulare* var. *angustifolium* Benth., *Fl. Austral.* 5: 161 (1870).

Spreading weak grey-green perennial with numerous stems arising from the tap root; leaves opposite or alternate; lamina thin, narrowly oblong-elliptic to narrow-hastate, 0.5–1.5 cm long, acute, glabrescent above, mealy below when young; petiole short and slender. **Inflorescence** a terminal racemose panicle elongating in fruit to 15 cm with disjunct glomerules; axis at first with globular hairs, short tubular hairs and small gland-tipped hairs; flowers sessile, 0.5–1 mm diam.; perianth-segments broad-obovate; stamens 1 or 2; fruiting perianth-segments imbricate and enveloping the seed, leathery, with a circular limb, somewhat resinous, eventually straw-coloured to black. **Pericarp** thin, prominently papillose; seed c. 1 mm diam.; testa finely radially rugulose. **Knotted goosefoot. Fig. 7H–J.**

S.A.: *?EP, *?SL; Qld; N.S.W. Flowers: Jan. (1 record).

Evidently an early introduction into S.A. and not collected here since 1962. The species is native to Qld and N.S.W.

8. ENCHYLAENA R.Br.

Prodr. 407 (1810).

(Greek *enchylos*, succulent; *chlaina*, cloak; alluding to the succulent fruiting perianth.)

Small shrubs; leaves alternate, simple, entire, fleshy. **Flowers** solitary, axillary, sessile, bisexual; perianth cup-shaped, 5-lobed with a deep split on one side; stamens 5. **Fruiting perianth** globular or depressed-globular, succulent, with a cartilaginous to woody inner layer, vertically split opposite the radicle (the succulent margins overlapping); lobes short, succulent, obscuring the ovary; wing (if present) forming a shallow undulate cup around the apex of the perianth and split opposite the radicle; seed horizontal; testa membranous; embryo annular; perisperm central; radicle centrifugal.

2 species endemic to Australia.

1. **Enchylaena tomentosa** R.Br., *Prodr.* 408 (1810).

Low compact or lax shrub up to 1 m high, densely woolly with short curled hairs to shortly villous or glabrous, sometimes glaucous; leaves slender, terete or fusiform, 7–20 mm long; perianth tube glabrous; lobes glabrous or pubescent, woolly-ciliate. **Fruiting perianth** depressed-globular, c. 5 mm diam., green, yellow, orange or red (drying black); apex flat or deeply sunken in the centre, glabrous or woolly; wing absent or represented by an incurved undulate corona up to 1 mm high. **Ruby saltbush, barrier saltbush.**

Widespread in mainland States, also as an introduction in New Caledonia. Occurs principally in slightly saline soil.

An extremely variable species both in indumentum and in shape of the fruiting perianth. Hybridisation occurs between *E. tomentosa* and *Maireana turbinata* and between *E. tomentosa* and *M. georgei*.

1. Leaves villous, branches tomentose..... 1b. **E. tomentosa** var. **tomentosa**
 1: Leaves and branches glabrous or minutely and sparsely appressed-pilosulose 1a. **E. tomentosa** var. **glabra**

- 1a. **Enchylaena tomentosa** var. **glabra** Benth., *Fl. Austral.* 5: 182 (1870).

Branches and leaves very sparsely and minutely appressed-villous to glabrous, glaucous. **Fruit** flat or slightly sunken in the centre; lobes glabrous apart from the ciliate margins.

S.A.: LE, GT, FR (Witchelina); W.A.; N.T.; Qld.; N.S.W.. Flowers: Dec. (1 record).

- 1b. **Enchylaena tomentosa** R.Br. var. **tomentosa** — *Enchylaena tomentosa* var. *villosa* Benth., *Fl. Austral.* 5: 182 (1870).

Branches decumbent to erect, with a thin woolly indumentum; leaves villous. **Fruiting perianth** depressed-

globular, flat to deeply sunken in the centre; wing absent or crown-like and incurved; lobes glabrous (but ciliolate) to pubescent. **Fig. 7K–M, Pl. 8J–L.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL, KI, SE; W.A.; N.T.; Qld.; N.S.W.; Vic. Flowers: probably all months.

Fruit colour in a population can be uniform or variable.

9. EREMOPHEA Paul G. Wilson

Fl. Austral. 4: 326 (1984).

(Greek *eremos*, solitary, as in deserts.)

Small shrubs, tomentose all over with dendritic or stellate hairs; leaves alternate, sessile, entire, fleshy, the floral ones often clustered. **Flowers** solitary or in triads, bisexual; perianth 5-lobed; stamens 5. **Fruiting** perianth woody and becoming embedded in the woody branch axis; spines initially 5, arising from the base of the perianth lobes but in *E. spinosa* fusing irregularly; seed and radicle erect; perisperm central. Infructescence persistent.

2 species endemic to Australia.

1. ***Eremophea spinosa*** (Ewart & O.B.Davies) Paul G.Wilson, *Fl. Austral.* 4: 327 (1984). — *Bassia spinosa* Ewart & O.B.Davies, *Fl. N. Territory.* 95 (1917); *Sclerolaena spinosa* (Ewart & O.B.Davies) A.J. Scott, *Feddes Repert.* 89:114 (1978). *B. eremaea* Ising, *Trans. Roy. Soc. S. Australia.* 88: 93 (1964), *nom. illeg.* — **Illustr.:** A.J. Ewart & O.B. Davies, *Fl. N. Territory*, t. 12, figs 1–3 (1917).

Rounded shrub c. 30 cm high; branches brittle, tomentose; leaves narrow-obovate to obovate, 10–15 mm long, obtuse, fleshy, tomentose, the floral ones often clustered. **Flowers** solitary, slightly sunken into the branch; perianth cup-shaped, densely tomentose outside. **Fruiting** perianth urceolate, c. 4 mm long, woody, tomentose, becoming embedded in the woody branch axis; lobes membranous, erect; spines arising from beneath the perianth lobes but usually coalescing to form a stout adaxial 3-pronged spine 3–6 mm long and a shorter abaxial 2-pronged spine the fused bases of which become flattened; fruits irregularly clustered, persistent. **Fig. 8A–D.**

S.A.: NW, LE; W.A.; N.T. Occurs in *Acacia aneura* scrub, also on calcareous hills and in sandy soil on eroded flats. Flowers: not known for S.A.

The irregularly shaped woody masses containing several fruits which occur along the branches appear to be the natural form taken by this plant.

10. ERIOCHITON (R.H.Anderson) A.J.Scott

Feddes Repert. 89: 119 (1978).

(Greek *erion*, wool; *chiton*, covering; alluding to the woolly perianth.)

Small woolly shrub; leaves alternate, sessile, linear, somewhat fleshy. **Flowers** bisexual, solitary and axillary, perianth cup-shaped, 5-lobed, fleshy in the lower half; stamens 5, glabrous; stigmas 2, slender. **Fruiting** perianth subglobular, hard, densely woolly, with a (radicular) split running almost to the base on one side, faintly ribbed; appendages in two series: inner appendages 5, erect, oblong, deeply divided, arising from the base of the perianth lobes; outer appendages 5, spreading, spinescent, arising from the base of the inner appendages; seed thick, horizontal; testa membranous; embryo circular, with a centrifugal radicle; perisperm central, copious.

Monotypic; central and western temperate Australia.

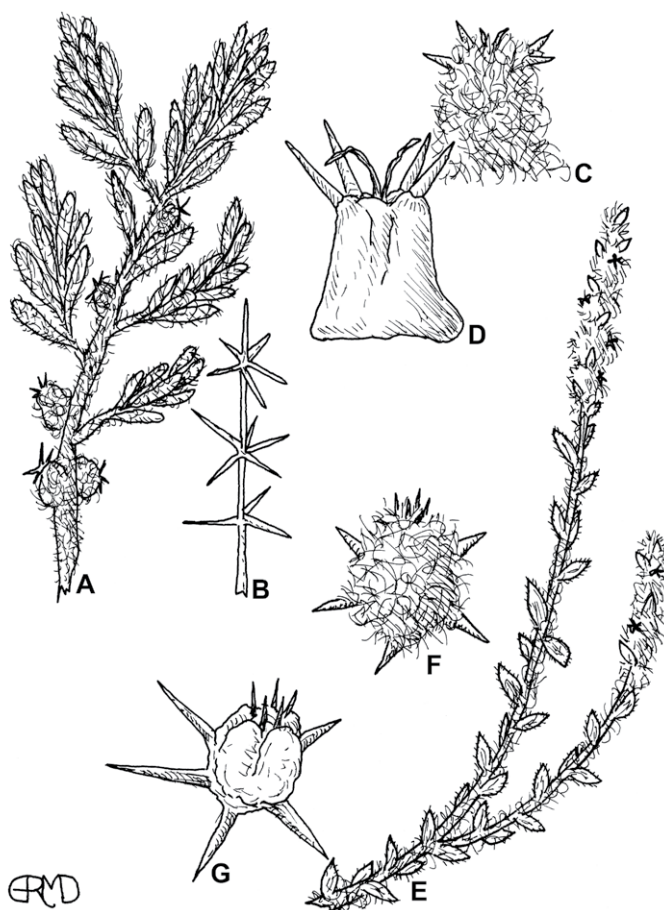


Fig. 8. A–D. *Eremophea spinosa*: A, twig; B, stellate hair; C, fruit; D, fruit with hair. **E–G. *Eriochiton sclerolaenoides*:** E, twig; F, fruit; G, fruit with hair removed. Illustrations by G.R.M. Dashorst, from *Flora of South Australia* 1: 266, Fig. 157 (1986).

1. **Eriochiton sclerolaenoides** (F.Muell.) F.Muell. ex A.J.Scott, *Feddes Repert.* 89: 119 (1978). — *Echinopsilon sclerolaenoides* F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 75 (1858); *Chenolea sclerolaenoides* (F.Muell.) F.Muell. ex Benth., *Fl. Austral.* 5: 192 (1870); *Bassia sclerolaenoides* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882); *B. eriochiton* Tate, *Handb. Fl. Extratrop. S. Austral.* 51, 218 (1890), *nom. illeg.*; *Maireana sclerolaenoides* (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 18 (1975). — **Illustr.: Pl. W. N.S.W.** 274 (1982).

Rounded shrub c. 20 cm high, with woolly branches; leaves linear, 5–10 mm long, silky-woolly. **Fruiting** perianth densely silky-woolly, c. 1 mm high and c. 2 mm wide, with the appendages c. 3 mm long; pericarp and the base of the style villous. **Woolly-fruit copperburr. Fig. 8E–G, Pl. 9A–C.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP; W.A.; N.T.; N.S.W.; Vic. Flowers: probably all months.

11. MAIREANA Moq.

Chenop. Monogr. Enum. 95 (1840).

(After A.C.Lemaire, 1800–1871, a French naturalist and friend of the author.)

Herbaceous to woody perennials or small shrubs, glabrous or hairy; leaves alternate or opposite, often succulent. **Flowers** axillary, solitary or paired, sessile, rarely minutely bi-bracteolate, unisexual or bisexual; perianth: tube flat to cup-shaped, greatly enlarging in fruit; lobes 5, usually deeply divided opposite the radicle and sometimes extending down the tube as a radicular split; stamens 5, exerted; stigmas 2 or 3. **Fruiting** perianth spongy, leathery, crustaceous or woody; tube saucer-shaped to globular, at the base of the perianth lobes developing a more or less horizontal wing or 5 separate wings which arise from the base of each lobe (occasionally wing not developed), additional accessory wings sometimes present; perianth lobes occasionally giving rise to erect appendages or to emergences; utricle discoid to globular; pericarp membranous to crustaceous; seed horizontal; embryo circular or horseshoe-shaped; perisperm copious, central. **Bluebushes.**

About 57 species endemic to the mainland States; rare in the tropics.

The fruiting perianth is here sometimes called the ‘fruit’; that portion lying within the horizontal wings is called the ‘upper perianth’; that portion below the wings the ‘tube’ irrespective of its shape.

Reference: Wilson (1975).

1. Fruit with 5 more or less horizontal wings surrounding the upper perianth
 2. Fruit with erect processes arising from the upper perianth 18. **M. lobiflora**
 - 2: Fruit without erect processes
 3. Leaves sericeous; fruit densely silky-lanate, c. 10 mm diam 12. **M. eriantha**
 - 3: Leaves and fruits not as above
 4. Flowers in pairs; tube of the fruit more or less flat or very shallow
 5. Wings more or less glabrous, pungent, woody 19. **M. luehmannii**
 - 5: Wings densely woolly 31. **M. scleroptera**
 - 4: Flowers solitary; wings glabrous
 6. Wings thin, obovate to fan-shaped
 7. Wings equal and horizontal; leaves alternate; flowers hermaphrodite 4. **M. brevifolia**
 - 7: Two of the 5 wings smaller and suberect; leaves often opposite; plants usually dioecious 22. **M. oppositifolia**
 - 6: Wings small, imbricate, lunate, incurved or inflated on the margins; slender perennial to 0.3 m high 11. **M. enchylaenoides**
 - 1: Fruit with a single wing surrounding the upper perianth (accessory wings on the tube or upper perianth may also be present)
 8. Fruit small (under 5 mm diam.), more or less densely silky-pilose; tube almost flat and continuous with the narrow wing; small perennials
 9. Upper surface of the fruit with an erect cup-shaped outgrowth 9. **M. coronata**
 - 9: Fruit without such an outgrowth.

10. Fruit 2.5–4 mm diam., upper surface with a pentagonal-shaped ridge..... 24. **M. pentagona**
- 10: Fruit c. 4 mm diam., upper surface with 5 narrow radial ridges extending from near the centre to the edge of the wing..... 8. **M. ciliata**
- 8: Fruit (including wing) mostly over 5 mm diam. or if smaller not silky-pilose
11. Fruit enveloped in long dense wool..... 7. **M. carnosa**
- 11: Fruit not enveloped in long wool
12. Fruit glabrous, with a large rounded soft spongy tube; upper perianth more or less flat
13. Branches with a pale-fawn indumentum of branched hairs; leaves very slender, glaucous; horizontal wing not decurrent on the tube 5. **M. campanulata**
- 13: Branches with a white woolly indumentum of simple hairs; leaves fleshy, narrowly terete or fusiform; horizontal wing attached by a short decurrent wing to the tube..... 33. **M. spongiocarpa**
- 12: Fruit not with the above characters combined
14. 1–5 vertical wings on the tube
15. Plant glabrous (or almost so) 37. **M. triptera**
- 15: Plant hairy, at least on the branches
16. Leaves villous; perianth lobes erect and longer than the tube 30. **M. schistocarpa**
- 16: Leaves glabrous; perianth lobes not erect
17. Vertical wings running the length of the tube and united at the apex to the horizontal wing; perianth lobes prominently woolly-ciliate .. 13. **M. erioclada**
- 17: Vertical wings often present only towards the base of the tube; perianth lobes arched and prominently tomentose 25. **M. pentatropis**
- 14: No vertical wings on the tube
18. Vertical processes present on the upper perianth..... 17. **M. lanosa**
- 18: No vertical processes above the wing
19. Plant glabrous (apart from axillary tufts of wool); slender lax plants
20. Upper perianth convex; wing of the mature fruit straw-coloured when dry..... 1. **M. aphylla**
- 20: Upper perianth more or less flat; fruit pale-brown when dry
21. Leaves slender-fusiform on flowering branches; flowers minutely bracteolate 34. **M. suaedifolia**
- 21: Leaves terete; flowers ebracteolate 10. **M. decalvans**
- 19: Plant variously hairy
22. Leaves opposite; tube dish-shaped; leaves sessile by a broad base, apex recurved; wing c. 6 mm diam..... 6. **M. cannonii**
- 22: Leaves all or mostly scattered
23. Wing of the fruit glabrous
24. Upper perianth flat or slightly concave or convex
25. Tube of the fruit abruptly narrowed at the base into a prominent terete stipe, 2–3 (rarely 1) mm long
26. Upper perianth convex, open in the centre to expose the utricle 1. **M. aphylla**
- 26: Upper perianth flat or slightly sunken, completely covering the utricle 2. **M. appressa**
- 25: Tube not as above
27. Tube expanded into a hollow spongy base; perennial herb..... 14. **M. excavata**

- 27: Tube not (or scarcely) expanded at the base
28. Wing of the fruit with a radial (radicular) slit
29. Leaves, branches and flowers closely tomentose with branched hairs; leaves obovoid; tube and the convex upper perianth of the fruit pubescent 3. **M. astrotricha**
- 29: Leaves and branches with more or less simple hairs or glabrous
30. Fruit large (wing c. 15 mm diam. or more); tube thick-walled, turbinate 15. **M. georgei**
- 30: Fruit with a wing 5–14 mm diam.; tube not thick-walled
31. Tube of the fruit pubescent; upper perianth more or less flat; leaves obovoid, fleshy 32. **M. sedifolia**
- 31: Tube of the fruit glabrous; leaves various
32. Leaves flattened, linear to obovate
33. Leaves linear, appressed-villous; upper perianth glabrous; wing with radial anastomosing veins when dry 39. **M. villosa**
- 33: Leaves narrowly to broadly obovate, pubescent with curled hairs; upper perianth pubescent; wing without obvious nerves 26. **M. planifolia**
- 32: Leaves terete, semiterete or obovoid
34. Fruit produced into a short terete hollow stipe at the base, straw-coloured when dry
35. Open divaricately branched shrub; branches striate and often spinescent; upper perianth convex and open in the centre 1. **M. aphylla**
- 35: Branches more or less ascending, neither spinescent nor striate; upper perianth flat or sunken and completely covering the utricle 2. **M. appressa**
- 34: Fruit without a stipe-like base
36. Upper perianth with a convex disc, open in the centre; wing not prominently crenulate
37. Stem striate; leaves sessile, woolly to glabrescent 1. **M. aphylla**
- 37: Stem not obviously striate, leaves narrowed at the base, glabrous 29. **M. rohrlachii**
- 36: Upper perianth more or less flat, concave, of if convex then closed in the centre

38. Upper perianth tomentose; wing with fine but obvious radiating nerves..... 28. **M. radiata**
- 38: Fruit glabrous or sparsely villous
39. Leaves tomentose
40. Fruit straw-coloured when dry and with a short hollow stipe..... 2. **M. appressa**
- 40: Fruit almost black when dry, sessile..... 20. **M. melanocarpa**
- 39: Leaves glabrous or sparsely villous; fruit brown when dry
41. Upper perianth closed in the centre; tube firm..... 21. **M. microcarpa**
- 41: Upper perianth open in the centre (exposing the utricle); tube weak
42. Wing 11–16 mm diam., often undulate..... 29. **M. rohrlachii**
- 42: Wing c. 8 mm diam., flat..... 10. **M. decalvans**
- 28: Wing of the fruit continuous (i.e. without a radial slit); leaves semiterete
43. Fruit large, wing c. 15 mm diam.; tube turbinate, smooth..... 38. **M. turbinata**
- 43: Fruit small, wing 11 mm or less in diam.; tube hemispherical to cup-shaped
44. Leaves 2–5 mm long, appressed on younger branches; wing 4–6 mm diam..... 23. **M. ovata**
- 44: Leaves over 5 mm long, spreading; wing usually 8–10 mm diam.
45. Upper perianth pubescent..... 16. **M. integra**
- 45: Upper perianth glabrous (or almost so) apart from the ciliate lobes..... 35. **M. tomentosa**
- 24: Upper perianth columnar in form, with large erect lobes
46. Leaves 2–6 mm long, shortly pubescent; no vertical wings on the tube..... 27. **M. pyramidata**
- 46: Leaves 5–12 mm long, appressed-villous; tube with a narrow vertical wing..... 30. **M. schistocarpa**
- 23: Wing of the fruit pubescent above
47. Upper perianth erect and columnar 30. **M. schistocarpa**
- 47: Upper perianth not erect 36. **M. trichoptera**

1. **Maireana aphylla** (R.Br.) Paul G.Wilson, *Nuytsia* 2: 54 (1975). — *Kochia aphylla* R.Br., *Prodr.* 409 (1810); *Salsola aphylla* (R.Br.) Spreng., *Syst. Veg.* 1: 925 (1824); *K. villosa* var. *aphylla* (R.Br.) Maiden & Betche, *Census N.S.W. Pl.* 70 (1916). — **Illustr.:** *Pl. W. N.S.W.* 265 (1982); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 195 (1988); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 101 (2003).

Divaricately branched shrub 0.5–2 m high, predominantly dioecious; branchlets striate, almost glabrous to somewhat woolly, often spinescent; leaves small, alternate, slender and subterete, 1–4 (rarely to 8) mm long, sparsely to densely woolly, very shortly spurred at the base, frequently caducous. **Flowers** solitary, occasionally minutely bi-bracteolate. **Fruiting** perianth straw-coloured when dry, glabrous except for the sparsely woolly upper perianth; base small, sometimes swollen or produced into a very short hollow stipe; tube hemispherical to turbinate, 1–2 mm high; wing simple, horizontal, c. 8 mm diam., papery, faintly to prominently veined, with a single radial slit; upper perianth thick, forming a circular convex disc open in the centre, sparsely woolly. **Cotton-bush, leafless bluebush. Fig. 9A, Pl. 9D.**

S.A.: NW, LE, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.T.; Qld; N.S.W.; Vic. Usually found in clay soil in seasonally waterlogged situations. Flowers and/or fruits: mainly June–Sep. in the north and Jan.–Jul. in the south.

This species sometimes has woolly galls caused by insect attack: hence the common name.

2. **Maireana appressa** (Benth.) Paul G.Wilson, *Nuytsia* 2: 54 (1975). — *Kochia appressa* Benth., *Fl. Austral.* 5: 188 (1870); *K. tomentosa* var. *appressa* J.M.Black, *Fl. S. Austral.* 197 (1924). *K. tomentosa* F.Muell., *Rep. Pl. Babbage's Exped.* 20 (1859). — **Illustr.:** *Pl. W. N.S.W.* 265 (1982); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 107 (2003).

Intricately branched shrub 10–60 cm high, loosely white-woolly all over; leaves alternate, sub-erect (if small) to spreading, narrow-deltoid to narrow-oblong, 2–5 (rarely to 8) mm long. **Flowers** solitary, bisexual, glabrous. **Fruiting** perianth glabrous (or rarely the upper perianth pubescent), straw-coloured when dry; attachment eccentric on a hollow stipe to 1 mm long, produced from the base of the tube; tube turbinate, 1–2 mm high, thin-walled and readily crushed; wing simple, c. 10 mm diam., papery, faintly nerved, with a radial (radicular) slit; upper perianth usually sunken, completely covering the ovary, with 5 ridges extending radially between the lobes. **Fig. 9B.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU; W.A.; N.T.; Qld; N.S.W.; Vic. Found on sandy saline or calcareous soils. Flowers and/or fruits: Mar.–Oct.

3. **Maireana astrotricha** (L.A.S.Johnson) Paul G.Wilson, *Nuytsia* 2: 35 (1975). — *Kochia astrotricha* L.A.S.Johnson, *Contr. New South Wales Natl. Herb.* 1: 343 (1951). *K. sedifolia* var. *stellulata*, J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 39: 828 (1915). — **Illustr.:** *Pl. W. N.S.W.* 266 (1982).

Rounded divaricately branched shrub to 1 m high, closely covered on the branches and leaves with branched hairs; leaves alternate, fleshy, narrowly to broadly obovoid, with an attenuate base, in all 5–10 mm long. **Flowers** solitary, polygamo-dioecious, the male hemispherical and the female globose, densely tomentose, minutely bi-bracteolate. **Fruiting** perianth tomentose, except for the glabrous wing; tube turbinate, c. 3 mm high, thick-walled and smooth; wing simple, papery, horizontal, c. 15–20 mm diam., pale- to dark-brown when dry, with a single radial slit; upper perianth convex, thick. **Low bluebush. Fig. 9C, Pl. 9E–G.**

S.A.: NW, LE, GT, FR, EA, EP, MU; N.T.; Qld.; N.S.W. Usually found in well drained gravelly soil. Flowers and/or fruits: June–Oct.

4. **Maireana brevifolia** (R.Br.) Paul G.Wilson, *Nuytsia* 2: 22 (1978). — *Kochia brevifolia* R.Br., *Prodr.* 409 (1810). *Suaeda tamariscina* Lindl. in T.Mitch., *J. Exped. Trop. Austral.* 239 (1848); *Enchylaena tamariscina* (Lindl.) Druce, *Bot. Soc. Exch. Club Brit. Isles* 4: 621 (1917); *K. tamariscina* (Lindl.) J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 47: 368 (1923). — **Illustr.:** *Pl. W. N.S.W.* 266 (1982).

Shrub to 1 m high; branches slender, striate, sparsely woolly; leaves alternate, fleshy, obovoid to narrow-fusiform, 2–5 mm long, glabrous. **Flowers** solitary, glabrous apart from the woolly ciliate lobes. **Fruiting** perianth glabrous; tube shallowly hemispherical, thin-walled, c. 2 mm diam.; wings 5, horizontal, thin, fan-shaped, 2–3 mm long, with delicate brown venation when dry; perianth lobes thick and fleshy, sharply demarcated from the wings. **Small-leaved (or short-leaved) bluebush, eastern cotton-bush, yarga bush. Fig. 9D, 9H–K.**

S.A.: LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.T.; Qld; N.S.W.; Vic. Usually found in slightly saline soil. Flowers and/or fruits: Mar.–Oct. in the north; Jan.–Jul. in the south.

A weedy species commonly found on disturbed soils especially along roadsides.

5. **Maireana campanulata** Paul G.Wilson, *Nuytsia* 2: 37 (1975). — **Illustr.:** *Pl. W. N.S.W.* 266 (1982); P.Moore, *Guide Pl. Inland Austral.* 92 (2005).

Small shrub to 60 cm high; branchlets with a thin tomentum of pale-fawn cured shortly branched hairs; leaves slender-terete, acute, 8–15 mm long, fleshy, glaucous, glabrous. **Flowers** solitary, bisexual, glabrous. **Fruiting** perianth glabrous; tube cup-shaped, c. 6 mm high and wide, spongy; wing thin, horizontal, entire, very narrow, c. 10 mm diam., with no radial slit. **Fig. 9E, 9L–M.**

S.A.: NW, LE, NU, GT (Mt Finke), FR, EA; N.T.; Qld. Found principally on rocky slopes and in other well-drained situations. Flowers and/or fruits: Jul.–Nov.

6. **Maireana cannonii** (J.M.Black) Paul G.Wilson, *Nuytsia* 2: 42 (1975). — *Kochia cannonii* J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 43: 29 (1919).

Small much-branched shrub; branchlets closely woolly; leaves opposite, sessile, semiterete, 5–6 mm long; with a short silky indumentum, base shortly spurred, apex recurved. **Flowers** solitary, bisexual, densely pubescent. **Fruiting** perianth strongly depressed, sparsely pubescent above, glabrous below; attachment broad and flat; tube dish-shaped, c. 2.5 mm diam., crustaceous; wing simple, circular, horizontal, thin, c. 6 mm diam., with a single radial (radicular) slit; upper perianth slightly convex; style hard and exerted. **Fig. 9F.**

S.A.: LE (Witchelina), GT, FR (Myrtle Springs), EP. Flowers and/or fruits: Sep.–Apr.

7. **Maireana carnososa** (Moq.) Paul G.Wilson, *Nuytsia* 2: 30 (1975). — *Echinopsilon carnosus* Moq. in A.DC., *Prodr.* 13(2): 136 (1849); *Chenolea carnososa* (Moq.) Benth., *Fl. Austral.* 5: 190 (1870); *Bassia carnososa* (Moq.) F.Muell., *Syst. Census Austral. Pl.* 30 (1882); *Kochia carnososa* (Moq.) R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 353 (1923). *B. lanuginosa* C.T.White, *Queensland Agric. J.* 15: 216 (1921). — **Illustr.:** P.Moore, *Guide Pl. Inland Austral.* 92 (2005).

Erect perennial woody at the base, to 30 cm high; branches woolly; leaves fleshy, alternate narrow- to broad-oblong, acute, to 10 mm long (floral leaves often broader than the stem leaves), silky to woolly or almost glabrous. **Flowers** solitary, bisexual, spirally arranged in dense leafy spikes, densely covered in long wool. **Fruiting** perianth sessile, enveloped in a thick mass of wool to 8 mm diam.; tube shallowly hemispherical, 2–3 mm diam., crustaceous; wing circular, horizontal, very narrow (to 0.5 mm wide), with a single radial slit; upper perianth flat or slightly inflexed in the centre, crustaceous. **Cottony bluebush. Fig. 9G, Pl. 10A–B.**

S.A.: NW, LE, NU, FR, EA, MU; W.A.; N.T.; Qld. Usually found around salt lakes. Flowers and/or fruits: Aug.–Oct.

8. **Maireana ciliata** (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 27 (1975). — *Kochia ciliata* F.Muell., *Rep. Pl. Babbage's Exped.* 20 (1859). — **Illustr.:** *Pl. W. N.S.W.* 266 (1982).

Decumbent to erect perennial with a woody base and slender tap root, to 10 cm high; branches slender, woolly; leaves alternate, narrow-oblong, c. 10 mm long, silky. **Flowers** solitary, densely villous, often congested into leafy spikes. **Fruiting** perianth lenticular, pentagonal in outline, c. 3 mm diam., horny, silky-villous all over; lower surface flat to slightly convex; upper surface convex in the centre otherwise flat and wing-like, with 5 prominent radiating ribs between the perianth segments extending to the angles of the wing. **(Hairy) fissure-weed. Fig. 9H.**

S.A.: NW, LE, GT, FR, EA, EP; N.T.; Qld.; N.S.W. Flowers and/or fruits: Apr.–Nov.

9. **Maireana coronata** (J.M.Black) Paul G.Wilson, *Nuytsia* 2: 28 (1975). — *Kochia coronata* J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 41: 43 (1917). — **Illustr.:** *Pl. W. N.S.W.* 266 (1982).

Decumbent to erect perennial with a woody base and slender tap root, c. 15 cm high; branches woolly; leaves alternate, linear, 7–20 mm long, appressed-villous or silky. **Flowers** solitary, densely silky-villous, often in

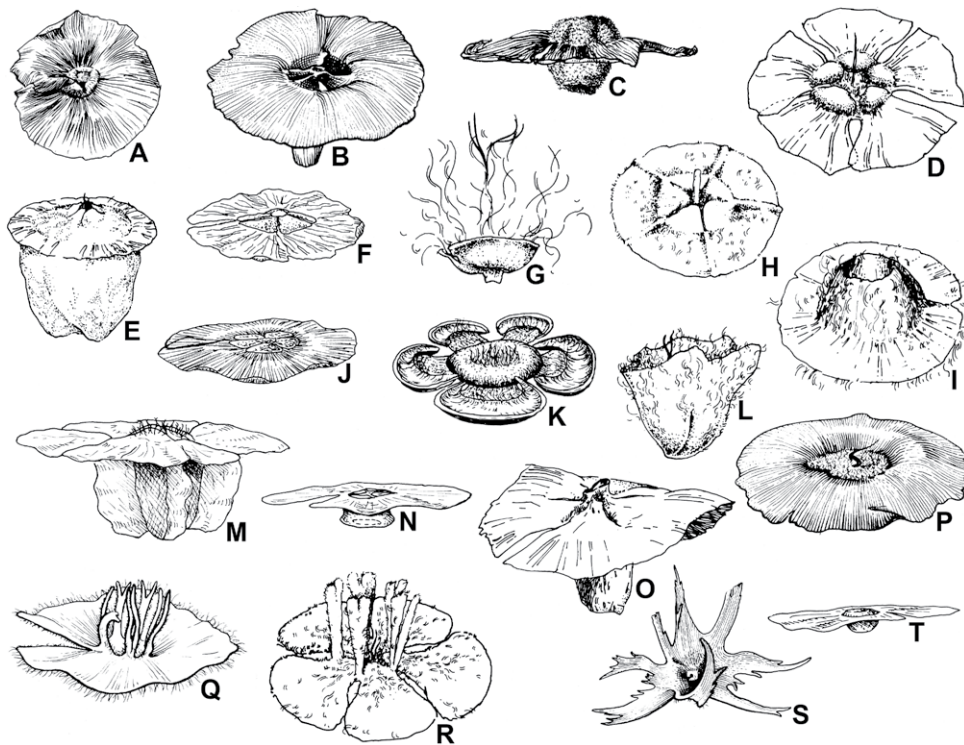


Fig. 9. Fruits of *Maireana*. A, *M. aphylla*; B, *M. apressa*; C, *M. astrotricha*; D, *M. brevifolia*; E, *M. campanulata*; F, *M. cannonii*; G, *M. carnosa*; H, *M. ciliata*; I, *M. coronata*; J, *M. decalvans*; K, *M. enchylaenoides*; L, *M. eriantha*; M, *M. erioclada*; N, *M. excavata*; O, *M. georgei*; P, *M. integra*; Q, *M. lanosa*; R, *M. lobiflora*; S, *M. luehmannii*; T, *M. melanocarpa*. Illustration reproduced from *Flora of Central Australia* 61, Fig. 83 (1981), and *Flora of South Australia* 1: 242, Fig. 150 (1986).

congested leafy spikes. **Fruiting perianth** like an inverted academic hat ("mortarboard"), horny, silky-villous; base flat and continuous with a narrow circular wing, in all c. 4 mm diam.; upper surface with a cup-shaped outgrowth (corona) to 2.5 mm high. **Crown fissure-weed**. Fig. 9I, Pl. 10C.

S.A.: NW, LE, GT, FR, EA; N.T.; Qld; N.S.W. Usually found in heavy soils. Flowers and/or fruits: Apr., Jul.–Nov.

Sometimes confused with *M. pentagona*, which is found in the Murray River flood plain.

10. ***Maireana decalvans*** (Gand.) Paul G.Wilson, *Nuytsia* 2: 46 (1975). — *Enchylaena decalvans* Gand., *Bull. Soc. Bot. France* 66: 224 (1919). *Kochia villosa* var. *tenuifolia* F.Muell. ex Benth., *Fl. Austral.* 5: 182 (1870); *K. tomentosa* var. *tenuifolia* (F.Muell. ex Benth.) J.M.Black, *Fl. S. Austral.* 2: 197 (1924); — **Illustr.**: *Pl. W. N.S.W.* 266 (1982).

Tufted to bushy shrub to 50 cm high; branches slender, striate, sparsely woolly or glabrous, often woolly in the leaf axils; leaves alternate, slender and terete to narrow-fusiform, 5–8 mm long, fleshy, glabrous. **Flowers** solitary, bisexual, glabrous. **Fruiting perianth** glabrous; tube shallowly hemispherical, c. 3 mm diam., thin-walled; wing thin, horizontal, simple, c. 8 mm diam., with fine pale-brown anastomosing veins when dry, entire except for a single radial slit; upper perianth flat, with somewhat fleshy lobes. **Black cotton-bush**. Fig. 9J.

S.A.: NL, MU, SL; Qld; N.S.W.; Vic. Found in heavy seasonally waterlogged soil. Flowers and/or fruits: Nov.–May.

(Endangered status in S.A.)

11. ***Maireana enchylaenoides*** (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 24 (1975). — *Bassia enchylaenoides* F.Muell., *Syst. Census Aust. Pl.* 1: 30 (1882). *Enchylaena villosa* F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 76 (1858), non *B. villosa* Wallich ex Don (1837); *Chenolea enchylaenoides* F.Muell., *Fragm.* 10: 92 (1876), *nom. illegit.*; *Kochia crassiloba* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 51: 383 (1926), *nom. illegit.*; *C. villosa* (F.Muell.) Ewart, *Fl. Victoria* 458 (1931); *Duriala villosa* (F.Muell.) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 537 (1934); *D. crassiloba* N.C.W.Beadle, *Stud. Fl. N.E. N.S.W.* 2: 199 (1972), *nom. inval.* — **Illustr.**: *Pl. W. N.S.W.* 268 (1982).

Perennial herb to 20 cm high; branches decumbent to erect, slender, sparsely puberulous to villous, arising from a woody rootstock; leaves alternate, narrowly oblong-elliptic, 4–10 (rarely to 20) mm long, sparsely pubescent

to villous. **Flowers** solitary, bisexual, sometimes subtended by a pair of small triangular bracteoles. **Fruiting** perianth sparsely puberulent, drying black; tube slightly convex, thin-walled, c. 3 mm diam.; wings 5, only slightly exceeding the tube, in all c. 4 mm diam., coriaceous, each broadly lunate and unevenly imbricate, margins sometimes incurved and somewhat inflated. **Wingless fissure-weed**, **wingless bluebush**. **Fig. 9K**, **Pl. 10D–F**.

S.A.: FR, EP, NL, MU, YP, SL, KI, SE; W.A.; Qld; N.S.W.; Vic. Generally found in woodland in loamy soil. Flowers and/or fruits: all months, especially Sep.–Mar.

12. **Maireana eriantha** (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 19 (1975). — *Kochia eriantha* F. Muell., *Rep. Pl. Babbage's Exped.* 20 (1859). ?*K. concava* Ising, *Trans. Roy. Soc. S. Austral.* 78: 112 (1955). — **Illustr.:** *Pl. W. N.S.W.* 268 (1982).

Shrub to 0.5 m high, predominantly dioecious; branchlets tomentose, the older ones scarred with persistent leaf bases; leaves alternate or opposite, fleshy, very narrow-oblong, obtusely trigonous in cross-section, 10–30 × 1.5–3 mm, acute, densely silky. **Flowers** solitary or paired, arranged in leafy spikes. **Fruiting** perianth long-silky-woolly, forming a soft ball c. 10 mm diam.; tube broadly turbinate to cup-shaped, c. 3 mm high, with thin weak walls; wing leathery, horizontal, more or less deeply and irregularly divided into 5 lobes; upper perianth deeply lobed, completely covering the ovary. **Woolly bluebush**. **Fig. 9L**, **Pl. 10G–I**.

S.A.: NW, LE, GT, FR, EP (far north-east); N.T.; Qld; N.S.W. Principally on stony plains or rocky hills. Flowers and/or fruits: Jul.–Sep.

The type of *Kochia concava* may represent a deformed state of *Maireana eriantha*, but this cannot be established from the available material.

13. **Maireana erioclada** (Benth.) Paul G.Wilson, *Nuytsia* 2: 39 (1975). — *Kochia triptera* var. *erioclada* Benth., *Fl. Austral.* 5: 185 (1870); *K. erioclada* (Benth.) Gauba, *Victorian Naturalist* 65: 163 (1948). — **Illustr.:** *Pl. W. N.S.W.* 268 (1982); A.Kapitany, *Austral. Succ. Pl.* 178–179 (2007).

Shrub to 60 cm high; branches closely white-woolly; leaves alternate, fleshy, narrow-obovoid to clavate, to 10 mm long, glabrous, apex rounded. **Flowers** solitary, bisexual, glabrous apart from the woolly-ciliate lobes. **Fruiting** perianth glabrous; tube narrowly funnel-shaped (the lower half solid), c. 5 mm high, with 5 vertical semicircular wings that are attached to the horizontal wing and to the tube throughout its length; horizontal wing at the apex of the tube, simple, c. 12 mm diam., radially sulcate at the attachment to the vertical wings and with a single radial (radicular) slit; upper perianth convex, glabrous apart from the ciliate margin to the lobes. **Rosy bluebush**. **Fig. 9M**, **Pl. 10J–L**.

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.S.W.; Vic. A frequent invader of disturbed road verges. Flowers and/or fruits: Jul.–Oct.

14. **Maireana excavata** (J.M.Black) Paul G.Wilson, *Nuytsia* 2: 31 (1975). — *Kochia excavata* J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 47: 368 (1923). *K. villosa* var. *humilis* Benth., *Fl. Austral.* 5: 187 (1870); *K. tomentosa* var. *humilis* (Benth.) J.M.Black, *Fl. S. Austral.* 2: 197 (1924), Black's description should be referred to *M. trichoptera*. *K. humillima* auct. non F.Muell.: Tate, *Handb. Fl. Extratrop. S. Austral.* 50 (1890). — **Illustr.:** *Pl. W. N.S.W.* 269 (1982).

Decumbent perennial with a stout tap root; branches loosely woolly-when young; leaves alternate; narrowly oblong-elliptic to elliptic, 7–12 mm long, tawny-appressed-villous. **Flowers** solitary, with or without a pair of narrow-oblong bracteoles c. 1.5 mm long. **Fruiting** perianth fleshy when fresh, depressed-barrel-shaped and constricted in the middle, c. 3 mm high, more or less flat above, glabrous; tube (when dry) with the upper half very broadly turbinate to convex, 10-ribbed, thin-walled, lower half expanded into a spongy hollow base, which when attached to the plant is filled by the cushion-shaped receptacle; wing thin, horizontal, circular, entire, c. 10 mm diam., faintly nerved and with a single radial slit; upper perianth flat, glabrous except for the woolly ciliate margin of the perianth lobes. **Bottle bluebush**, **bottle fissure-weed**. **Fig. 9N**.

S.A.: GT, FR, EP, NL, MU (eastern margin of Mt Lofty Ranges); N.S.W.; Vic. Flowers and/or fruits: Jul.–Dec.

(Listed as Vulnerable in S.A.)

15. **Maireana georgei** (Diels) Paul G.Wilson, *Nuytsia* 2: 33 (1975). — *Kochia georgei* Diels in Diels & E.Pritzel, *Bot. Jahrb. Syst.* 35: 184 (1904). — **Illustr.:** Cochrane et al., *Fl. Pl. Victoria* fig. 139 (1968); *Pl. W. N.S.W.* 269 (1982);

A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 199 (1988); F.Kutche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 103 (2003); A.Kapitany, *Austral. Succ. Pl* 180–181 (2007).

Compact rounded shrub to 50 cm high; branches closely woolly; leaves alternate, slender and semiterete, 8–15 (rarely to 30) mm long, fleshy, sparsely to densely silky or almost glabrous. **Flowers** solitary. **Fruiting** perianth glabrous except for the woolly margin to the lobes; tube turbinate, somewhat laterally compressed, very thick-walled, the upper half fleshy on the outside when fresh and becoming wrinkled on drying, base solid and rounded, c. 6 mm high and wide (at the apex); wing horizontal, 15–20 mm diam., thin, faintly veined, with a single radial slit; upper perianth flat, style massive, hemispherical, hard, included within the perianth. **Satiny bluebush. Fig. 9O, Pl. 11A.**

S.A.: NW, LE, NU, GT, FR, EA, EP, MU; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers and/or fruits: all months.

A very variable species which hybridises with *Enchylaena tomentosa*. It may be readily distinguishable from *M. turbinata* (with which it has been confused) by the wrinkled tube to the fruit (not smooth all over) and the radial split in the wing (not entire).

16. **Maireana integra** (Paul G.Wilson) Paul G.Wilson, *Nuytsia* 2: 50 (1975). — *Kochia integra* Paul G.Wilson in H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 122 (1965).

Shrub 0.3–1 m high; branches woolly; leaves alternate, semiterete, 5–14 × c. 1 mm, obtuse, woolly. **Flowers** solitary, bisexual. **Fruiting** perianth pale- to dark-brown when dry; tube hemispherical, c. 1 mm high, c. 2.5 mm wide at the apex, faintly costate, crustaceous, glabrous; wing simple, without a radial slit, horizontal, c. 10 mm diam., glabrous; upper perianth more or less flat, pubescent. **Fig. 9P, Pl. 11B–C.**

S.A.: NW, LE, NU, GT, FR, EA, EP, MU; W.A.; N.T.; Qld; N.S.W. Found in well-drained loamy soil. Flowers and/or fruits: Apr.–Sep.

17. **Maireana lanosa** (Lindl.) Paul G.Wilson, *Nuytsia* 2: 26 (1975). — *Kochia lanosa* Lindl. in T. Mitch., *J. Exped. Trop. Austral.* 88 (1848). — **Illustr.:** A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 203 (1988).

Small divaricately branched shrub to 0.5 m high; branches woolly; leaves alternate, elliptic to narrow-obovate, c. 4 mm long on the upper (fruiting) branches, 10–20 mm long on the lower branches, silky-pubescent. **Flowers** solitary, densely woolly. **Fruiting** perianth sparsely woolly, leathery to crustaceous; tube slightly convex; wing simple, horizontal, 7–12 mm diam., with a single radial slit; upper perianth with 4 + 2 erect processes alternating with the perianth lobes (the contiguous pair placed either side of the radicular slit); processes linear to subulate, 3–4 mm long. **Fig. 9Q.**

S.A.: NW, GT, FR; W.A.; N.T.; Qld; N.S.W. Found in sandy and loamy soils. Flowers and/or fruits: May–June (few records).

18. **Maireana lobiflora** (F.Muell. ex Benth.) Paul G.Wilson, *Nuytsia* 2: 25 (1975). — *Kochia lobiflora* F.Muell. ex Benth., *Fl. Austral.* 5: 184 (1870). — **Illustr.:** *Pl. W. N.S.W.* 270 (1982).

Decumbent perennial herb with a woody rootstock to small shrub to 0.5 m high; branches shortly woolly; leaves alternate, linear to very narrowly elliptic, 7–15 (rarely to 25) mm long. **Flowers** solitary, bisexual. **Fruiting** perianth leathery to crustaceous, woolly; tube slightly convex; wing horizontal, of 5 spatulate to fan-shaped lobes, in all to 10 mm diam.; upper perianth with 4 + 2 erect processes, alternating with the perianth lobes (the contiguous pair placed either side of the radicular slit), processes narrow-spatulate to clavate, to 4 mm long, frequently expanded or lacerate at the apex or deeply 2-lobed. **Lobed bluebush. Fig. 9R, Pl. 11D.**

S.A.: NW, LE, NU, GT, FR, EA, EP, MU; W.A.; N.T.; N.S.W.; Vic. Flowers and/or fruits: probably all months.

19. **Maireana luehmannii** (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 20 (1975). — *Bassia luehmannii* F.Muell., *Victorian Naturalist* 7: 47 (1890).

Woody divaricately branched perennial to 40 cm high; branchlets woolly; leaves alternate, fleshy, obovoid, c. 5 mm long, shortly silky. **Flowers** paired. **Fruiting** perianth flattened and appressed to the axis; attachment broad and flat; tube short, convex, 10-ribbed; wings 5, woody, 2–3 mm long, often curved, each divided into 2 or

more spiny lobes; upper perianth flat. **Fig. 9S.**

S.A.: NW, LE; W.A.; N.T.; Qld. Usually found around salt lakes. Flowers and/or fruits: Aug. (1 record).

20. **Maireana melanocarpa** Paul G.Wilson, *Nuytsia* 2: 52 (1975).

Much branched shrub c. 50 cm high; branchlets woolly; leaves alternate, spreading, semiterete, 3–5 × c. 1 mm, woolly, rounded at the apex. **Flowers** solitary, bisexual, glabrous apart from the woolly ciliate margins to the lobes. **Fruiting** perianth dark-brown to black when dry, glabrous; tube shortly hemispherical, c. 1 mm high and c. 2 mm diam., faintly costate, firmly crustaceous; wing simple, horizontal, to 6 mm diam., with prominent dark-brown venation and a single radical slit; upper perianth thickened and convex around the margin, thin and sunken in the centre. **Fig. 9T.**

S.A.: LE, FR, EA. Found on sandy rises around salt lakes. Flowers and/or fruits: May–Sep.

(Rare status in S.A.)

21. **Maireana microcarpa** (Benth.) Paul G.Wilson, *Nuytsia* 2: 48 (1975). — *Kochia villosa* var. *microcarpa* Benth., *Fl. Austral.* 5: 187 (1870); *K. microcarpa* (Benth.) Paul G.Wilson in H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 123 (1965). — **Illustr.:** *Pl. W. N.S.W.* 270 (1982).

Weak shrub c. 40 cm high; branches slender, loosely white-woolly when young; leaves alternate, subterete to obovoid, 3–5 (rarely to 10) mm long, fleshy, glabrous. **Flowers** solitary, bisexual, glabrous. **Fruiting** perianth glabrous, dark- rarely pale-brown on the wing; tube shortly cup-shaped, c. 1.5 mm high, c. 2 mm diam., more or less costate, crustaceous; wing simple, horizontal, firm, 5–6 (rarely to 8) mm diam., with a single radial (radicular) slit, margin usually recurved; upper perianth flat or concave, completely obscuring the ovary. **Swamp bluebush. Fig. 10A, Pl. 11E–F.**

S.A.: LE, GT, FR (Lake Watherston), EA, EP; N.T.; Qld; N.S.W. Found in low-lying seasonally waterlogged areas. Flowers and/or fruits: May–Nov.

22. **Maireana oppositifolia** (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 23 (1975). — *Kochia oppositifolia* F.Muell., *Trans. Philos. Soc. Victoria* 1: 134 (1855).

Compact shrub to 1 m high, predominantly dioecious; branches finely woolly when young; leaves opposite, sessile, spurred, narrowly ovate, to 4 mm long, obtusely trigonous in cross-section, shortly sericeous to subglabrous. **Flowers** solitary. **Fruiting** perianth glabrous (except the lobes); tube broadly obconical to convex, 1.5–2 mm diam., thin-walled; wings 5, thin, fan-shaped, prominently veined, spreading unevenly (the smaller 2 suberect), in all c. 7 mm diam. **Heathy bluebush. Fig. 10B, Pl. 11G–I.**

S.A.: NW, NU, GT, EP, NL, MU, YP, SL, KI, SE; W.A.; Vic. Found on coastal mud-flats. Flowers and/or fruits: Jan.–June.

23. **Maireana ovata** (Ising) Paul G.Wilson, *Nuytsia* 2: 48 (1975). — *Kochia ovata* Ising, *Trans. Roy. Soc. S. Austral.* 78: 112 (1955).

Small densely branched shrub to 0.3 m high; branches densely woolly; leaves small, alternate, sessile, erect or appressed, narrowly ovate to broadly triangular, 2–5 mm long, loosely woolly. **Flowers** solitary, bisexual. **Fruiting** perianth small, pale-gold when dry, glabrous apart from the woolly upper perianth; tube hemispherical, c. 1 mm high, c. 1.5 mm diam., woody, smooth (apart from the radicular ridge); wing simple, entire, with no radial slit, horizontal, 4–6 (rarely 2.5) mm diam., translucent; upper perianth woody, shortly woolly. **Fig. 10C.**

S.A.: NW, LE, FR, EA; N.T.; N.S.W. Found on sandy rises and eroded slopes of stony hills. Flowers and/or fruits: Jul.–Oct.

24. **Maireana pentagona** (R.H.Anderson) Paul G.Wilson, *Nuytsia* 2: 27 (1975). — *Kochia pentagona* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 51: 385 (1926). — **Illustr.:** *Pl. W. N.S.W.* 272 (1982).

Prostrate to decumbent perennial with a small woody base and a long fleshy tap root, c. 10 mm high; branches

woolly; leaves alternate, linear, 7–12 (rarely to 20) mm long, appressed-villous. **Flowers** solitary, bisexual, densely woolly-villous. **Fruiting** perianth woolly-villous, discoid, more or less pentagonal in outline, 2.5–4 mm diam. (without indumentum), cartilaginous to crustaceous; lower surface convex continuous with the narrow horizontal rim (wing), which is sometimes divided into 5 short truncate lobes; upper surface raised to a thick hard more or less pentagonal ridge or platform formed from the convex bases of the perianth lobes, centre sunken. **Hairy (or slender) bluebush, slender-fissure-weed. Fig. 10D, Pl. 12A.**

S.A.: MU; W.A.; N.S.W.; Vic. In S.A. largely confined to the flood plain of the River Murray. Flowers and/or fruits: Aug.–Sep. (few records).

Sometimes confused with *M. ciliata*, which has a more northern distribution.

(Rare status in S.A.)

25. **Maireana pentatropis** (Tate) Paul G.Wilson, *Nuytsia* 2: 39 (1975). — *Kochia pentatropis* Tate, *Trans. & Proc. Roy. Soc. S. Austral.* 7: 67 (1885). *K. decipiens* Gauba, *Victorian Naturalist* 65: 165 (1948). — **Illustr.:** *Pl. W. N.S.W.* 273 (1982); F.Kutche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 104 (2003).

Shrub to 60 cm high; branches ascending, densely white-woolly, pilose in the leaf axils; leaves subterete, c. 10 mm long, fleshy, glabrous. **Flowers** solitary, bisexual; perianth lobes densely woolly-villous towards the margin. **Fruiting** perianth glabrous except for the densely woolly margins to the lobes; tube turbinate, c. 4 mm high, solid in the lower half, crustaceous, with 3–5 fan-shaped vertical wings usually restricted to the lower half of the tube; horizontal wing circular, flat, to 12 mm diam., with a single radial (radicular) slit; upper perianth convex or arched. **Erect mallee bluebush. Fig. 10E, Pl. 11J–L.**

S.A.: NW, LE, NU, GT, FR, EA, EP, MU, YP; W.A.; N.T.; N.S.W.; Vic. Frequently on calcareous soil. Flowers and/or fruits: probably all months.

26. **Maireana planifolia** (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 52 (1975). — *Kochia planifolia* F.Muell., *Fragm.* 1: 213 (1859). *K. tomentosa* var. *platyphylla* Ising, *Trans. & Proc. Roy. Soc. S. Austral.* 57: 185 (1933). — **Illustr.:** A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 207 (1988).

Open loosely branched shrub 0.5–1 m high; branches slender, closely woolly; leaves alternate, flattened, narrow-obovate to obovate, obtuse, 8–15 (rarely 5) mm long, sparsely to densely appressed-pubescent. **Flowers** solitary or paired (normally only one maturing), bisexual. **Fruiting** perianth straw-coloured to pale-brown when dry; tube broadly turbinate, smooth or faintly ribbed, thin-walled, glabrous; wing horizontal (never infolded when young), simple, with a single radial (radicular) slit, 10–14 mm diam., translucent; upper perianth flat, shortly woolly all over. **Low bluebush. Fig. 10F, Pl. 12B.**

S.A.: NW, LE, GT; W.A.; N.T. Usually found on rocky slopes of hills. Flowers and/or fruits: May–Oct.

27. **Maireana pyramidata** (Benth.) Paul G.Wilson, *Nuytsia* 2: 41 (1975). — *Kochia pyramidata* Benth., *Fl. Austral.* 5: 186 (1870). — **Illustr.:** Cochrane et al., *Fl. Pl. Victoria* fig. 138 (1968); *Pl. W. N.S.W.* 273 (1982); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 213 (1988); F.Kutche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 105 (2003).

Divaricately branched shrub c. 1 m high; branchlets woolly (sometimes sparsely so); leaves alternate, spreading, subterete, acute, 2–6 mm long, shortly appressed-pubescent (asperulous, woolly and scattered coarse smooth hairs). **Flowers** predominantly unisexual, shortly woolly. **Fruiting** perianth pale-brown to black when dry; tube flat to shortly turbinate, thin-walled and readily crushed, sparsely puberulent; wing papery, horizontal, simple, to 12 (rarely to 16) mm diam., entire or with a single radial slit; upper perianth erect, pyramidal, 2–4 mm high, puberulous. **Black bluebush, sago bush, shrubby bluebush. Fig. 10G, Pl. 12C–D.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP; W.A.; N.T.; Qld; N.S.W.; Vic. Often found in slightly saline heavy soil. Flowers and/or fruits: probably in all months.

28. **Maireana radiata** (Paul G.Wilson) Paul G.Wilson, *Nuytsia* 2: 57 (1975). — *Kochia radiata* Paul G.Wilson in H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 124 (1965).

Densely branched shrub c. 0.3 m high; branches closely woolly, the hairs at first white but eventually dark-brown;

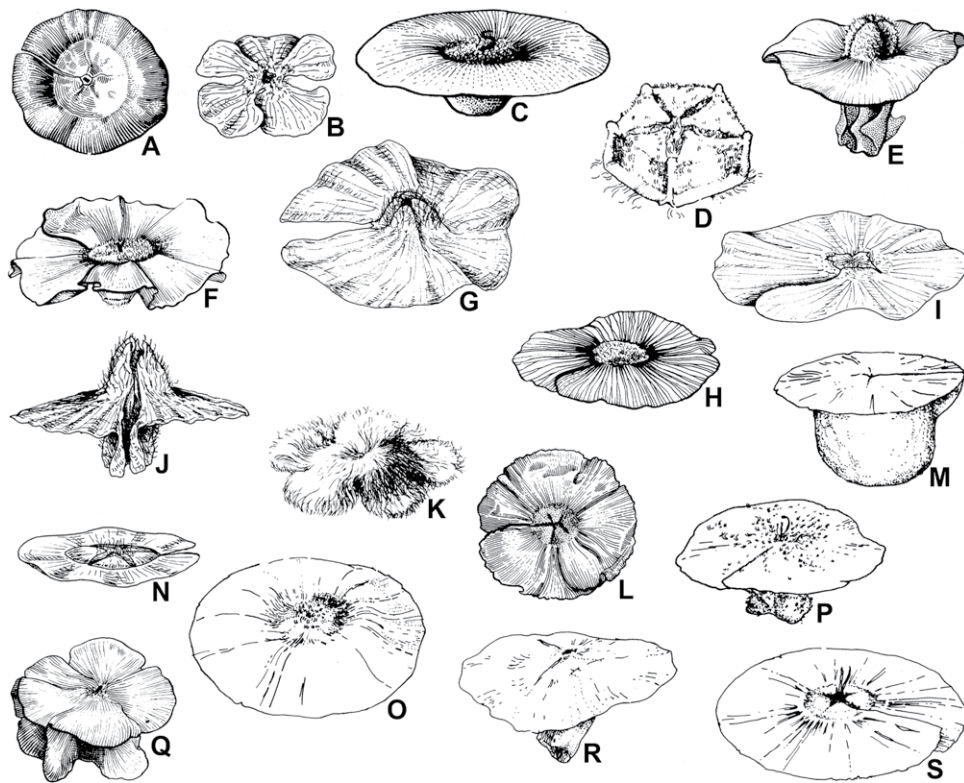


Fig. 10. Fruits of *Maireana*. A. *M. microcarpa*; B. *M. oppositifolia*; C. *M. ovata*; D. *M. pentagona*; E. *M. pentatropis*; F. *M. planifolia*; G. *M. pyramidata*; H. *M. radiata*; I. *M. rohrlachii*; J. *M. schistocarpa*; K. *M. scleroptera*; L. *M. sedifolia*; M. *M. spongiocarpa*; N. *M. suaedifolia*; O. *M. tomentosa* subsp. *urceolata*; P. *M. trichoptera*; Q. *M. triptera*; R. *M. turbinata*; S. *M. villosa*. Illustration reproduced from *Flora of Central Australia* 61, Fig. 83 (1981), and *Flora of South Australia* 1: 281, Fig. 160 (1986).

leaves alternate, more or less erect, fleshy, narrow-ovate to semiterete, 2–4 mm long, somewhat woolly. **Flowers** solitary, bisexual, glabrous below and usually above. **Fruiting** perianth glabrous except for the densely woolly upper perianth; tube hemispherical, to 1 mm high and 1.5 mm diam., brittle or almost woody, faintly ribbed; wing simple, horizontal, papery, 4–6 mm diam., translucent when dry and between the fine dark-brown radial veins, with a single radial slit; upper perianth slightly convex, densely woolly. **Grey bluebush**. Fig. 10H, Pl. 12E–F.

S.A.: NW, LE, NU, GT, FR, EP, NL, MU, YP; W.A.; N.S.W.; Vic. Generally found in sandy, usually calcareous, loam. Flowers and/or fruits: Aug.–Nov.

29. ***Maireana rohrlachii*** (Paul G.Wilson) Paul G.Wilson, *Nuytsia* 2: 46 (1975). — *Kochia rohrlachii* Paul G.Wilson in H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 123 (1965).

Intricately branched shrub to 1 m high; branches slender, closely woolly; leaves alternate, obovate to narrow-fusiform, 3–8 mm long, fleshy, glabrous or sparsely pubescent. **Flowers** solitary, bisexual, glabrous. **Fruiting** perianth glabrous, pale-brown when dry; tube broadly turbinate to hemispherical, to 2 mm high, c. 3 mm diam. at the apex, thin-walled and readily crushed; wing simple, horizontal or undulate, thin, 12–16 mm diam., radially veined, with a single radial slit; upper perianth flat, thin. Fig. 10I, Pl. 12G–H.

S.A.: FR, EP, NL, MU, YP, SL; N.S.W.; Vic. Found in heavy soil. Flowers and/or fruits: Dec.–June.

(Rare status in S.A.)

30. ***Maireana schistocarpa*** Paul G.Wilson, *Nuytsia* 2: 40 (1975). — **Illustr.:** *Pl. W. N.S.W.* 274 (1982).

Divaricately branched shrub to 1 m high; branchlets densely tomentose; leaves slender, terete, fleshy, 4–12 mm long, acute, sparsely appressed-villous with simple hairs. **Flowers** solitary (or rarely paired), bisexual, densely tomentose. **Fruiting** perianth soft and easily crushed, sparsely pilose except for the wing, straw-coloured when dry; tube broadly turbinate, c. 2 mm high, with a vertical slit opposite the radicle extending half way down; wing more or less horizontal, simple, papery, 12–15 mm diam., very faintly veined, with a single radial slit from whose margins the wing passes down the tube in two membranes one either side of the slit. Fig. 10J.

S.A.: NW, LE, GT, EP; N.T.; Qld; N.S.W. Found on a variety of non-saline habitats such as sanddunes and gibber plains. Flowers and/or fruits: June-Sep.

31. **Maireana scleroptera** (J.M.Black) Paul G.Wilson, *Nuytsia* 2: 21 (1975). — *Kochia scleroptera* J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 46: 568 (1922).

Prostrate to erect perennial to 30 cm high, with a woody base; branches slender, woolly; leaves alternate, narrow-oblong to narrow-obovate, 5–10 (rarely to 20) mm long, silky to almost glabrous. **Flowers** paired, densely woolly. **Fruiting perianth** cartilaginous to woody, more or less woolly all over; tube convex, 10-ribbed, c. 2 mm diam.; wings 5, horizontal, cartilaginous, broadly oblong, flat, crenulate on the margin, 1–2 mm long; upper perianth open in the centre, thick and hard, forming a discoid rim. **Fig. 10K.**

S.A.: NW, LE; W.A.; N.T. Usually found in heavy loam. Flowers and/or fruits: all months.

32. **Maireana sedifolia** (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 36 (1975). — *Kochia sedifolia* F.Muell., *Trans. Philos. Soc. Victoria* 1: 134 (1855). — **Illustr.:** E.R.Rotherham *et al.*, *Fl. Pl. New South Wales & S. Queensl.*, fig. 456 (1975); *Pl. W. N.S.W.* 274 (1982); F.Kutche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 106 (2003); A.Kapitany, *Austral. Succ. Pl.* 182–183 (2007).

Compact divaricately branched shrub c. 1 m high, covered with a close bluish-grey woolly tomentum; dioecious; leaves alternate, fleshy, narrowly obovate, 4–8 mm long, rounded at the apex and slightly narrowed at the base. **Flowers** in pairs but usually only one maturing, closely woolly, the male hemispherical and the female globular. **Fruiting perianth** straw-coloured or pale-brown when dry; tube hemispherical to turbinate, c. 2 mm high and 2–3 mm wide at the apex, firm but thin-walled except for the thick base, sparsely woolly; wing simple, horizontal, papery, c. 10 mm diam., glabrous, with line radial venation and a single radial slit; upper perianth more or less flat, closely woolly; style short, thick and woolly. **Bluebush, pearl (or hoary) bluebush, hoary saltbush. Fig. 10L, Pl. 12I–J.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP; W.A.; N.T.; N.S.W.; Vic. Often occurring on calcareous soil. Flowers and/or fruits: in all months.

33. **Maireana spongiocarpa** (F.Muell.) Paul G.Wilson, *Nuytsia* 2: 37 (1975). — *Kochia spongiocarpa* F.Muell., *Victorian Naturalist* 3: 92 (1886).

Small shrub to 30 cm high; branches thin, densely woolly with smooth curled hairs; leaves well-spaced, alternate, fleshy, narrow-terete or fusiform, 8–15 mm long, acute, glabrous, dark-green. **Flowers** solitary, bisexual, glabrous except for the woolly margin of the perianth lobes. **Fruiting perianth** glabrous, dark-brown when dry; tube spongy, swollen and subglobular, c. 8 mm high and wide, easily crushed; wing simple, horizontal, entire, 12–15 mm diam., thin, shortly decurrent opposite the radicle as a fused double vertical membrane on the tube; upper perianth flat. **Fig. 10M.**

S.A.: NW, LE, GT, FR, EA, EP; N.T.; Qld; N.S.W. Occurs on open plains and scalded areas. Flowers and/or fruits: Apr.–Nov.

34. **Maireana suaedifolia** (Paul G.Wilson) Paul G.Wilson, *Nuytsia* 2: 45 (1975). — *Kochia suaedifolia* Paul G.Wilson in H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 122 (1965).

Weak open spreading dark-bluish-green shrub c. 0.5 m high, glabrous except for axillary tufts of wool; branches slender, striate, glaucous; leaves alternate, well spaced, fleshy, narrowed at the base, those of the fruiting branchlets fusiform and c. 5 mm long, on the main branches slender-terete and up to 25 mm long. **Flowers** solitary, bisexual, glabrous, minutely bi-bracteolate at the base. **Fruiting perianth** glabrous, pink when fresh; tube shortly hemispherical, c. 3 mm diam., faintly costate, thin-walled; wing thin, horizontal, simple, with a single radial (radicular) slit, 8–12 mm diam.; upper perianth flat. **Lax bluebush. Fig. 10N, Pl. 12K.**

S.A.: NU, GT, EP; W.A. Found on raised areas around salt lakes. Flowers and/or fruits: Nov.–Jan. (few records). (Rare status in S.A.)

35. **Maireana tomentosa** Moq., *Chenop. Monogr. Enum.* 97 (1840), subsp. **urceolata** Paul G.Wilson, *Nuytsia* 2: 49 (1975). — *Kochia tomentosa* var. *enchylaenoides* J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 47: 368 (1923); *K. enchylaenoides* (J.M.Black) J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 51: 379 (1927); *Chenolea blackii* Ewart, *Fl. Victoria* 462 (1931), *nom. inval.*

Shrub 0.5 m high; branches woolly; leaves terete, 5–8 mm long, fleshy, woolly-villous. **Flowers** solitary, bisexual. **Fruiting** perianth glabrous, glossy; tube cup-shaped, 1–1.5 mm high, c. 2 mm diam., often constricted at the apex, smooth, woody; wing simple, horizontal, c. 10 mm diam., without a radial slit, straw-coloured when dry; upper perianth raised into a hard annular disc, woolly-ciliate but otherwise glabrous. **Fig. 10O.**

S.A.: NW, LE, NU, FR, EA; N.S.W. Flowers and/or fruits: Apr.–Oct.

36. **Maireana trichoptera** (J.M.Black) Paul G.Wilson, *Nuytsia* 2: 31 (1975). — *Kochia excavata* var. *trichoptera* J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 47: 368 (1923). — **Illustr.:** *Pl. W. N.S.W.* 275 (1982); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 221 (1988).

Erect perennial to 50 cm high, woody at the base; branches woolly; leaves fleshy, semiterete, 5–10 mm long and 1.5–2 mm wide, appressed-pubescent. **Flowers** solitary, often spicate. **Fruiting** perianth pubescent all over or only on the upper surface, often red when fresh; tube (when fresh) c. 4 mm high, medially constricted, the lower half expanded into an eccentric fleshy hollow stipe (the hollow occupied by the receptacle), upper half shortly turbinate (when dry the lower half shrivels and becomes firm or spongy, the upper half becomes shallowly convex and papery); wing simple, horizontal, thin, more or less reticulately veined, c. 10 mm diam. with a single radial slit; upper perianth flat, pubescent. **Fig. 10P, Pl. 12L, 13A–C.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.T.; N.S.W.; Vic. Flowers and/or fruits: all months, but mainly June–Nov.

37. **Maireana triptera** (Benth.) Paul G.Wilson, *Nuytsia* 2: 38 (1975). — *Kochia triptera* Benth., *Fl. Austral.* 5: 185 (1870). — **Illustr.:** *Pl. W. N.S.W.* 275 (1982); F.Kutche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 108 (2003).

Compact bluish-green shrub to 50 cm high, glabrous except for pubescence in the leaf axils; leaves alternate, dense, slender and subterete, acute, c. 10 mm long. **Flowers** solitary, usually bisexual. **Fruiting** perianth glabrous, glossy, dark-brown to black when dry, frequently congested along the branches; tube turbinate, crustaceous, hard and solid in the lower half; wings papery, in two series; vertical wings 5 (or with 1 or 2 undeveloped), alternate to the perianth lobes, running the length of the tube and fusing with the horizontal wing; horizontal wing at the apex of the tube, flat, entire, c. 8 mm diam., without a radial slit but sulcate opposite the radicle; upper perianth flat. **Three-wing bluebush. Fig. 10Q, Pl. 13D–F.**

S.A.: NW, LE, GT, FR, EA, EP, MU; W.A.; N.T.; Qld; N.S.W.; Vic. Found in heavy slightly saline soil. Flowers and/or fruits: May–Sep.

38. **Maireana turbinata** Paul G.Wilson, *Nuytsia* 2: 34 (1975). — **Illustr.:** F.Kutche & B.Lay, *Fieldguide Pl. outback S. Austral.* 108 (2003).

Divaricately branched shrub 30–60 cm high; branchlets closely woolly; leaves alternate, subterete, 5–7 mm long, more or less appressed-villous, fleshy. **Flowers** solitary. **Fruiting** perianth glabrous, golden-brown when mature; tube turbinate, attenuate at the solid base, crustaceous, smooth and glossy; wing papery, horizontal, 14–20 mm diam., with no radial slit, very faintly veined; upper perianth flat; style massive, solid and conical, sparsely woolly, included within the perianth. **Fig. 10R, Pl. 13G.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP; W.A.; Qld; N.S.W.; Vic. Flowers and/or fruits: May–Dec.

This species hybridises with *Enchylaena tomentosa* to produce a shrub with fleshy reddish-orange fruits that have a short erect wing. Very similar in appearance to *M. georgei*.

39. **Maireana villosa** (Lindl.) Paul G.Wilson, *Nuytsia* 2: 51 (1975). — *Kochia villosa* Lindl. in T.Mitch., *J. Exped. Trop. Austral.* 91 (1848). — **Illustr.:** *Pl. W. N.S.W.* 276 (1982).

Open shrub to 0.5 m high; branches slender, minutely to loosely woolly; leaves alternate, flattened, linear to very

narrow-oblong or narrow-obovate, acute, 5–12 mm long, appressed-villous. **Flowers** solitary or paired, bisexual, glabrous except for the ciliate lobes. **Fruiting** perianth brown when dry; tube broadly turbinate, faintly costate, c. 1 mm high, thin-walled and readily crushed; wing simple, horizontal (infolded when young), papery, with a single radial (radicular) slit, 7–10 mm diam., with dark-brown anastomosing veins (when dry); upper perianth flat, glabrous or sparsely pilose. **Silky (or common) bluebush. Fig. 10S.**

S.A.: NW, LE, GT; W.A.; N.T.; Qld; N.S.W. Flowers and/or fruits: Apr.–Sep.

A variable taxon that may consist of more than one species.

12. MALACOCERA

R.H.Anderson, *Proc. Linn. Soc. New South Wales* 51: 382 (1926).

(Greek *malakos*, soft; *keras*, horn.)

Annual or perennial herbs or small shrubs with woolly branches; leaves alternate, linear or subterete. **Flowers** axillary, solitary or paired, bisexual; perianth small, globose, woolly, 5-lobed; stamens 5; stigmas 2 or 3. **Fruiting** perianth depressed, not woody, with 3–5 processes arising from the segments forming a Y, inverted Y or star-shaped configuration; processes flattened or subcylindrical, woolly, attached along the length of the perianth tube; radicular (opposite the radicle) slit prominent; pericarp membranous; seed horizontal; radicle centrifugal; perisperm abundant, central.

An Australian endemic genus of 4 species found in arid areas of southern Australia.

Reference: Chinnock (1980).

1. Flowers paired in the leaf axils

2. Processes subterete, over 2 mm long..... 1. **M. albolanata**

2: Processes narrow-triangular, flattened, c. 1.5 mm long..... 2. **M. biflora**

1: Flowers solitary in the leaf axils

3. Stems weak; leaves appressed; 3 major processes forming an inverted Y configuration 3. **M. gracilis**

3: Stems robust; leaves spreading; 3 (rarely 4) processes forming a Y configuration..... 4. **M. tricornis**

1. **Malacocera albolanata** (Ising) Chinnock, *J. Adelaide Bot. Gard.* 2: 141 (1980). — *Bassia albolanata* Ising, *Trans. Roy. Soc. South Australia* 88: 95 (1964); *Sclerolaena albolanata* (Ising) A.J.Scott, *Feddes Repert.* 89: 111 (1978). — **Illustr.:** Chinnock, *J. Adelaide Bot. Gard.* 2: 141, fig. 1 (1980).

Shrub to 40 cm high; branches slender, densely white-woolly; leaves spreading, narrow-linear or semiterete, 6–18 mm long, densely villous when young, glabrous with age. **Flowers** paired in the leaf axils, densely woolly. **Fruiting** perianths depressed; processes slender, terete, 2.5–4.5 mm long, 3 major and 2 minor or all of the same length, with a Y- or star-shaped configuration, densely white-woolly. **Fig. 11A–C.**

S.A.: LE, GT, EA; Qld; N.S.W. Found in depressions and clay pans. Flowers and/or fruits: May–Sep.

2. **Malacocera biflora** Ising, *Trans. Roy. Soc. South Australia* 78: 113 (1955). — **Illustr.:** Chinnock, *J. Adelaide Bot. Gard.* 2: 144, fig. 3A–D (1980).

Small shrub to 25 cm high; branches slender, white-woolly; leaves slender, semiterete, acuminate, 5–12 mm long (rarely to 25 mm), white- to brown-villous. **Flowers** in pairs in the leaf axils, densely woolly. **Fruiting** perianth very depressed; processes flat, narrow-triangular, densely woolly, 3 major c. 1.5 mm long and forming a Y configuration, 1 or 2 minor ones sometimes also present. **Fig. 11D–F.**

S.A.: LE; N.T. Flowers and/or fruits: Aug.–Oct.

3. **Malacocera gracilis** Chinnock, *J. Adelaide Bot. Gard.* 2: 144 (1980). — **Illustr.:** Chinnock, *J. Adelaide Bot. Gard.* 2: 145, fig. 4 (1980).

Erect annual or perennial herb to 25 cm high; rootstock woody; branches slender, densely white-woolly; leaves

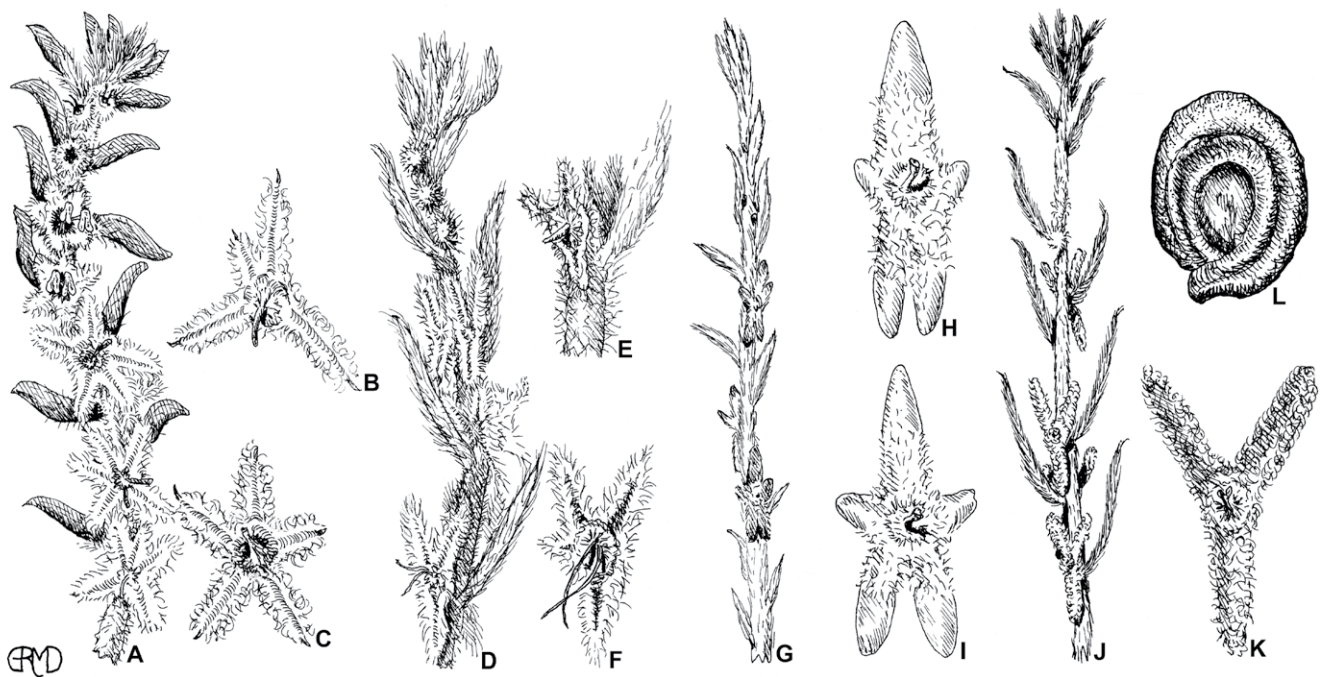


Fig. 11. A–C, *Malcococera albolanata*: A, branch; B–C, fruiting perianths. **D–F, *M. biflora*:** D, branch; E, enlargement of portion of twig; F, fruiting perianth. **G–I, *M. gracilis*:** G, branch; H–I, fruiting perianths. **J–L, *M. tricornis*:** J, branch; K, fruiting perianth; L, seed. Illustration by G.R.M. Dashorst, reproduced from *Flora of South Australia* 1: 284, Fig. 161 (1986).

linear, acuminate, white-villous, 2.5–5 mm long, appressed or eventually spreading. **Flowers** solitary, densely woolly. **Fruiting** perianth depressed, appressed to the branch; processes 3–5; 3 major narrow-oblong, 2–3 mm long, forming an inverted Y configuration; 2 minor ones irregularly shaped and fused with the major ones to form a plate-like expansion. **Fig. 11G–I.**

S.A.: GT, EA, EP. Growing on saline clay soils or gypseous mounds. Flowers and/or fruits: May, Aug. (few records).

(Vulnerable status in S.A.)

4. ***Malcococera tricornis*** (Benth.) R.H.Anderson, *Proc. Linn. Soc. New South Wales* 51: 382 (1926). — *Chenolea tricornis* Benth., *Fl. Austral.* 5: 190 (1870); *Bassia tricornis* (Benth.) F.Muell., *Syst. Census Austral. Pl.* 30 (1882). — **Illustr.:** Chincock, *J. Adelaide Bot. Gard.* 2: 144, fig. 2E–H (1980).

Erect shrub to 80 cm high; branches slender, densely white-woolly; leaves slender, semiterete, acute, 5–15 mm long, spreading, with recurved tips, densely white- or pale-brown-villous. **Flowers** solitary, woolly. **Fruiting** perianth densely woolly; processes 3 (rarely 4), subcylindrical, 3.5–6 mm long, forming a Y configuration. **Goat-head, soft horns. Fig. 11J–L.**

S.A.: LE, GT, FR, EA, EP, MU; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers and/or fruits: Jul.–Dec.

13. **MONOLEPIS** Schrader

Index Seminum Hort. Acad. Gotting. 1830: 4 (1830).

(Greek *mono*, one; *lepis*, scale; referring to the solitary perianth-segment.)

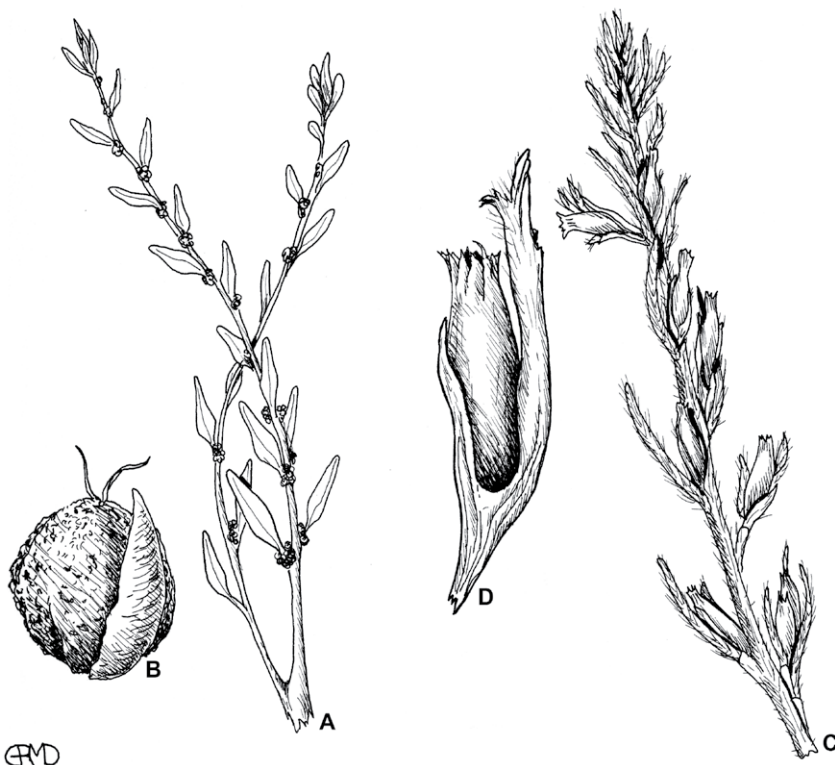
Small glabrous or mealy annual herbs; leaves alternate, succulent, flattened. **Flowers** small, in axillary clusters, bisexual or female; terminal flower of each cluster: perianth-segments 3, delicate; stamens 2; stigmas 2, slender; lateral flowers: perianth-segment usually 1 (2–3 in central flowers); stamen 1 or absent (female flowers); utricle orbicular. **Pericarp** hard; epicarp membranous, mesocarp white and crystalline, endocarp crustaceous; seed erect; testa thin; embryo almost annular, curved around the apex of the seed, radicle inferior; perisperm copious, central.

About 6 species in America and Asia. One species adventive in Australia.

1. ****Monolepis spathulata*** A.Gray, *Proc. Amer. Acad. Arts* 7: 389 (1868). — *Blitum spathulatum* (A.Gray) S.Fuentes, Uotila & Borsch, *Willdenowia* 42: 17 (2012).

Annual with several decumbent branches to 15 cm long arising from the base; leaves narrow-obovate, obtuse, c. 10 mm long, sparsely mealy. **Flowers** in compact axillary clusters; perianth-segment spathulate, c. 0.5 mm long; utricle orbicular, c. 0.5 mm high. **Fig. 12A–B.**

S.A.: *LE; Qld (formerly naturalised). Native to North America. Flowers and/or fruits: not available.



G.M.D.

Fig. 12. A–B, *Monolepis spathulata*: A, branch; B, fruit. **C–D, *Neobassia procerifera*:** C, twig; D, fruiting perianth. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 285, Fig. 162A–B (1986).

14. **NEOBASSIA** A.J.Scott

Feddes Rept. 89: 117 (1978).

(Greek *neos*, new; *Bassia*, a genus of the same family.)

Small shrubs; leaves alternate, sessile, subterete. **Flowers** bisexual, solitary in the leaf axil; perianth 5-lobed; stamens 5. **Fruiting** perianth cylindrical, crustaceous to woody, with 5 spines arising from the base of the lobes; pericarp membranous; seed vertical; testa membranous; embryo U-shaped, with an erect radicle; perisperm central.

3 species endemic to Australia.

1. ***Neobassia proceriflora*** (F.Muell.) A.J.Scott, *Feddes Rept.* 89: 118 (1978). — *Threlkeldia proceriflora* F.Muell., *Fragm.* 8: 38 (1873). — **Illustr.:** *Pl. W. N.S.W.* 281 (1982).

Small glabrous or sparsely villous shrub; branches brittle; leaves slender, 10–20 mm long, c. 1 mm diam. **Fruiting** perianth tubular to bluntly ellipsoid, c. 8 mm long, c. 2.5 mm diam., glabrous to villous; wall thick, initially succulent outside later spongy, woody within; base oblique, firmly attached to the branch; apex produced into a thin very shortly 5-spined cup-shaped structure obscuring the small lobes. **Soda bush, desert glasswort. Fig. 12C–D, Pl. 13H.**

S.A.: NW, LE, GT, FR, EA; N.T.; Qld; N.S.W.; Vic. Flowers and/or fruits: May–Oct.

Branches and fruits are commonly red.

15. **OSTEOCARPUM** F.Muell.

Trans. & Proc. Philos. Inst. Victoria 2: 77 (1858).

(Greek *osteon*, bone; *karpos*, fruit; alluding to the hard fruiting perianth.)

Erect perennial herbs, branching from the base, usually glabrous except for axillary pubescence; leaves alternate, succulent, subterete to clavate, 6–10 mm long. **Flowers** bisexual, solitary, axillary, glabrous apart from the ciliate margin to the lobes; perianth tube somewhat fleshy; upper perianth membranous, 5-lobed; stamens 5. **Fruiting** perianth glabrous; tube woody, subglobular, straw-coloured when dry; limb hidden in the sunken apex of the tube; radicular (opposite the radicle) tubercle prominent, either bare or bearing an erect wing; inter-segment tubercles 0–4 or replaced by vertical wings; style short and hard, pubescent at the apex; seed horizontal, with a horizontal to ascending or erect radicle.

5 species endemic to temperate Australia.

1. Fruiting perianth stipitate on a hollow base or, if sessile, then with 5 erect wings
 2. Vertical wings absent; radicular tubercle prominent; inter-segment tubercle 0 or 1 1. **O. acropterum**
 - 2: Vertical wings present
 3. Vertical wings 1–3
 4. Vertical wings 1 or 2, obovate, not extending downward along the tube..... 1. **O. acropterum**
 - 4: Vertical wings 2 or 3, semicircular..... 2. **O. diptercarpum**
 - 3: Vertical wings 5..... 3. **O. pentapterum**
- 1: Fruiting perianth subglobose, sessile or almost so, without wings..... 4. **O. salsuginosum**

1. **Osteocarpum acropterum** (F.Muell. & Tate) Volken, *Natürl. Pflanzenfam.* III(1a): 72 (1893). — *Babbagia acroptera* F.Muell. & Tate, *Trans. & Proc. Roy. Soc. South Australia* 6: 108 (1883).

Rounded perennial, branching from the base, c. 15 cm high, glabrous or sparsely pilose when young; leaves semiterete, 3–5 mm long, fleshy. **Fruiting perianth:** tube subglobose, c. 0.6 mm high, smooth or multiribbed, stipitate on a hollow cylindrical base equal in length to the tube; apex usually produced into 2 opposite erect tubercles which bear vertical obovate wings c. 3 mm long, or only the radicular tubercle present and winged, or this tubercle prominent and radially flattened but un-winged. **Water weed, babbagia.**

There are 2 varieties which grade into each other.

1. Vertical wings 1 or 2, prominent 1a. **O. acropterum** var. **acropterum**
- 1: Vertical wings absent; radicular tubercle narrow-oblong, prominent 1b. **O. acropterum** var. **deminutum**

- 1a. **Osteocarpum acropterum** (F.Muell. & Tate) Volken var. **acropterum**

Fruiting perianth with 1 or 2 vertical wings; when 2 the longer borne on the radicular tubercle. **Fig. 13A, Pl. 13J–L.**

S.A.: NW, LE, NU, GT, FR, EA, EP, MU; W.A.; N.T.; Qld; N.S.W. Flowers and/or fruits: not available.

- 1b. **Osteocarpum acropterum** var. **deminutum** (J.M.Black) Paul G.Wilson, *Fl. Austral.* 4: 327 (1984). — *Babbagia acroptera* var. *deminuta* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 46: 568 (1922). — **Illustr.:** Rotherham *et al.*, *Fl. Pl. N.S.W. & S. Queensl.* 139, fig. 445 (1975), as *Babbagia acroptera* var. *deminuta*.

Fruiting perianth without wings; radicular tubercle prominent, erect, narrow-oblong, c. 2 mm high, sometimes pale-red.

S.A.: LE, FR, MU; N.S.W.; Vic. Usually found in heavy periodically waterlogged soil. Flowers and/or fruits: not available.

(Rare status in S.A.)

2. **Osteocarpum diptercarpum** (F.Muell.) Volken, *Natürl. Pflanzenfam.* III(1a): 72 (1893). — *Babbagia diptercarpa* F.Muell., *Rep. Pl. Babbage's Exped.* 21 (1859). — **Illustr.:** F.Kutche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 184 (2003).

Rounded perennial, branching from the base, c. 15 cm high, glabrous; leaves clavate, c. 5 mm long, fleshy. **Fruiting** perianth tube cup-shaped with a rounded inflexed apex, c. 0.7 mm high, ribbed, stipitate on a swollen hollow base about twice the length of the tube; apex bearing 2 or 3 vertical wings c. 5 mm high which extend downwards to the semicircular base of the fruit. **Fig. 13B–C.**

S.A.: NW, LE, GT, FR, EA, EP; N.T.; Qld; N.S.W. Found on the margin of salt lakes or on clay pans. Flowers and/or fruits: not available.

3. **Osteocarpum pentapterum** (F.Muell. & Tate) Volken, *Natürl. Pflanzenfam.* III(1a): 72 (1893). — *Babbagia pentaptera* F.Muell. & Tate, *Trans. & Proc. Roy. Soc. South Australia* 6: 108 (1883).

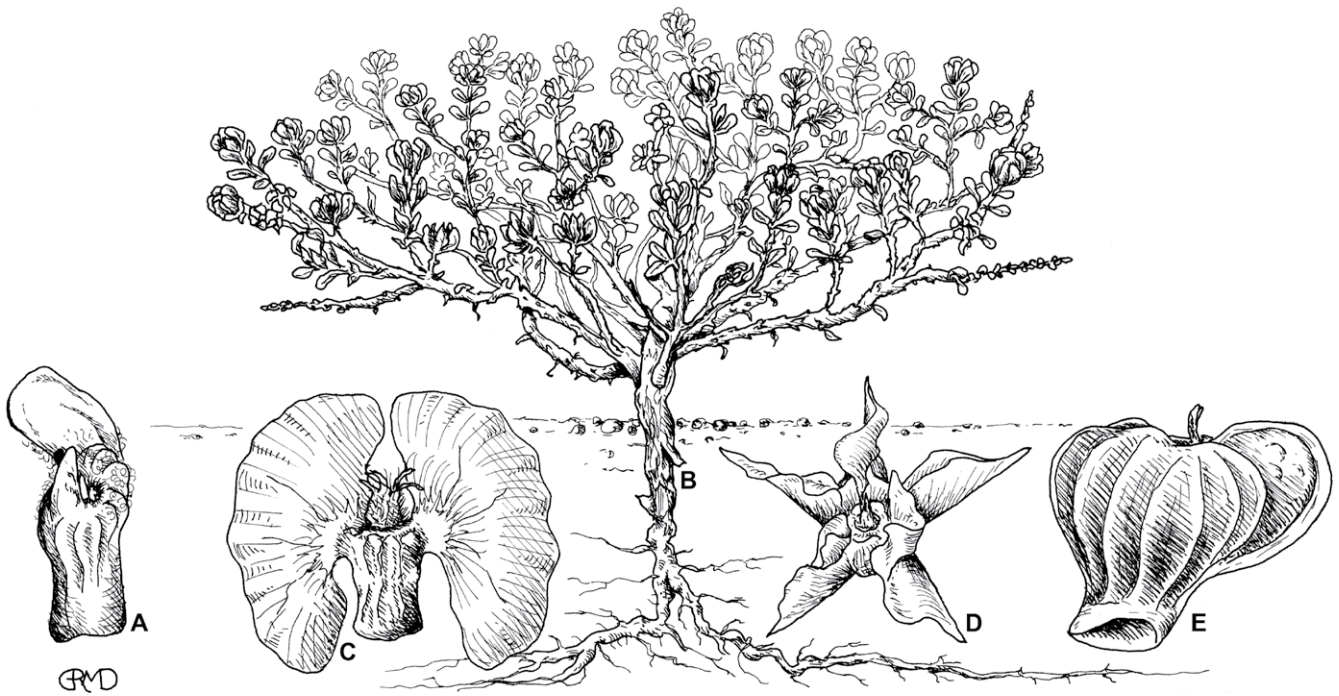


Fig. 13. A, *Osteocarpum acropterum* var. *acropterum*, fruit. B–C, *O. acropterum* var. *diptheroacarpum*: B, habit; C, fruit. D, *O. pentapterum*, fruit. E, *O. salsuginosum*, fruit. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 287, Fig. 163 (1986).

Rounded perennial, branched from the base, c. 20 cm high, pilose in the leaf axils otherwise glabrous; leaves congested, clavate, c. 5 mm long, fleshy. **Fruiting** perianth: tube depressed-globular, sessile, ribbed, c. 1 mm high and 1.5 mm wide; wings 5, erect, fan-shaped, c. 2 mm high, arising from the side of the tube, in all c. 6 mm diam. **Fig. 13D, Pl. 13I.**

S.A.: LE, FR (Mt Parry), ?EP; N.T.; Qld; N.S.W. In heavy soil subject to flooding. Flowers and/or fruits: not available.

There is a collection (*Chinnock 2101*) recorded from the Red Cliff area in the EP region that was referred to this species and thought possibly to be a hybrid. The plant consistently has four vertical wings.

(Endangered status in S.A.)

4. ***Osteocarpum salsuginosum*** F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 77 (1858). — *Threlkeldia salsuginosa* (F.Muell.) F.Muell. ex Benth., *Fl. Austral.* 5: 197 (1870); *Chenolea salsuginosa* (F.Muell.) F.Muell., *Fragm.* 10: 92 (1876); *Bassia salsuginosa* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 30 (1882).

Glabrous rounded perennial, branching from the base, to 20 cm high; leaves fleshy, semiterete or clavate, more or less flattened above, congested towards the apex of the branches. **Fruiting** perianth sessile or with a short hollow base; tube subglobular, c. 1 mm high, smooth (or less often faintly ribbed), keeled and gibbous on one side with the radicular protuberance which is sometimes produced into a rounded tubercle. **Bonefruit. Fig. 13E.**

S.A.: NU, GT, EP, MU, YP, SL; W.A.; N.T.; ?N.S.W.; Vic. Generally found in clay soil subject to periodic flooding or on the outer margins of salt lakes. Flowers and/or fruits: not available.

The most widely distributed variant of this species has a sessile perianth with a smooth tube, but in the northern portion of S.A. a variant is found with a stipitate perianth and strongly ribbed tube; this variant is intermediate in morphology between *O. salsuginosum* and *Sclerolaena urceolata*, probably intergrading with the latter species. Typical *O. salsuginosum* appears to grade into *O. acroptera* var. *deminuta*.

16. RHAGODIA R.Br.

Prodr. 408 (1810).

(Greek *rhagodes*, bearing berries.)

Dioecious shrubs, somewhat mealy (at least when young) with globular hairs which may collapse to form a scurfy or

a continuous silvery sheen; leaves opposite or alternate, simple, entire or bluntly lobed at the base. **Flowers** small, clustered, forming panicles or spike-like thyrses; perianth globular; segments 5, shortly united at the base, often spreading and enlarged in fruit; male flowers: stamens 5, usually united into a disc at the base that is puberulous or woolly within (rarely glabrous); female flower: if terminal then with staminodes and a woolly disc; if lateral then with small glabrous staminodes or these absent; ovary glabrous; stigmas 2, sessile. **Fruit** a depressed-globular berry c. 3 mm diam.; pericarp succulent; seed horizontal, lenticular, 1–1.5 mm diam.; testa crustaceous, black, smooth to reticulate; embryo circular; perisperm copious, central. **Rhagodias**.

11 species, all endemic to Australia.

Reference: Wilson (1983).

- 1. Leaves c. 3 mm long; intricately branched spinescent shrubs..... 8. **R. ulicina**
- 1: Leaves more than 3 mm long or plant not spinescent
 - 2. Perianth glabrous or almost so 6. **R. preissii**
 - 2: Perianth mealy
 - 3. Leaves becoming scaly and covered with a silvery sheen; staminodes present in female flowers
 - 4. Leaves flat, papery or slightly fleshy..... 1. **R. candolleana**
 - 4: Leaves fusiform or semiterete, fleshy 2. **R. crassifolia**
 - 3: Leaves mealy with spherical to irregular shaped vesicular hairs or glabrous (not becoming scaly or forming a sheen)
 - 5. Indumentum of spherical or saucer-shaped vesicular hairs
 - 6. Leaves narrow-elliptic; lamina mostly 7–10 mm long; female flowers lacking both a disc and staminodes; seed almost smooth..... 3. **R. drummondii**
 - 6: Leaf-shape variable; lamina 5–20 mm long; lateral female flowers with a disc and often staminodes; seed prominently reticulate..... 7. **R. spinescens**
 - 5: Indumentum of minute irregularly shaped vesicular hairs
 - 7. Leaves broad-obovate or bluntly hastate, flat; inflorescence pyramidal..... 5. **R. parabolica**
 - 7: Leaves ovate or oblong-ovate, c. 15 mm long, sparsely mealy below with minute hairs; flowers in dense slender spikes sometimes paniculately arranged..... 4. **R. eremaea**

- 1. **Rhagodia candolleana** Moq., *Chenop. Monogr. Enum.* 10 (1840). — *Chenopodium candolleianum* (Moq.) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012). *R. billardieri* auct. non R.Br.: Benth., *Fl. Austral.* 5: 152 (1870), partly; *R. baccata* auct. non (Labill.) Moq.: J.M.Black, *Fl. S. Austral.* ed. 2, 2: 287 (1948),

Weak spreading shrub; leaves opposite to alternate, shortly petiolate; lamina thin to leathery, narrow- to broad-elliptic, broad-ovate or hastate, 10–25 mm long, acute to obtuse, sparsely scaly to glabrous above, scaly below and developing a grey to silvery sheen or glabrescent. **Inflorescence** a pyramidal panicle to 15 cm long; perianth densely mealy outside; perianth-segments ovate, with thickened midrib; male flowers: disc saucer-shaped, puberulous within; pistillode minute or similar to the ovary but with erect stigmas; female flower: staminodes with ovate membranous filaments; disc thick and woolly; stigmas spreading. **Berry** clasped at the base by the fleshy red perianth; seed depressed-globose, 1.5–2.5 mm diam.; testa almost smooth to rugulose. **Seaberry saltbush**.

- 1. Leaves elliptic to broadly ovate or bluntly hastate; lower surface grey or glabrescent..... 1b. **R. candolleana** subsp. **candolleana**
- 1: Leaves hastate, acute, lower surface with a silvery sheen 1a. **R. candolleana** subsp. **argentea**

- 1a. **Rhagodia candolleana** subsp. **argentea** Paul G.Wilson, *Nuytsia* 4: 216 (1983). — *Chenopodium candolleianum* subsp. *argenteum* (Paul. G.Wilson) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012).

Shrub covered all over with a silvery sheen; leaves somewhat hastate, acute. **Pl. 14A–B.**

S.A.: NU. Found near inland salt lakes. Flowers and/or fruits: all months.

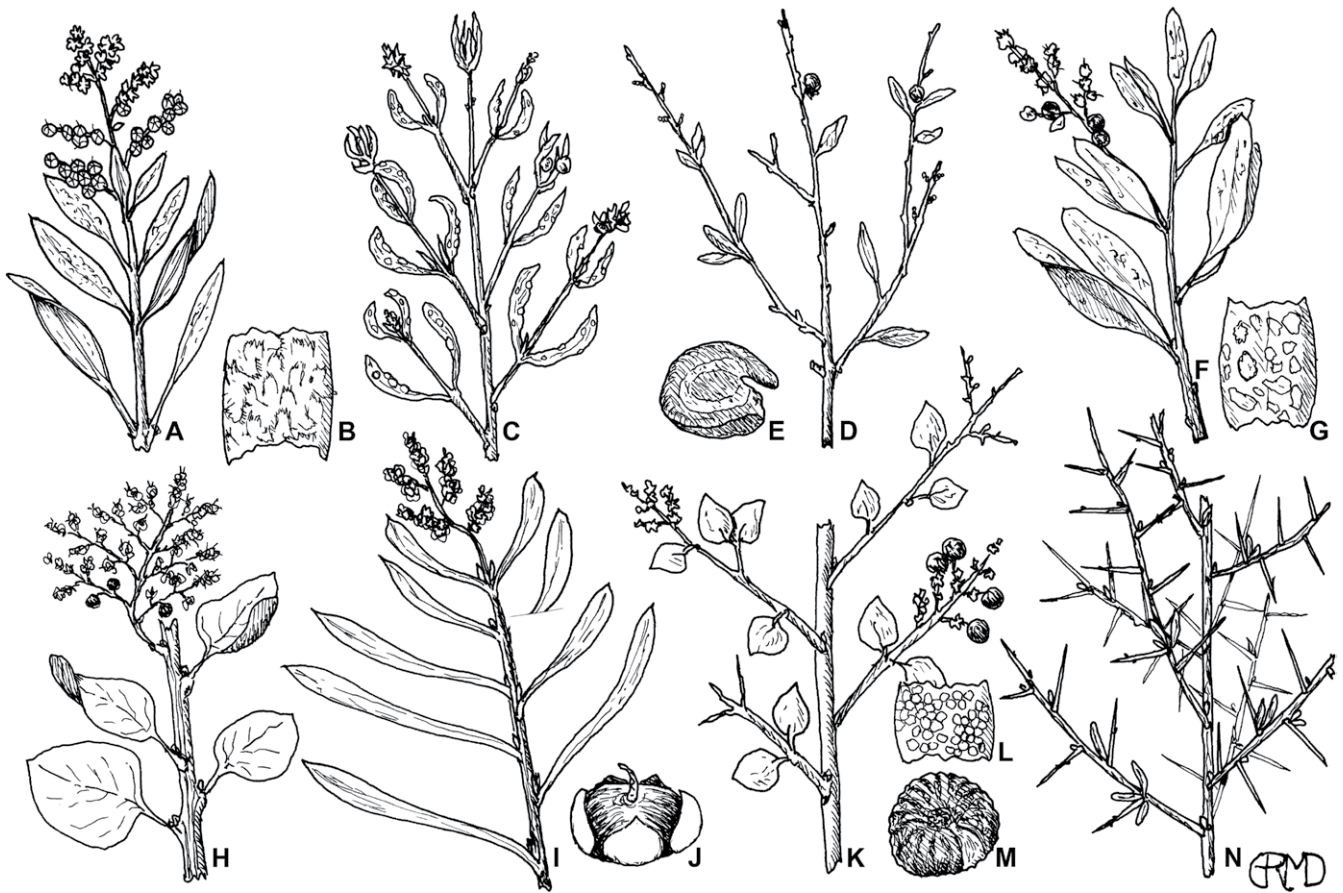


Fig. 14. A–B. *Rhagodia candolleana* subsp. *candolleana*: A, twig; B, portion of leaf. C. *R. crassifolia*, twig. D–E. *R. drummondii*: D, twig; E, seed. F–G. *R. eremaea*: F, twig; G, portion of leaf. H. *R. parabolica*, twig. I–J. *R. preissii*: I, twig; J, fruit. K–M. *R. spinescens*: K, twig; L, portion of leaf; M, seed. N. *R. ulicina*, twig. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 289, Fig. 164 (1986).

1b. *Rhagodia candolleana* Moq. subsp. *candolleana*

Leaves narrow- to broad-elliptic, broad-ovate, or bluntly hastate, obtuse; lower surface covered with a grey sheen or glabrescent. **Fig. 14A–B, Pl. 14C–F.**

S.A.: EP, NL, MU, YP, SL, KI, SE; W.A.; N.S.W.; Vic.; Tas. A coastal plant. Flowers and/or fruits: all months.

2. *Rhagodia crassifolia* R.Br., *Prodr.* 408 (1810). — *Chenopodium crassifolium* (R.Br.) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012). *Rhagodia baccata* var. *linearis* auct. non Benth.: J.M.Black, *Fl. S. Austral.* 4: 683 (1929); ed. 2, 2: 287 (1948).

Shrub to 1.5 m high; leaves alternate, fleshy, fusiform to semiterete, often channelled above or falcate, 1–2 cm long, mealy when young, the vesicles fusing to form a metallic sheen with age. **Panicle** to 5 cm long or reduced to a short spike; flowers and fruit as in *R. candolleana*. **Fleshy saltbush. Fig. 14C, Pl. 14G–I.**

S.A.: NU, GT, FR, EP, NL, MU, YP, SL, KI; W.A.; Vic. Flowers and/or fruits: all months.

The typical variant is coastal and intergrades with *R. candolleana*. An inland variant with strongly divaricate habit and more slender leaves is found from northern EP to north-west Vic., usually in calcareous soil; this may represent a distinct species.

3. *Rhagodia drummondii* Moq. in A.DC., *Prodr.* 13(2): 52 (1849). — *Chenopodium drummondii* (Moq.) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012).

Open often scrambling shrub to 1.5 m high; leaves opposite or alternate, somewhat fleshy, narrow-elliptic to elliptic, shortly petiolate; lamina 7–10 (–15) × 2–3 (–4) mm, acute, glabrescent above, densely mealy below with grey saucer-shaped vesicular hairs. **Inflorescences** spicate or paniculate, to 2.5 cm long; perianth densely mealy; male flowers: staminal filaments united into a fleshy disc which is woolly within; female: terminal flowers with minute staminodes and a disc, slightly woolly; lateral flowers glabrous within, lacking staminodes and a disc.

Fruiting perianth eventually spreading, pale-fawn or red within; seed c. 1.8 mm diam., faintly radially rugulose. **Fig. 14D–E.**

S.A.: NW; W.A. The species grows in somewhat saline soil around salt lakes. Flowers and/or fruits: not available.

4. **Rhagodia eremaea** Paul G.Wilson, *Nuytsia* 4: 232 (1983). — *Chenopodium eremaeum* (Paul G.Wilson) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012), as *eremaea*. — **Illustr.:** G.F.Craig, *Pilbara Coastal Fl.*, 51 (1983); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrublands W. Austral.* 243 (1988).

Rounded shrub to 2 m high; leaves alternate; lamina ovate to elliptic, 0.5–1.5 cm long, glabrescent above and mealy below with minute irregularly shaped hairs; petiole about half the length of the lamina. **Inflorescence** spicate to paniculate, with the flowers continuous along its branches; perianth densely mealy; male flowers caducous; perianth globular, c. 1.5 mm diam.; filaments united into a thick saucer-shaped disc pubescent within; female flower: perianth eventually hard and spreading beneath the fruit, red above; staminodes present in the terminal flower, absent in the others. **Seed** c. 1.3 mm diam.; testa reticulate. **Fig. 14F–G.**

S.A.: NW, LE, NU, GT; W.A.; N.T. Flowers and/or fruits: recorded mainly May–Oct.

5. **Rhagodia parabolica** R.Br., *Prodr.* 408 (1810). — *Chenopodium parabolicum* (R.Br.) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012). — **Illustr.:** F. Kutsche & B. Lay, *Fieldguide Pl. Outback S. Austral.* 120 (2003).

Rounded shrub 1–2 m high; leaves mostly opposite; lamina thin, very broadly elliptic to broadly or very broadly ovate, rarely bluntly hastate, 1.5–4 cm long, acute to rounded at the apex, apiculate, truncate to cuneate at the base and passing into the slender petiole half to equal in length to the lamina, minutely mealy, becoming reddish-brown with age. **Inflorescence** a broad pyramidal panicle 5–8 cm long; perianth mealy, c. 1 mm diam.; male flowers: filaments united into a cupular disc densely woolly on the margin; female flower: staminodes in terminal flowers united into a cupular disc densely woolly within, in lateral flowers reduced or absent. **Berry** depressed-spherical, 2–3.5 mm diam.; seed c. 1.5 mm diam, dark brown. **Fragrant (or mealy) saltbush. Fig. 14H, Pl. 14J–L.**

S.A.: NW, LE, ?NU, GT, FR, EA, EP, NL, MU, YP, SL; N.T.; Qld; N.S.W.; Vic. Growing principally in rocky hillsides and creek banks. Flowers and/or fruits: all months.

The identity of plants collections from the NU region needs confirmation.

6. **Rhagodia preissii** Moq. subsp. **preissii**, in A.DC., *Prodr.* 13(2): 49 (1849). — *Chenopodium preissii* (Moq.) Diels in Diels & E.Pritzl, *Bot. Jahrb. Syst.* 35: 181 (1904).

Shrub to 2 m high; leaves thin to leathery, linear to spatulate or narrow-obovate, lamina 3–4 cm long, tapering into a slender petiole, sparsely and minutely mealy beneath when young. **Inflorescence** a pyramidal panicle c. 5 cm long; flowers spherical, c. 1 mm diam., perianth-segments glabrous; male flowers: filaments somewhat pilose at the base, united into a saucer-shaped disc; female flowers: terminal flowers usually sterile, with densely pilose linear staminodes; lateral flowers fertile, staminodes absent. **Berry** depressed-spherical, c. 3 mm diam.; seed c. 1.5 mm diam.; testa with faint radial ribbing. **Fig. 14I–J, Pl. 15A–B.**

S.A.: NW, NU, GT, FR, EP, NL, MU, YP, KI; W.A. Flowers and/or fruits: June–Dec.

7. **Rhagodia spinescens** R.Br., *Prodr.* 408 (1810). — *R. spinescens* var. *deltophylla* F.Muell., *Rep. Pl. Babbage's Exped.* 1858: 19 (1859); *R. deltophylla* (R.Br.) A.J.Scott, *Feddes Repert.* 89: 10 (1978); *Chenopodium spinescens* (R.Br.) S.Fuentes & Borsch, *Mol. Phylogen. Evol.* 62: 372 (2012). — **Illustr.:** *Pl. W. N.S.W.*, 279 (1982); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 121 (2003).

Shrub to 1.5 m high; branches divaricate, frequently spinescent; leaves opposite or subopposite, mealy all over with discrete saucer-shaped or spherical vesicular hairs; lamina ovate to deltoid or hastate, 0.5–2 cm long, obtuse to rounded at the apex; petiole about half the length of the lamina. **Inflorescence** a straight panicle or reduced to a spike; perianth densely mealy outside; male flowers globular, 0.5–1 mm diam., filaments united into a glabrous saucer-shaped disc; female flowers globular to broadly turbinate, c. 1 mm high, eventually spreading beneath the fruit and 2.5–3 mm diam., becoming hard and pale-red; staminodes c. 0.3 mm long, united into a broad glabrous

or sparsely hairy disc. **Berry** depressed-globular, pink or red; seed c. 1 mm diam.; testa prominently reticulate. **Spiny saltbush, thorny (or hedge or creeping) saltbush. Fig. 14K–M.**

NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers and/or fruits: probably all months, especially Aug.–Dec.

A very variable species that occupies a number of different habitats.

8. **Rhagodia ulicina** (Gand.) Paul G.Wilson, *Nuytsia* 4: 53 (1982). — *Chenopodium ulicinum* Gand., *Bull. Soc. Bot. France* 66: 224 (1919). — **Illustr.:** *Pl. W. N.S.W.* 263 (1982), as *Chenopodium ulicinum*; F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 122 (2003).

Dense intricately branched spinescent shrub 0.5–1 m high; leaves alternate, often clustered, fleshy, elliptic, 2–5 mm long, closely mealy with vesicular hairs. **Inflorescence** a narrow condensed cyme (sometimes spinescent) with 1–4 lateral and a large terminal flower; perianth globose, 1.5 mm diam., mealy; male flower: disc inconspicuous, glabrous, pistillode minute; female flower: staminodes and style minute, stigmas spreading, slender, subulate. **Berry** at first enveloped by the perianth; seed c. 1.5 mm diam.; testa smooth to minutely granular **Spiny goosefoot. Fig. 14N, Pl. 15C.**

S.A.: LE, NU, GT, FR, EA, EP, MU; W.A.; N.S.W.; Vic. Usually found in rocky situations or over limestone. Flowers and/or fruits: all months.

17. SALSOLA L.

Sp. Pl. 1: 222 (1753).

(Latin *sal*, salt; with reference to the salty taste of *Halogeton sativus* (L.) C.A.Meyer, a species once included in *Salsola*)

Herbs or shrubs; leaves alternate, sessile, entire. **Flowers** bisexual, usually solitary in the leaf axil, sessile, 2-bracteolate, bracteoles spinescent; perianth-segments 5, lanceolate, scarious, each usually developing a transverse scarious wing in fruit; stamens 5; anthers sometimes bearing scarious or bladder-shaped appendages; ovary subglobular; stigmas 2, sessile or on a long style. **Utricle** dry, included in the scarious perianth; seed orbicular, horizontal; testa membranous; embryo in a conical spiral; perisperm absent; filaments strap-shaped, attached to the outer surface of an annular or shallowly cup-shaped disc.

A genus of over 100 species in Europe, Asia, and Africa; introduced into America and Australia.

1. **Salsola australis** R.Br., *Prodr.* 411 (1810) — *Kali australis* (R.Br.) Akhani & E.H.Roalson, *Int. J. Pl. Sci.* 168: 946 (2007). *S. kali* var. *pontica* Pall., *Ill. Pl.* 37 (1893), partly; ?*S. macrophylla* R.Br., *Prodr.* 411 (1810); *S. kali* var. *leptophylla* Benth., *Fl. Austral.* 5: 207 (1870); *S. kali* var. *strobilifera* Benth., *Fl. Austral.* 5: 207 (1870); *S. australis* var. *strobilifera* (Benth.) Domin, *Biblioth. Bot.* 89: 628 (1921); *S. kali* subsp. *austroriparica* Aellen, *Mitt. Bot. Staatssamml. München* 4: 27 (1961); *S. tragus* subsp. *pontica* (Pall.) Rilke, *Biblioth. Bot.* 149: 133 (1999), partly; *S. tragus* subsp. *grandiflora* Rilke, *Biblioth. Bot.* 149: 135 (1999). *S. kali* auct. non L: Tate, *Trans. & Proc. Roy. Soc. South Australia* 2: 123 (1879) & 3: 59 (1880); Paul G.Wilson in A.S.George, *Fl. Austral.* 4: 314 (1984); Paul G.Wilson in Jessop & Toelken, *Fl. S. Austral.* 1: 291 (1986); N.G.Walsh in N.G.Walsh & Entwisle, *Fl. Victoria* 3: 197 (1996); S.W.L.Jacobs in G.J.Harden, *Fl. N.S.W.* 1: 238 (2000); *Salsola tragus* auct. non L: Rilke, *Biblioth. Bot.* 149: 111 (1999), partly. *S. australis* subsp. *compacta* (R.J.Chinnock 10176) Chinnock, *J. Adelaide Bot. Gard.* 24: 77 (2010); *S. australis* subsp. *Coastal* (R.J.Chinnock 10246) Chinnock, J.

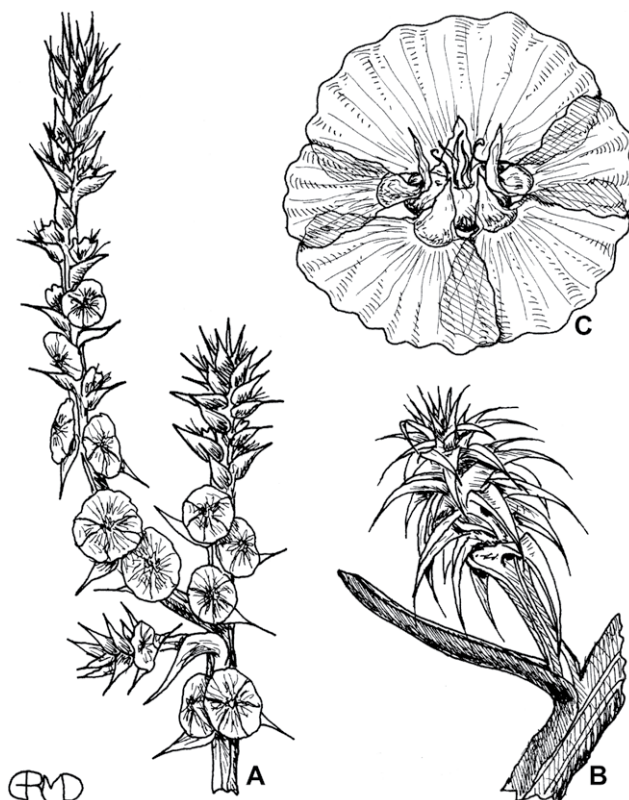


Fig. 15. *Salsola australis*: A–B, branchlets; C, fruit. Illustration by G.R.M. Dasherst, from *Flora of South Australia* 1: 291, Fig. 165 (1986).

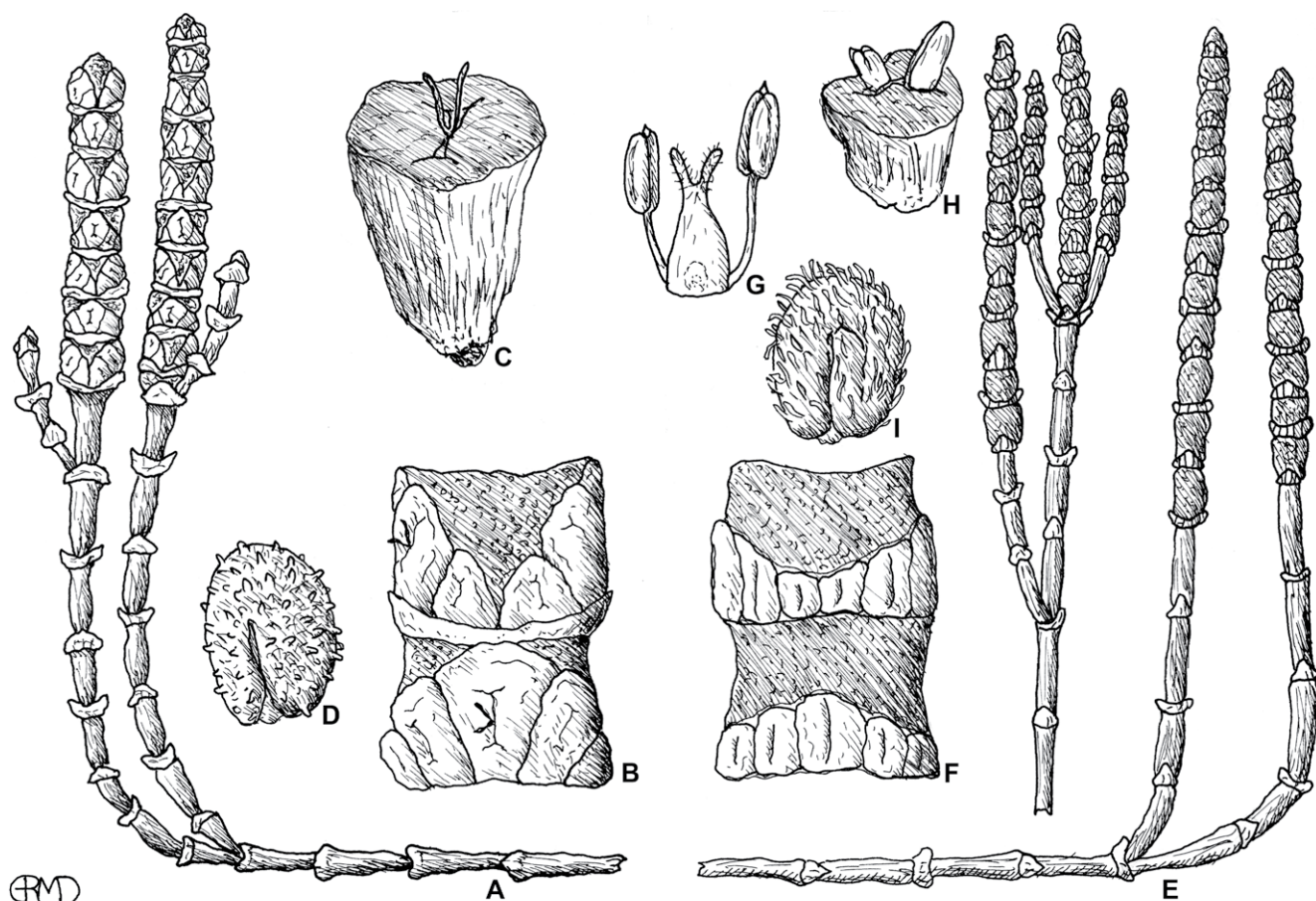


Fig. 16. A–D, *Sarcocornia blackiana*: A, twig; B, portion of spike; C, fruit; D, seed. **E–I, *S. quinqueflora*:** E, twig; F, portion of spike; G, stamens and pistil; H, fruit; I, seed. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 292, Fig. 166 (1986).

Adelaide Bot. Gard. 24: 76 (2010); *S. australis* subsp. *Strobilifera* (R.J.Chinnock 10177) Chinnock, *J. Adelaide Bot. Gard.* 24: 77 (2010). — **Illustr.:** *Pl. W. N.S.W.* 279 (1982), as *Salsola kali*; A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 55 (1988), as *S. kali*; F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 197 (2003), as *S. kali*.

Erect rounded annual c. 60 cm high, succulent when fresh, glabrous or hispid, often verrucose, sometimes woolly in the axils; leaves linear-subulate, decurrent, 10–30 × 2–3 mm, semiterete, broad and slightly clasping at the base. **Floral** leaves and bracteoles similar to foliage leaves or much broader at the base, equal to or exceeding the flowers; flowers in open or condensed spikes; perianth-segments 3–4 mm long, free, oblong, obtuse to acute, at first membranous but becoming cartilaginous; developing unequal obovate to reniform horizontal scarious wings 2–5 mm wide or these represented by pectinate protuberances **Utricle** hemispherical, truncate above; pericarp crustaceous above, otherwise membranous. **Buckbush, roly-poly, soft roly-poly, prickly saltwort. Fig. 15, Pl. 15D–F.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL, KI, SE; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers and/or fruits: mainly May–Oct.

Chinnock (2010) discusses the complex taxonomy of Australian *Salsola* in detail. Until recently the name *Salsola kali* has been misapplied to the species found in Australia (e.g. Wilson 1984). Walsh (1996) referred to three entities within *S. kali* in Victoria, but did not recognise them formally. Rilke (1999), in her revision of *Salsola* sect. *Salsola*, referred all Australian material to *S. tragus* and recognised a number of subspecies in Australia. Recent studies by Hrusa & Gaskin (2008) and Borger *et al.* (2008) suggest that the Australian populations of *Salsola* are most probably endemic and not referable to *S. tragus*. The study undertaken by Borger *et al.* (2008) only covered a very small area of the south west of the continent so there is need for a detailed Australia-wide study of *Salsola*, combining morphology, ecology, cytology and molecular analyses, before any meaningful taxonomic treatment of the genus in Australia will be achieved.

In this treatment, the name *Salsola australis* R.Br. is adopted and no attempt is made to apply any formal infraspecific names. Chinnock (2010) recognises six well-defined taxa in W.A., S.A. and Vic. with phrase names, of which at least three occur in S.A. (see synonymy), but considers it unwise, at this stage, to try and apply any of the infraspecific names that have been used in the past under misapplied names like *S. kali* or *S. tragus*.

18. SARCOCORNIA A.J.Scott

Bot. J. Linn. Soc. 75: 366 (1978).

(Greek *sarx*, flesh; Latin *cornu*, horn.)

Perennial herbs or subshrubs, glabrous, seemingly leafless; branches made up of cylindrical internodes (articles) that are cup-shaped or 2-lobed at the apex, succulent; sclereids usually present in the palisade tissue. **Inflorescence** a terminal spike-like thyrse consisting of 3–12-flowered small cymes (cymules), sessile in the axils of the bracts; bracts united in opposite pairs; flowers apparently embedded in the spongy mesophyll of the succulent axis, bisexual or unisexual by abortion or the plants dioecious; perianth succulent, of fused segments; apex truncate, exposed, the orifice a vertical slit; lobes 3, 2 lateral and a small semicircular outer adaxial lobe; stamens 2, on the abaxial and adaxial side of the ovary. **Fruiting** perianth spongy; pericarp membranous, eventually separating from the axis just above the base; seed ovate to orbicular; testa weak, papillose or with slender hairs; embryo horseshoe-shaped; albumen absent. Samphires.

A cosmopolitan genus of about 16 species 3 of which are native to Australia (Wilson 1980).

1. Seed papillose with short rounded hairs..... 1. **S. blackiana**
1: Seed with slender acuminate (sometimes hooked) hairs..... 2. **S. quinqueflora**

1. **Sarcocornia blackiana** (Ulbr.) A.J.Scott, *Bot. J. Linn. Soc.* 75: 369 (1978). — *Salicornia pachystachya* J.M.Black, *Trans. Roy. Soc. South Australia* 45: 8 (1921), *nom. illeg.*, non Ung.-Sternb. (1866); *S. blackiana* Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 552 (1934). — **Illustr.:** A.Kapitany, *Austral. Succ. Pl.* 190, top left (2007).

Erect or decumbent perennial to 0.8 m high, frequently rooting at the nodes; articles narrow-obovoid to cylindrical, to 10 mm long; sclereids numerous, spirally thickened. **Spikes** cylindrical, 2–5 cm long, c. 8 mm diam. in fruit; cymules 5–13-flowered, frequently with the central flowers in 2 tiers; perianth with a small semicircular adaxial lobe; abaxial lobe minute. **Seed** circular, with spreading papilliform hairs. **Thick-head glasswort. Fig. 16A–D, Pl. 15G–I.**

S.A.: LE, NU, EP, NL, YP, SL, KI, SE; W.A.; Vic.; Tas. Found in periodically waterlogged saline soils, frequently around estuaries. Flowers and/or fruits: probably in all months.

Easily distinguished from *S. quinqueflora* by the shorter thicker fruiting spikes.

2. **Sarcocornia quinqueflora** (Bunge ex Ung.-Sternb.) A.J.Scott, *Bot. J. Linn. Soc.* 75: 368 (1978). — *Salicornia quinqueflora* Bunge ex Ung.-Sternb., *Vers. Syst. Salicorn.* 59 (1866); *S. australis* Sol. ex Benth., *Fl. Austral.* 5: 205 (1870). — **Illustr.:** G.R.Cochrane *et al.*, *Fl. Pl. Victoria* 71, fig. 187 (1968); A.Kapitany, *Austral. Succ. Pl.* 192–193 (2007).

Erect and caespitose or decumbent perennial, rooting at nodes, to 0.5 m high; branches slender; articles cylindrical to narrow-obovoid, 5–15 mm long; sclereids uniformly (or rarely spirally) thickened. **Spikes** 2–5 cm long, 4–5 mm diam. in fruit; cymules 5–9-flowered in a single row; perianth with a small semicircular adaxial lobe; abaxial lobe minute. **Seed** circular, with acute (sometimes uncinat) hairs. **Beaded glasswort. Fig. 16E–I, Pl. 15J–L.**

S.A.: GT, FR, EP, MU, YP, SL, KI, SE; W.A.; Qld; N.S.W.; Vic.; Tas. Found in moderately saline flooded situations particularly in estuaries. Flowers and/or fruits: all months.

19. SCLEROBLITUM Ulbr.

Natürl. Pflanzenfam. ed. 2, 16c: 495 (1934).

(Greek *sklēros*, hard; *Blitum*, a synonym of *Chenopodium*.)

Slightly succulent sparsely mealy herb with numerous simple stems arising from the rootstock; leaves alternate, simple, flat, the basal ones forming a rosette. **Flowers** in compact clusters in the axils of basal and cauline leaves; terminal flower bisexual, the others female; perianth-segments 4, free; stamen 0 or 1. **Pericarp** thick and hard; seed erect; embryo around the apex of the seed; perisperm copious, central.

1 species endemic to Australia.

In this genus the pericarp is thick and hard while the testa is thin, a situation different from that found in *Chenopodium* and *Dysphania*.

Reference: Wilson (1983)

1. **Scleroblitum atriplicinum** (F.Muell.) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 495 (1934). — *Blitum atriplicinum* F.Muell., *Trans. & Proc. Victorian Inst. Advancem. Sci. 1854–1855*: 133 (1855); *Chenopodium atriplicinum* (F.Muell.) F.Muell., *Fragm.* 7: 11 (1869). — **Illustr.**: *Pl. W. N.S.W.* 280 (1982).

Somewhat succulent herb with a prominent tap root; stems numerous, prostrate or ascending, arising from a rootstock; leaves very sparsely mealy when young; basal leaves rosetted; lamina hastate-acuminate, c. 3 cm long; petiole slender, 3–8 cm long, with a broad clasping base; cauline leaves becoming elliptic and sessile upwards. **Flowers** shortly pedicellate; perianth-segments 4, erect, imbricate, ovate, acute, c. 1.5 mm long, glumaceous; ovary glabrous. **Fruiting perianth** cartilaginous; perianth-segments acuminate, c. 2.5 mm long, with a keeled and sigmoid base; utricle erect, lenticular; pericarp hard and thick; seed erect, completely filling the utricle and fused to the pericarp; testa membranous; mature fruit shed with the surrounding perianth. **Purple (or starry or purple-leaved) goosefoot, lambs tongue.** **Fig. 17.**

S.A.: LE, GT, FR, EA, EP, NL, MU; W.A.; Qld; N.S.W.; Vic.
Flowers and/or fruits: Aug.–Oct., Feb.

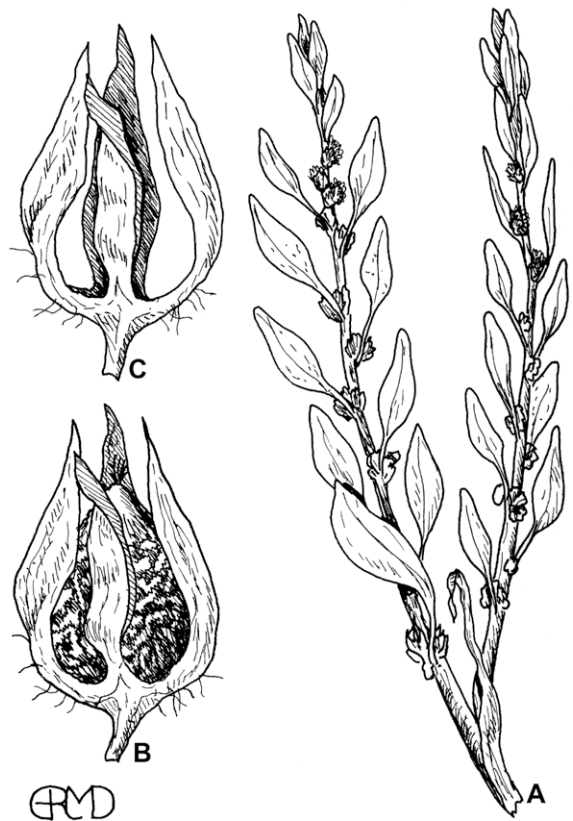


Fig. 17. *Scleroblitum atriplicinum*: A, twig; B, perianth with fruit; C, perianth without fruit. *Illustration by G.R.M. Dashorst, from Flora of South Australia 1: 291, Fig. 165 (1986).*

20. SCLEROLAENA R.Br.

Prodr. 410 (1810).

(Greek *skleros*, hard; *chlaina*, covering; referring to the hard perianth in fruit.)

Perennial herbs or small shrubs, glabrous or variously pubescent with simple (rarely bifid or branched) hairs; leaves small, simple, entire, usually semiterete or linear, fleshy, sessile or shortly petiolate. **Flowers** small, axillary, solitary or paired, bisexual or rarely unisexual; perianth usually cup-shaped, shortly 3–5-lobed, enlarging in fruit; stamens 3–5, hypogynous; anthers exserted; ovary thin-walled; stigmas 2 or 3, slender, papillose. **Fruiting** perianth enveloping the utricle as a tube, crustaceous to woody, often with a lower chamber (hollow base) filled with moist tissue when fresh; a slit or tubercle (radicular tubercle) present opposite the radicle; spines 0–9 usually 2–6, arising between the perianth lobes, a contiguous pair often opposite the radicle (radicular spines); perianth lobes and the upper portion of the tube (above the spines) sometimes prominent (the limb); utricle thin-walled; seed horizontal to erect; testa membranous; embryo horseshoe-shaped to annular, the radicle often lying within a radicular tubercle (through which it emerges on germinating); perisperm central. **Bindyis, copperburrs.**

An Australian endemic genus of 62 species, none of which are found in Tas. Typically found in heavy soil in semi-arid regions.

The last edition of the *Flora of South Australia* (Wilson 1986) contained the two monotypic genera *Scleroclamys* F.Muell. (*S. brachyptera* F.Muell.) and *Stelligera* A.J.Scott (*S. endecaspinis* A.J.Scott). These are now subsumed in *Sclerolaena*.

Notes to key and descriptions: (1) In the key the term ‘perianth’ is used for the fruiting perianth. (2) Species of *Sclerolaena* sometimes hybridise with other members of the genus, or with members of related genera. Hybrids can often be recognised as such by the perianths which may be deformed or be exceedingly variable on the one plant; they are frequently sterile. (3) The full number of spines is not necessarily expressed on every perianth; a check should therefore be made of several. (4) Fruiting perianths frequently develop even though the seed does not; the sterile ‘fruits’ sometimes differ substantially from fertile ‘fruits’ and may cause confusion with identification. (5) In the description the spine numbers are divided between the radicular spines and the normal spines; thus ‘4 + 2’ indicates that 4 spines alternate with the perianth lobes and 2 spines are placed opposite the radicle.

Reference: Ising (1964), Scott (1978).

1. Spines absent or represented by 1 or 2 blunt tubercles
 2. Fruiting perianth with 1 or 2 blunt tubercles..... 35. **S. patenticuspis**
- 2: Fruiting perianth apex truncate consisting of a horizontal wing
 3. Fruiting perianth shortly turbinate, wing 5-angled..... 7. **S. brachyptera**
 - 3: Fruiting perianth urceolate, wing margin crenate-dentate with c. 11 spines..... 36. **S. stelligera**
- 1: Spines 1–10, hard
 4. Stems and leaves glabrous apart from axillary tufts of hairs
 5. Leaves linear to narrow-oblong or elliptic, flat 31. **S. muricata**
 - 5: Leaves terete to semiterete, fleshy
 6. Spines 1–3
 7. Perianth and young leaves variously pubescent; limb erect, oblong, c. 3.5 mm long..... 4. **S. bicuspis**
 - 7: Perianth glabrous (or with a puberulous limb); young leaves glabrous or almost so
 8. Base of the perianth tube expanded, principal spines 3
 9. Principal spines irregularly arranged, 20–30 mm long..... 29. **S. longicuspis**
 - 9: Principal spines symmetrically arranged, under 15 mm long 39. **S. tricuspis**
 - 8: Base of the perianth tube not expanded, principal spines 2 or 3
 10. Limb fully erect; leaf axil woolly-pilose..... 2. **S. articulata**
 - 10: Limb incurved (at least at the tip); leaf axil shortly pubescent to glabrous
 11. Principal spines 2, laterally placed and ascending; radicular spine solitary and curved adaxially 23. **S. glabra**
 - 11: Principal spines 3, almost horizontal (one lateral, one abaxial, and one somewhat adaxial or curved around the branch)..... 15. **S. cuneata**
 - 6: Spines 4–9
 - 12: Longer spines 20–30 mm long, slender; perianth tube very thick, with an expanded base..... 29. **S. longicuspis**
 - 12: Longer spines under 15 mm long
 13. Spines 6, spreading; 4 equidistantly arranged and a short contiguous pair on a radicular spur, base slightly hollowed
 14. Spines spreading; perianth somewhat dorsiventrally compressed, base slightly hollowed 9. **S. calcarata**
 - 14: Spines erect; perianth cylindrical with a prominent hollow base..... 1. **S. anisacanthoides**
 - 13: Spines 4 or 5
 15. Spines 4 (2 long 2 short and contiguous)..... 22. **S. fusiformis**
 - 15: Spines not as above
 16. Perianth very shortly cylindrical, attachment basal; spines 5, spreading (3 equidistant and a contiguous pair)..... 26. **S. johnsonii**
 - 16: Perianth dorsiventrally compressed; attachment very oblique
 17. Spines 4 (on some ‘fruits’ 3); perianth limb inflexed or inflexed at the tip
 18. Major spines 2, laterally placed..... 23. **S. glabra**
 - 18: Major spines 2 or 3 one of which is somewhat abaxially placed
 19. Major spines: 1 abaxial and 2 lateral in line; stamens 3..... 19. **S. divaricata**
 - 19: Major spines: 1 abaxial, 1 lateral, and 1 somewhat adaxial or curved around the branch; stamens 5..... 15. **S. cuneata**
 - 17: Spines 5 (3 major and 2 minor adaxial); limb erect..... 25. **S. intricata**
 - 4: Stems and leaves variously hairy

20. Flowers in pairs; perianth appendages ('spines') in 2 series, fan-shaped, fimbriate; leaves linear, silky..... 37. **S. symoniana**
- 20: Flowers solitary in the leaf axil; perianth appendages ('spines') not in 2 series
21. Spines 2; perianth with a prominently hollowed base
22. Perianth tube glabrous, oblong, dorsiventrally compressed, c. 3 mm long, crustaceous, red- to straw-coloured 38. **S. tatei**
- 22: Perianth tube hairy
23. Perianth long-silky-villous 20. **S. eriacantha**
- 23: Perianth puberulous to shortly woolly
24. Spines parallel and erect; perianth expanded into a hollow base with an elliptic attachment..... 33. **S. parallelicuspis**
- 24: Spines not parallel or, if so, attachment circular
25. Perianth narrowed above the very swollen hollow base to form a dorsiventrally compressed tube..... 11. **S. constricta**
- 25: Perianth tube and base continuous
26. Perianth slightly ribbed on the abaxial face; attachment narrow- to broad-elliptic 24. **S. holtiana**
- 26: Perianth smooth or almost so; attachment circular to elliptic
27. Spines erect and almost parallel, mostly 0.5–1 mm long..... 40. **S. uniflora**
- 27: Spines divergent, mostly c. 2 mm long..... 18. **S. diacantha**
- 21: Spines 1–6 if 2 then the perianth base not prominently hollowed
28. Spines 5 or more
29. Spines 6
30. Perianth oblong, dorsiventrally compressed, glabrous; spines spreading, 1–4 mm long..... 9. **S. calcarata**
- 30: Perianth globular to shortly cylindrical or shortly turbinate
31. Leaves villous, apex of perianth broad, larger spines 5–8 mm long
32. Leaves obovate, flattened..... 13. **S. cornishiana**
- 32: Leaves linear, semiterete..... 17. **S. deserticola**
- 31: Leaves sparsely hairy, perianth shortly cylindrical, spines 1–2 mm long..... 34. **S. parviflora**
- 29: Spines 5
33. Spines equal, regularly arranged around the apex of the barrel-shaped tube; plant loosely woolly all over..... 6. **S. blackiana**
- 33: Spines irregular in arrangement or size
34. Perianth tube oblong, dorsiventrally compressed, curved, woolly; spines flattened and fused to form an abaxial and an adaxial group 10. **S. clelandii**
- 34: Perianth tube squat, shortly turbinate to subglobular, spines not in 2 groups
35. Perianth silky-villous, with a prominent erect chartaceous limb 21. **S. fontinalis**
- 35: Perianth glabrous, sparsely villous or woolly; limb not apparent
36. Perianth glabrous or very sparsely woolly, prominently ribbed; apex cushion-shaped, sunken in the centre 14. **S. costata**
- 36: Perianth sparsely villous or woolly, not prominently ribbed, if glabrous then with a convex apex
37. Perianth tube somewhat narrowed towards the base, pubescent or shortly villous; apex convex, attachment circular, not sunken 12. **S. convexula**

- 37: Perianth tube not obviously narrowed towards the base; attachment broad or elliptic, sometimes hollowed
- 38: Leaves slender, semiterete, villous; perianth woolly, the 3 longer spines 5–8 mm long..... 17. **S. deserticola**
- 38: Leaves linear to elliptic or obovate, flattened (sometimes fleshy)
- 39: Perianth densely woolly
- 40: Perianth 4-lobed 5. **S. birchii**
- 40: Perianth 5-lobed 13. **S. cornishiana**
- 39: Perianth glabrous, sparsely villous, or minutely woolly..... 31. **S. muricata**
- 28: Spines 1–4
- 41: Longer spines 10–30 mm long..... 3. **S. bicornis**
- 41: Longer spines mostly under 10 mm long
- 42: Perianth glabrous (limb sometimes hairy); leaves glossy; hairs on the leaves appressed, medifixed 16. **S. decurrens**
- 42: Perianth hairy; hairs on the leaves basifixed
- 43: Spines 3 or 4; perianth barrel-shaped; limb erect, densely hairy..... 41. **S. ventricosa**
- 43: Spines 2–4, if 3 or 4 then the perianth tube not barrel-shaped
- 44: Leaves tomentose with shortly branched hairs 28. **S. limbata**
- 44: Leaves glabrous or with simple (sometimes asperulous) hairs
- 45: Leaves slender, semiterete, 10–20 mm long, with a recurved apex at least when young 3. **S. bicornis**
- 45: Leaves flattened, or ellipsoid, or if semiterete less than 10 mm long
- 46: Perianth tube 1.5–3 mm long; apex truncate, slightly concave, bordered by 2–4 very short spines 0.5–1.5 mm long; attachment minute 30. **S. minuta**
- 46: Perianth not as above
- 47: Spines 2, slender, 4–7 mm long, glabrous or sparsely hairy towards the base
- 48: Spines ascending in the same vertical plane; hairs smooth 35. **S. patentiuspis**
- 48: Spines ascending in different vertical planes
- 49: Leaves 2–3 mm long; hairs smooth..... 8. **S. brevifolia**
- 49: Leaves mostly 6–10 mm long; hairs asperulous..... 32. **S. obliquispis**
- 47: Spines 3 or 4, short or slender, glabrous or densely hairy in the lower part
- 50: Perianth tube oblong, dorsiventrally compressed, curved; spines up to 1 mm long..... 10. **S. clelandii**
- 50: Perianth tube turbinate, not curved; 2 longer spines slender, 3–6 mm long, pilose in the lower half.... 27. **S. lanicuspis**

1. **Sclerolaena anisacanthoides** (F.Muell.) Domin, *Biblioth. Bot.* 89: 70 (1921). — *Echinopsilon anisacanthoides* F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 76 (1858). — **Illustr.:** *Pl. W. N.S.W.* 253 (1982), as *Bassia anisacanthoides*; P.G.Wilson, *Fl. Austral.* 4: 244, Fig. 46F (1984).

Glabrous rounded perennial to 0.15 m high, branching from base; leaves slender, terete, 5–10 mm long, fleshy. **Flowers** solitary, stamens 5. **Fruiting** perianth cylindrical, c. 2.5 mm high excluding spines; lower half to two-thirds forming a hollow, sometimes swollen base with a truncate, circular attachment; limb insignificant; spines 6 erect, 0.5–2 mm long, collateral pair borne on the shortly ascending radicular tubercle; seed horizontal with ascending radicle. **Yellow burr.**

SA: LE; Qld; N.S.W.

This species was recently discovered in S.A.

2. **Sclerolaena articulata** (J.Black) A.J.Scott, *Feddes Repert.* 89: 111 (1978). — *Bassia articulata* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 57: 150 (1933).

Small rounded shrub to 0.4 m high, glabrous except for the woolly-pilose leaf axils; leaves slender, semiterete, acute, 5–15 mm long. **Flowers** solitary; perianth glabrous apart from the woolly-ciliate perianth-segments; stamens 5. **Fruiting** perianth hard, erect and appressed to the branch; attachment very oblique, firm; tube semicylindrical, dorsiventrally compressed, c. 3 mm high; limb erect, c. 1 mm long, woolly-ciliate; spines 3, spreading to recurved, slender, 2.5–5 mm long; seed and radicle erect. **Jointed poverty-bush. Fig. 19A.**

S.A.: LE, FR, ?EA; W.A.; N.S.W.; Vic. The fruits are sometimes congested along short portions of a branch which, when dead, may fall to the ground. Flowers and/or fruits: Aug.–Sep. (few records).

Only differs from *S. intricata* in having 3 and not 5 spines; it is possibly conspecific with that species. The identity of material from EA needs to be confirmed.

3. **Sclerolaena bicornis** Lindl. in T.Mitch. var. **bicornis**, *Three Exped. Austral.* 2: 47 (1838). — *Bassia bicornis* (Lindl.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882); *Chenolea bicornis* (Lindl.) F.Muell. ex Tate, *Trans. & Proc. Rep. Roy. Soc. South Australia* 3: 58 (1880). — **Illustr.:** *Pl. W. N.S.W.* 248 (1982); P.Moore, *Guide Pl. Inland Austral.* 98 (2005).

Intricately branched shrub c. 0.5 m high; branches closely white-woolly; leaves well-spaced, slender and semiterete, c. 20 mm long, erect and spreading at the tips when young, sparsely silky-pilose with asperulous hairs to glabrous. **Flowers** solitary; perianth densely woolly; stamens 5. **Fruiting** perianth woody, covered with a thick white woolly indumentum except for the distal portion of the spines; attachment basal, elliptic, 2–5 mm long; tube globular, c. 6 mm diam.; limb erect; spines 2 (rarely 3), opposite, erect to spreading, 10–20 mm long; seed horizontal; radicle erect. **Goathead burr. Fig. 19B, Pl. 16A.**

S.A.: NW, LE, GT, FR, EA; W.A.; N.T.; Qld; N.S.W. Flowers and/or fruits: probably in all months.

4. **Sclerolaena bicuspis** (F.Muell.) Domin, *Biblioth. Bot.* 89: 624 (1921). — *Anisacantha bicuspis* F.Muell., *Trans. & Proc. Victorian Inst. Advancem. Sci.* 133 (1855); *Chenolea bicuspis* (F.Muell.) F.Muell. ex Tate, *Trans. & Proc. Rep. Roy. Soc. South Australia* 3: 58 (1880); *Bassia bicuspis* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882). — **Illustr.:** F.Muell., *Iconogr. of Austral. Salsolac. Pl.* t. 73 (1891).

Small shrub c. 15 cm high; branches robust, glabrous, glossy, densely pilose in the axils; leaves crowded, slender and semiterete, flattened towards the base, 1–1.5 cm long, sparsely pilose when young. **Flowers** solitary but congested; perianth pilose; stamens 5; style robust, pilose. **Fruiting** perianth woody; attachment oblique, circular, c. 1.5 mm diam.; tube very shortly turbinate, 1.5–2 mm high and c. 4 mm wide at the apex, ribbed, sparsely pilose; limb erect, oblong, c. 3.5 mm high, membranous to crustaceous, sparsely pilose; spines 2 (–3), erect or slightly spreading, opposite, 8–13 mm long; radicular tubercle present; seed horizontal. **Fig. 19C.**

S.A.: LE, FR, EP; W.A. Flowers: and/or fruits: Aug.–Nov.

5. **Sclerolaena birchii** (F.Muell.) Domin, *Biblioth. Bot.* 89: 623 (1921). — *Anisacantha birchii* F.Muell., *Fragm.* 8: 163 (1874); *Bassia birchii* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882). — **Illustr.:** B.A.Auld & P.M.Martin, *Proc. Linn. Soc. New South Wales* 100: t. 17 (1976); F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 72 (1891), excl. right-hand figures; *Pl. W. N.S.W.* 249 (1982).

Intricately branched shrub to 1 m high; branches closely woolly; leaves narrow-obovate to obovate, 5–15 mm long, obtuse, woolly-villous. **Flowers** solitary; perianth woolly, 4-lobed; stamens 4. **Fruiting** perianth hard, woolly, persistent; attachment very oblique, elliptic, c. 1.5 mm long; tube steeply ascending, turbinate, c. 1.5 mm high and wide, ribbed; apex convex, higher on the adaxial side; spines 2 + 1 + 2, 2 abaxial spines stout, divergent, 8–15 mm long, the solitary adaxial spine usually much shorter (1–3 mm long) and the radicular adaxial pair 1–2 mm long, all sometimes rough towards the base from persistent hair bases; seed erect. **Galvanised burr. Fig. 19D.**

S.A.: NW, *FR, *NL, *MU; N.T.; Qld; N.S.W.; *?Vic. Flowers and/or fruits: all months.

(Proclaimed S.A. plant)

6. **Sclerolaena blackiana** (Ising) A.J.Scott, *Feddes Repert.* 89: 111 (1978). — *Bassia blackiana* Ising, *Trans. & Proc. Roy. Soc. South Australia* 57: 91 (1933). — **Illustr.:** Ising, *Trans. & Proc. Roy. Soc. South Australia* 57: 92, figs 1–3 (1933); *Pl. W. N.S.W.* 249 (1982).

Rounded herb to 30 cm high; branches loosely woolly; leaves slender, semiterete, 5–20 mm long, silky-villous or eventually glabrous. **Flowers** solitary; perianth woolly, 5-lobed; stamens 5. **Fruiting** perianth woolly-villous or eventually glabrous; attachment small, basal; tube barrel-shaped, c. 2 mm high, hard (possibly fleshy outside when fresh), smooth or 5–10-ribbed; apex conical, woolly on the lobes; spines 5, 0.5–1.5 mm long (the radicular one the shortest), recurved; seed slightly oblique; radicle ascending. **Blacks copperburr. Fig. 19E, Pl. 16B–E.**

S.A.: LE; Qld; N.S.W. Flowers and/or fruits: Jul.–Dec.

(Rare status in S.A.)

7. **Sclerolaena brachyptera** (F.Muell.) S.W.L.Jacobs, *Telopea* 3 (2): 143 (1988). — *Sclerochlamys brachyptera* F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 76 (1858); *Echinopsilon brachypterus* (F.Muell.) F.Muell., *Fragm.* 7: 13 (1869); *Kochia brachyptera* (F.Muell.) Benth., *Fl. Austral.* 5: 189 (1870); *Bassia brachyptera* (F.Muell.) R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 351 (1923). — **Illustr.:** Rotherham *et al.*, *Fl. Pl. N.S.W. S. Queensl.* fig. 460 (1975); *Pl. W. N.S.W.* 250 (1982); P.Moore, *Guide Pl. Inland Austral.* 97 (2005).

Decumbent shrub; branches villous; leaves sessile, linear, c. 10 mm long, somewhat fleshy, villous. **Flowers** solitary, perianth glabrous, shortly 5-lobed; stamens 5. **Fruiting** perianth shortly turbinate, hard, glabrous, tube c. 1.5 mm high and c. 2 mm wide, with 5 prominent tepaline and 5 less obvious intertepaline ribs; base truncate and slightly hollowed; apex truncate, and extending into a hard narrow entire horizontal 5–angled wing c. 3 mm diam.; seed horizontal. **Short-winged copperburr, hairy bassia, shortwing saltbush. Fig. 18, Pl. 16F.**

S.A.: NW, LE, GT, FR, EA, EP, NL, MU; W.A.; N.T.; Qld; N.S.W.; Vic. Usually found in heavy slightly saline soils. Flowers and/or fruits: probably all months.

Sclerolaena xnitida (Ising) A.J.Scott, *Feddes Repert.* 89:113 (1978), is probably a hybrid involving this and other species of the genus. (Basionym: *Bassia nitida* Ising, *Trans. Roy. Soc. South Australia* 93: 123, 1969).

8. **Sclerolaena brevifolia** (Ising) A.J.Scott, *Feddes Repert.* 89: 111 (1978). — *Bassia brevifolia* Ising, *Trans. Roy. Soc. South Australia* 88: 82 (1964).

Small erect shrub c. 30 cm high, hirtellous all over or eventually almost glabrous; leaves frequently congested, ellipsoid, 2–3 mm long. **Flowers** solitary. **Fruiting** perianth sparsely pubescent, hard; attachment basal, narrowly elliptic, c. 3 mm long, extending as a short decurrent spur down the stem and sometimes also upwards; tube c. 1 mm long and wide, more or less dorsiventrally compressed; limb inconspicuous, eventually incurved; spines 2, obliquely spreading in different vertical planes (the radicular spine inclined abaxially and the other adaxially), c. 5 mm long, pubescent towards the base; seed and radicle erect. **Fig. 19F.**

S.A.: NU, GT, EP, NL, MU, YP; W.A. Found in slightly saline or calcareous soils. Flowers and/or fruits: all months.

A species similar to (and probably intergrading with) *S. obliquicuspis*.

9. **Sclerolaena calcarata** (Ising) A.J.Scott, *Feddes Repert.* 89: 111 (1978). — *Bassia calcarata* Ising, *Trans. Roy. Soc. South Australia* 88: 102 (1964).

Rounded perennial branching from the base, c. 25 cm high, glabrous to pilose; leaves slender, terete, 5–10 mm long, fleshy. **Flowers** solitary, glabrous; stamens 5. **Fruiting** perianth oblong (somewhat dorsiventrally compressed), c. 2 mm long, 10-ribbed, glabrous or with a pubescent limb, produced at the base into 2 spurs; attachment broadly elliptic, slightly hollowed, oblique; spines 6 (4 + 2), 1–4 mm long, spreading, the collateral pair borne on a short radicular tubercle; limb small, membranous, erect, in the slightly sunken apex; seed vertical, radicle erect. **Red copperburr, redburr. Fig. 19G.**

S.A.: NW, LE, EA; N.T.; Qld; N.S.W. Found on heavy soil. Flowers and/or fruits: Apr.–Sep.

S. ×murrayae (Ising) A.J.Scott, *Feddes Repert.* 89: 113 (1978), is probably a hybrid involving *S. calcarata*. (Basionym: *Bassia murrayae* Ising, *Trans. Roy. Soc. South Australia* 88: 103, 1964).

10. ***Sclerolaena clelandii*** (Ising) A.J.Scott, *Feddes Repert.* 89: 112 (1978). — *Bassia clelandii* Ising, *Trans. Roy. Soc. South Australia* 88: 94 (1964). — **Illustr.:** Ising, *Trans. Roy. Soc. South Australia* 88: 94, Fig. 10 (1964).

Perennial to 30 cm high; branches woolly; leaves narrow-ovate to elliptic, acute, c. 5 × 1.5 mm, thick, somewhat boat-shaped, silky-pubescent, crowded towards the branch apices. **Flowers** solitary, tomentose, stamens 5. **Fruiting** perianth hard, woolly, persistent; attachment basal, circular, concave; base slightly gibbous, tube oblong, c. 3 mm long, dorsiventrally flattened, somewhat recurved; limb erect, c. 1 mm long; spines 4 or 5, flattened and fused together in 2 pairs as short oblong plates on the abaxial and adaxial surfaces of the perianth, a single lateral spine sometimes also present or this fused to the abaxial pair, the plates either very short or up to 1 mm long and recurved, bearing at their apex short tubercles or slender spines to 1 mm long; seed erect; radicle vertical. **Fig. 19H.**

S.A.: NW, LE; W.A.; N.T.; Qld. Usually found in clay on the margins of salt lakes. Flowers and/or fruits: all months.

11. ***Sclerolaena constricta*** (Ising) A.J.Scott, *Feddes Repert.* 89: 112 (1978). — *Bassia constricta* Ising, *Trans. Roy. Soc. South Australia* 84: 95 (1961); *B. uniflora* var. *incongruens* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 48: 254 (1924). — **Illustr.:** Ising, *Trans. Roy. Soc. South Australia* 84: 89, fig. 7 (1961); *Pl. W. N.S.W.* 250 (1982).

Rounded perennial to 20 cm high; branches velvety to cottony; leaves linear to very narrow-oblong, c. 10 mm long, sparsely appressed-pilose. **Flowers** solitary; perianth sparsely pilose; stamens 5. **Fruiting** perianth very sparsely pubescent; tube shortly oblong, dorsiventrally compressed, c. 1 mm high, slightly constricted around the base, c. 1.5 mm wide, concave on the adaxial face, ascending, expanded below into a hollow oblong to circular base 2–3 mm long; limb ridgelike, incurved; spines 2, lateral, 1.5–5 mm long (or one reduced to a small knob), divergent; radicular tubercle adjacent to one of the spines and decurrent as a prominent rib; seed and radicle vertical. **Fig. 19I.**

S.A.: LE, GT, FR, EA, MU; N.S.W. Found frequently on slightly saline loam or alluvial soil. Flowers and/or fruits: June–Dec.

A rather variable species, which possibly intergrades with *S. parallelispis* and *S. boltiana*.

12. ***Sclerolaena convexula*** (R.H.Anderson) A.J.Scott, *Feddes Repert.* 89: 112 (1978). — *Bassia convexula* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 346 (1923). — **Illustr.:** *Pl. W. N.S.W.* 251 (1982).

Erect woody perennial to 30 cm high; branches slender, cottony; leaves linear to narrow-elliptic, 4–10 mm long, appressed-villous. **Flowers** solitary; stamens 4. **Fruiting** perianth hard, somewhat pubescent or shortly villous; attachment basal, circular, c. 1.2 mm diam.; tube turbinate, c. 1 mm high and c. 1.5 mm wide at the summit; apex convex, limb inconspicuous, pubescent; spines 3 + 2, 1–2 mm long, radiating, the radicular pair shorter and borne on a short radicular spur. **Tall copperspur. Fig. 19J, Pl. 16G.**

S.A.: NW, LE, GT, FR, EA, MU; W.A.; N.T.; Qld; N.S.W. Flowers and/or fruits: Apr.–Oct.

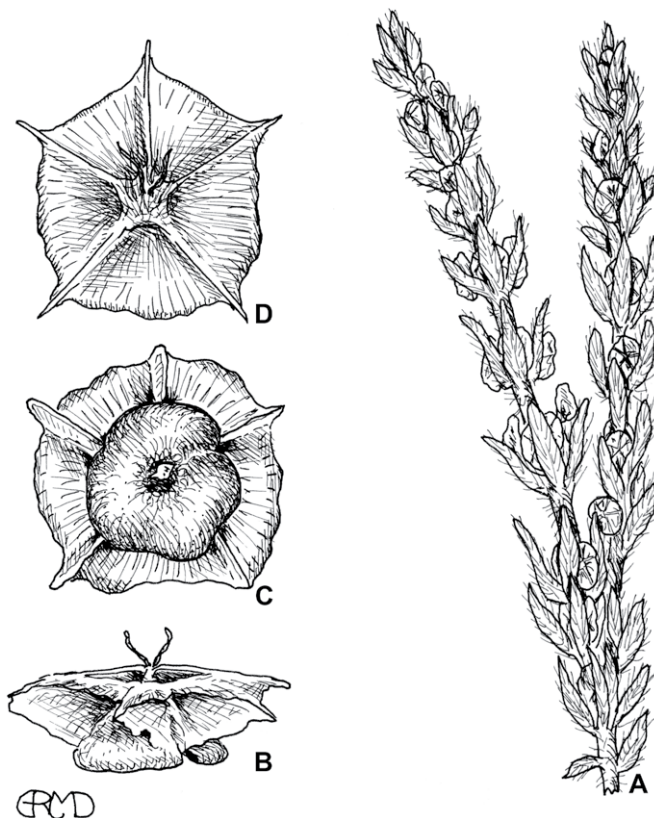


Fig. 18. *Sclerolaena brachyptera*: A, twig; B–D, fruits from side (B), bottom (C) and top (D). Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 291, Fig. 165 (1986).

13. **Sclerolaena cornishiana** (F.Muell.) A.J.Scott, *Feddes Repert.* 89: 112 (1978) — *Bassia cornishiana* F.Muell., *Australas. Chem. Druggist* 8: 41 (1885). — **Illustr.:** P.Moore, *Guide Pl. Inland Austral.* 98 (2005).

Intricately branched annual or perennial herb; branches woolly; leaves narrowly obovate to obovate, c. 10 mm long. **Flowers** solitary; stamens 5. **Fruiting** perianth hard, woolly, persistent; attachment oblique, tube turbinate with a thick solid base c. 3 mm high, 2.5–4 mm wide at summit; apex more or less circular, cushion-shaped, radially 5-grooved; spines radiating and regularly positioned, typically 4 + 2 (but one of the radicular pair may be very reduced or absent), the longer c. 7 mm long, woolly at base. Seed horizontal.

S.A.: NW, LE; W.A.; N.T.; Qld.

14. **Sclerolaena costata** (R.H.Anderson) A.J.Scott, *Feddes Repert.* 89: 112 (1978). — *Bassia costata* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 347 (1923).

Small woody perennial to 30 cm high; branches shortly villous or sparsely woolly; leaves linear to very narrow-elliptic, 5–10 mm long, appressed-villous. **Flowers** solitary; perianth sparsely villous; stamens 4. **Fruiting** perianth hard, more or less glabrous; base slightly hollowed, attachment circular, 0.5–1 mm diam., sometimes slightly spreading; tube turbinate, c. 1.5 mm high and wide at the summit, prominently ribbed; apex cushion-shaped, sunken in the centre; spines 3 + 2, horizontal, 3–5 mm long, the radicular pair shorter and borne on a short spur; seed horizontal. **Fig. 19K.**

S.A.: NW, LE; W.A.; N.T. Flowers and/or fruits: May–Sep.

15. **Sclerolaena cuneata** Paul G.Wilson, *Fl. Austral.* 4: 328 (1984). — **Illustr.:** A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 57 (1988).

Intricately branched rounded perennial to 30 cm high, glabrous apart from the axillary pubescence; leaves slender-terete, 10–20 mm long, fleshy. **Flowers** solitary; perianth glabrous apart from the woolly-ciliate margin of the lobes; stamens 5 rarely 4. **Fruiting** perianth woody, glabrous; tube oblong-obcuneate, dorsiventrally compressed and with a few blunt ribs, c. 3 mm high, rounded at the base; limb incurved; attachment oblique, flat, circular, c. 1.5 mm diam.; spines 3, (or sometimes 4 when a small inner radicular spine is present), slender, 8–15 mm long, more or less horizontally spreading, 1 lateral, 1 abaxial, and 1 radicular spine which is directed somewhat adaxially or is curved around the branch; seed erect. **Fig. 19L.**

S.A.: NW, LE, GT, FR, EA, EP, MU; W.A.; N.T.; Qld; N.S.W. Flowers and/or fruits: all months.

16. **Sclerolaena decurrens** (J.M.Black) A.J.Scott, *Feddes Repert.* 89: 112 (1978). — *Bassia decurrens* J.M.Black, *Trans. & Proc. Roy. Soc. South Austral.* 46: 567 (1922); *Austrobassia decurrens* (J.M.Black) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 532 (1934). — **Illustr.:** *Pl. W. N.S.W.* 251 (1982).

Small dense shrub to 30 cm high; branches loosely woolly; leaves semiterete, 5–10 mm long, acute, appressed-hirsute to glabrous, glossy; hairs medifixed, with the distal arm longer than the proximal. **Flowers** solitary; perianth moderately pilose; stamens 5. **Fruiting** perianth hard, glossy; attachment slightly oblique, more or less circular, depressed, c. 1.5 mm diam.; tube shortly turbinate, ribbed, c. 1.5 mm high and c. 2 mm broad at the apex, glabrous; limb oblong, erect, exceeding the tube, thin, sparsely pilose towards the apex; spines 2 or 3, 2 of these opposite and divergent, 5–7 mm long, 1 radicular and 2.5 mm or less or this reduced to a tubercle, the radicular canal produced into a flange which is decurrent down the tube as a prominent rib; seed erect. **Green copperburr. Fig. 19M, Pl. 16H–I.**

S.A.: NW, LE, GT, FR, EA, EP, MU; N.T.; Qld; N.S.W.; Vic. Flowers and/or fruits: Apr.–Sep.

Sclerolaena oppositicuspis (Ising) A.J. Scott, *Feddes Repert.* 89:113 (1978) is probably a hybrid between *S. decurrens* and *S. intricata*. (Basionym: *Bassia oppositicuspis* Ising, *Trans. Roy. Soc. South Australia.* 88: 86 (1964).

17. **Sclerolaena deserticola** Paul G.Wilson, *Fl. Austral.* 4: 329 (1984). — *Bassia quinqueuspis* var. *lanata* Ising, *Trans. Roy. Soc. South Australia* 88: 97 (1964); *S. muricata* var. *lanata* (Ising) A.J.Scott, *Feddes Repert.* 89: 113 (1978).

Divaricately branched perennial to 30 cm high; branches velvety-tomentose; leaves slender and semiterete, 5–15 mm long, spreading, villous. **Flowers** solitary; perianth woolly, 4-lobed; stamens 4. **Fruiting** perianth

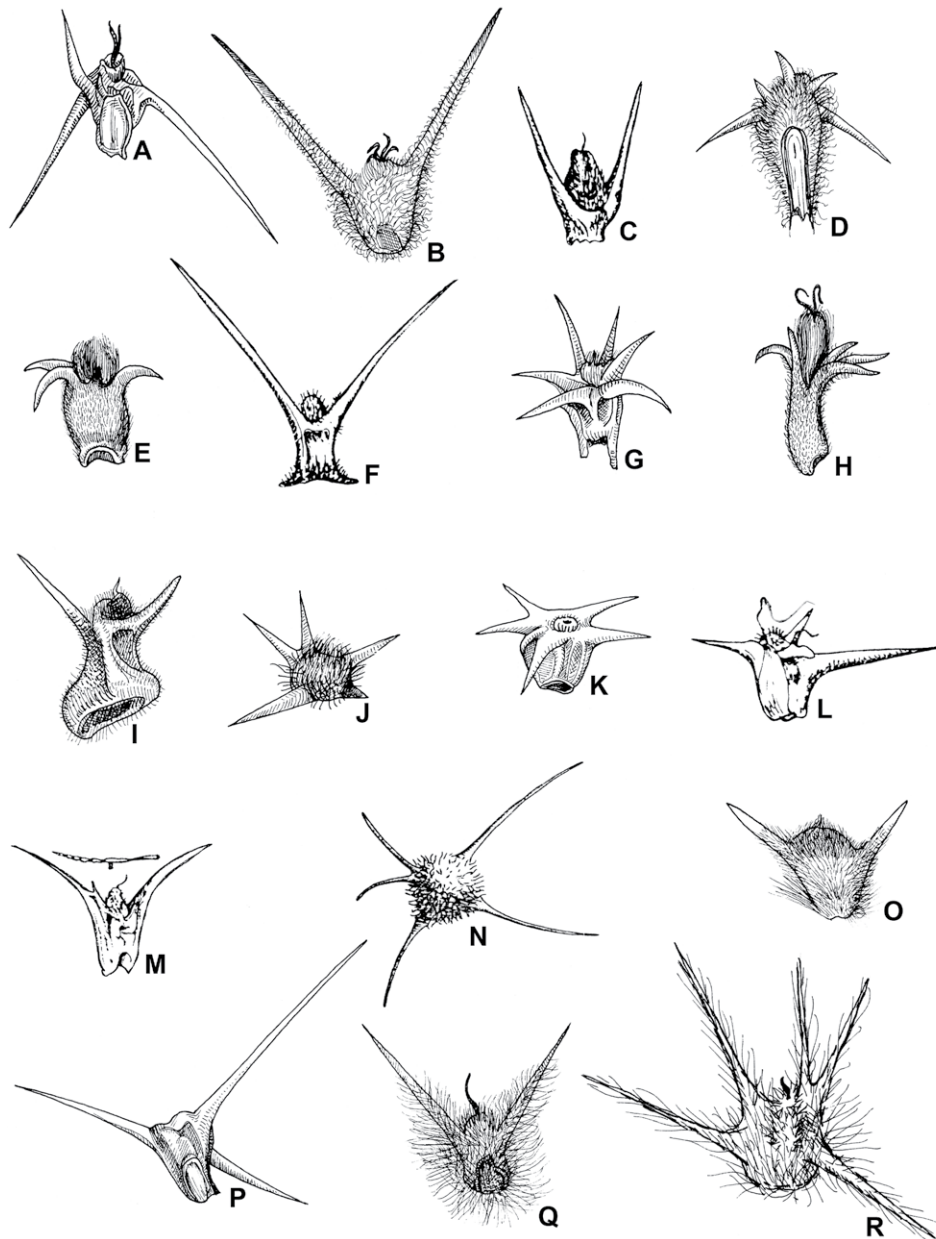


Fig. 19. *Sclerolaena* fruits: A, *S. articulata*; B, *S. bicornis* var. *bicornis*; C, *S. bicuspis*; D, *S. birchii*; E, *S. blackiana*; F, *S. brevifolia*; G, *S. calcarata*; H, *S. clelandii*; I, *S. constricta*; J, *S. convexula*; K, *S. costata*; L, *S. cuneata*; M, *S. decurrens*; N, *S. deserticola*; O, *S. diacantha*; P, *S. divaricata*; Q, *S. eriakantha*; R, *S. fontinalis*. Illustration reproduced from *Flora of South Australia* 1: 298, Fig. 169 (1986), mainly based on *Flora of Central Australia* 68, Fig. 88 (1981).

moderately to densely woolly; tube very shortly cylindrical, c. 2 mm high and c. 3 mm wide, divaricate or slightly ascending; base slightly oblique to horizontal; attachment broadly elliptic, c. 3–5 mm long, slightly concave; apex slightly convex; spines 3 + 2 (rarely 6 spines), spreading, the 3 longer c. 5–8 mm long, the radicular pair to 5 mm long with 1 longer than the other; seed horizontal. **Fig. 19N.**

S.A.: NW, LE, FR, EA; W.A.; N.T.; N.S.W. Flowers and/or fruits: all months.

18. ***Sclerolaena diacantha*** (Nees) Benth., *Fl. Austral.* 5: 194 (1870). — *Anisacantha diacantha* Nees in Lehm., *Pl. Preiss.* 1: 635 (1845); *Kentropsis diacantha* (Nees) Moq. in A.DC., *Prod.* 13(2): 138 (1849); *Chenolea diacantha* (Nees) F.Muell., *Fragm.* 10: 91 (1876); *Bassia diacantha* (Nees) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882). — **Illustr.:** *Pl. W. N.S.W.* 251 (1982); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 59 (1988).

Rounded perennial to 30 cm high; branches closely tomentose; leaves semiterete, fleshy, 10–15 mm long, appressed-pubescent. **Flowers** solitary; perianth tomentose; stamens 5. **Fruiting** perianth depressed-spherical to pear-shaped, smooth, sparsely to densely tomentose; tube c. 2.5 mm high and wide including the deeply hollowed base which occupies the lower two-thirds; attachment oblique, elliptic, c. 3 mm long; limb inconspicuous, incurved; spines 2, laterally placed, c. 2 mm long, divergent; tubercle adjacent to a spine, inconspicuous to prominent, decurrent as a rib; seed horizontal; radicle ascending. **Grey copperburr, bassia. Fig. 19O, Pl. 16J.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL; W.A.; N.T.; Qld; N.S.W.; Vic. Usually found on slightly saline soil. Flowers: and/or fruits: in all months, especially June–Nov.

19. **Sclerolaena divaricata** (R.Br.) Sm. in Rees, *Cyclop.* 31: Sclerolaena no. 4 (1815). — *Anisacantha divaricata* R.Br., *Prodr.* 1: 410 (1810); *Bassia divaricata* (R.Br.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882). *A. erinacea* Moq. in A.DC., *Prodr.* 13(2): 122 (1849); *Bassia erinacea* W.R.Barker *et al.*, *J. Adelaide Bot. Gard. Suppl.* 1: 42 (2005), *nom. inval. pro syn.* — **Illustr.:** *Pl. W. N.S.W.* 252 (1982); G.R.Cochrane *et al.*, *Fl. & Pl. Victoria*, fig. 144 (1968).

Rounded perennial, glabrous except for the axillary pubescence; leaves terete, c. 10 mm long. **Flowers** solitary, glabrous outside except for the ciliate perianth lobes; stamens 3. **Fruiting** perianth glabrous, somewhat dorsiventrally compressed, appressed to the branch, cuneate-oblong, c. 2.5 mm long, firmly attached but eventually deciduous, straw-coloured; base slightly concave; attachment very oblique, ovate, slightly 2-spurred; spines 4 (the inner of the radicular pair much smaller than the others), spreading, slender, the 3 longer 5–15 mm long (2 spreading laterally and in line, 1 abaxially), the small inner radicular spine straight and parallel with its neighbour, 1–3 mm long; limb incurved; seed erect; radicle erect. **Poverty-bush, tangled copperburr, pale poverty-bush, tangled bassia. Fig. 19P.**

S.A.: NW, LE, GT, FR, EA, EP, MU; N.S.W.; Vic. Flowers and/or fruits: May–Nov.

S. ×caput-casuarii (J.H.Willis) A.J.Scott, *Feddes Repert.* 89: 111 (1978), is probably a hybrid between *S. divaricata* and *Osteocarpum acropterum*. (Basionym: *Bassia caput-casuarii* J.H.Willis, *Victorian Naturalist* 73: 153, 1957).

20. **Sclerolaena eriakantha** (F.Muell.) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 534 (1934). — *Kentropsis eriakantha* F.Muell., *Fragm.* 2: 140 (1861); *Bassia eriakantha* (F.Muell.) R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 328 (1923). — **Illustr.:** *P. W. N.S.W.* 252 (1982); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 61 (1988).

Much branched perennial c. 30 cm high; branches velvety; leaves alternate, succulent, semiterete, c. 15 mm long, appressed-villous to silky. **Flowers** solitary: perianth silky-villous; stamens 5. **Fruiting** perianth c. 4 mm high (excluding spines), densely long-silky-villous, usually fawn-coloured; attachment narrow-oblong, c. 3 mm long, oblique; base hollow, occupying about two-thirds of the perianth; tube dorsiventrally compressed; spines 2, obliquely erect, c. 6 mm long; tubercle prominent; limb erect but inflexed towards the apex; seed oblique to horizontal, depressed; radicle erect. **Silky copperburr. Fig. 19Q.**

S.A.: NW, LE, GT, FR, EA, EP; W.A.; N.T.; Qld; N.S.W. Flowers and/or fruits: probably all months, especially Jul.–Oct.

21. **Sclerolaena fontinalis** Paul G.Wilson in Jessop & Toelken, *Fl. S. Austral.* 1: 302 (1986).

Compact rounded perennial to 30 cm high; branches shortly, pilose; leaves scattered, mostly narrow-oblong, c. 7 mm long, 1–1.5 mm wide, sometimes becoming linear to 30 mm long with age, villous. **Flowers** solitary, bisexual; stamens 5. **Fruiting** perianth woody, villous; attachment basal, circular, 0.5–0.8 mm diam., slightly concave; tube broadly turbinate to cup-shaped, c. 1.5 mm high and 1.5–2 mm wide at the apex, smooth; upper surface more or less square, flat apart from the prominent erect chartaceous limb c. 2 mm high; spines 3 + 2, divaricate to ascending, acicular, 2 lateral and one adaxial c. 3.5 mm long, and an unequal adaxial radicular pair fused towards their bases c. 3 mm and c. 2 mm long; seed horizontal with centripetal radicle. **Fig. 19R.**

S.A.: LE. Flowers and/or fruits: Jul.–Aug. (few records).

(Rare status in S.A.)

22. **Sclerolaena fusiformis** Paul G.Wilson in A.S.George, *Fl. Austral.* 4: 329 (1984).

Dense rounded perennial to 20 cm high; glabrous except for slight pubescence in leaf axils; leaves fusiform 3–5 mm long, fleshy, passing at base into a very short flattened petiole. **Flowers** solitary; perianth glabrous except for slight pubescence on lobes; stamens 3. **Fruiting** perianth glabrous; attachment slightly oblique, c. 1 mm diam., tube shortly cylindrical (slightly dorsiventrally compressed), c. 1.5 mm high and wide; limb very small and slightly sunken; spines 2 + 2, slender; abaxial spines laterally placed, ascending, 6–8 mm long; adaxial radicular spines close together, c. 1 mm and 0.5 mm long, placed equidistant between the lateral spines; seed and radicle erect.

S.A.: NW; W.A.

(Vulnerable status in S.A.)

23. **Sclerolaena glabra** (F.Muell.) Domin, *Biblioth. Bot.* 89: 624 (1921). — *Kentropsis glabra* F.Muell., *Fragm* 1: 139 (1859); *B. glabra* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882). *Bassia andersonii* Ising, *Trans. & Proc. Roy. Soc. South Australia* 57: 185 (1933); *S. andersonii* (Ising) A.J.Scott, *Feddes Repert.* 89: 111 (1978). — **Illustr.:** F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 66, figs 2–5, 7–10 (1891).

Small rounded shrub to 0.4 m high, glabrous apart from the axillary pubescence. **Flowers** solitary; perianth glabrous except for the ciliate perianth-segments; stamens 5. **Fruiting** perianth, hard, glabrous; attachment oblique, circular, slightly hollowed; tube oblong (slightly broader at the apex), c. 2.5 mm long, dorsiventrally compressed; faintly ribbed; limb erect, with the tip inflexed, c. 1 mm high; spines 2 + 1 or 2 + 2, an opposite pair laterally placed and ascending, 3–7 mm long, a radicular spine curved adaxially, 1–2 mm long, usually with a collateral tubercle or small spine; embryo erect. **Fig. 20A.**

S.A.: NW, LE, FR, EA; W.A.; N.T.; Qld; N.S.W. Usually on heavy somewhat saline soil. Flowers and/or fruits: all months.

24. **Sclerolaena holtiana** (Ising) A.J.Scott, *Feddes Repert.* 89: 113 (1978). — *Bassia holtiana* Ising, *Trans. Roy. Soc. South Australia* 78: 111 (1955). *B. eichleri* Ising, *Trans. Roy. Soc. South Australia* 84: 96 (1961); *B. wilsonii* Ising, *Trans. Roy. Soc. South Australia* 88: 80 (1964); *S. eichleri* (Ising) A.J.Scott, *Feddes Repert.* 89: 112 (1978); *S. wilsonii* (Ising) A.J.Scott, *Feddes Repert.* 89: 114 (1978). — **Illustr.:** Ising, *Trans. Roy. Soc. South Australia* 78: 116, figs 17–19 (1955).

Perennial to 20 cm high; branches tomentose; leaves linear, c. 10 mm long, fleshy, silky, pilose. **Flowers** solitary; perianth tomentose; stamens 5. **Fruiting** perianth very closely white-tomentose, somewhat ribbed on the abaxial face; tube subglobular, gibbous, c. 2.5 mm high and wide including the deeply hollowed base, adaxial surface very convex, abaxial surface almost flat; attachment elliptic, c. 3 mm long; limb incurved and inconspicuous; spines 2, lateral, slender, to 7 mm long, divergent, sometimes very reduced; radicular tubercle inconspicuous, adjacent to a spine; seed oblique to erect or rarely horizontal. **Fig. 20B.**

S.A.: NW, LE, GT, FR, EA, EP, MU; N.T.; Qld. Flowers and/or fruits: Aug.–Oct.

Not clearly distinguishable from the *S. diacantha*-*S. uniflora* complex.

25. **Sclerolaena intricata** (R.H.Anderson) A.J.Scott, *Feddes Repert.* 89: 113 (1978). — *Bassia intricata* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 340 (1923). — **Illustr.:** *Pl. W. N.S.W.* 252 (1982).

Intricately branched dwarf shrub to 40 cm high, glabrous apart from the woolly-pilose leaf axils; leaves clavate and c. 5 mm long to slender and semiterete and to 10–15 mm long, acute. **Flowers** solitary perianth glabrous apart from the woolly-ciliate perianth-segments; stamens 5. **Fruiting** perianth hard, erect and appressed to the branch, persistent attachment very oblique; tube semicylindrical, dorsiventrally compressed, c. 3 mm high; limb erect, woolly-ciliate; spines 3 + 2, spreading to recurved, slender, 5–15 mm long (the inner of the radicular pair shorter); seed and radicle erect. **Poverty-bush, tangled poverty-bush. Fig. 20C, Pl. 16K.**

S.A.: LE, GT, FR, EA, EP, MU; N.T.; Qld; N.S.W. Flowers and/or fruits: Apr.–Dec.

26. **Sclerolaena johnsonii** (Ising) A.J.Scott, *Feddes Repert.* 89: 113 (1978). — *Bassia johnsonii* Ising, *Trans. Roy. Soc. South Australia* 88: 101 (1964).

Bushy intricately branched annual or perennial, glabrous; leaves slender, subterete or very narrowly fusiform, obtuse, 5–10 (–15) mm long. **Flowers** solitary, glabrous; stamens 4. **Fruiting** perianth hard, glabrous; attachment circular; base truncate, horizontal; tube shortly cylindrical, c. 1.5 mm high, c. 2 mm wide; apex convex; spines 3 + 2, horizontally spreading; radicular pair on a short lateral spur 2–3 mm long; the 3 principal spines either opposite or at right angles to the radicular pair, 5–7 mm long; seed horizontal; radicle ascending. **Johnsons copperburr. Fig. 20D.**

S.A.: NW, LE; W.A.; N.T.; Qld; N.S.W. Found on sand plains or sandy swales between dunes. Flowers and/or fruits: Apr.–May, Aug.–Sep. (few records).

27. **Sclerolaena lanicuspis** (F.Muell.) F.Muell. ex Benth., *Fl. Austral.* 5: 195 (1870). — *Anisocantha lanicuspis* F.Muell., *Fragm.* 2: 170 (1861); *Bassia lanicuspis* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882). — **Illustr.:** K.A.W. Williams, *Native Pl. Queensl.* 1: 29 (1980); F. Kutsche & B. Lay, *Fieldguide Pl. Outback S. Austral.* 202 (2003).

Woody perennial c. 25 cm high; branches tomentose; leaves flattened to subterete, 4–20 mm long, fleshy, pilose. **Flowers** solitary; perianth pilose; stamens 5. **Fruiting** perianth pilose all over, readily detached; attachment basal, circular, concave, 0.4–1.2 mm diam.; tube turbinate, dorsiventrally compressed, 1.5–3 mm long; limb erect, membranous; spines 3, rarely 4; 2 lateral erect, c. twice the length of the tube and 1 (or 2 collateral) adaxial and either erect and equal to the lateral spines or divaricate and shorter; seed and radicle erect. **Woolly copperburr, spinach burr. Fig. 20E, PL. 16L.**

S.A.: NW, LE, GT, FR, EA, EP; W.A.; N.T.; Qld; N.S.W.; Vic. Flowers and/or fruits: probably all months, especially Apr.–Oct.

A variable taxon possibly consisting of more than one species. *Sclerolaena × cristata* (Ising) A.J. Scott, *Feddes Repert.* 89: 112 (1978), is probably a hybrid between *S. lanicuspis* and *S. uniflora*. (Basionym: *Bassia cristata* Ising, *Trans. Roy. Soc. S. Austral.* 88: 79, 1964).

28. **Sclerolaena limbata** (J.M. Black) Ulbr., *Natiirl. Pflanzenfam.* ed. 2, 16c: 534 (1934). — *Bassia limbata* J.M. Black, *Trans. & Proc. Roy. Soc. S. Austral.* 46: 567 (1922). — **Illustr.:** *Pl. W. N.S.W.* 254 (1982).

Shrub to 1 m high, tomentose all over with shortly branched hairs; leaves slender, semiterete to clavate, 10–30 mm long, often recurved at the apex, fleshy. **Flowers** solitary; perianth tomentose. **Fruiting** perianth hard, tomentose; attachment basal, elliptic, c. 3.5 mm long; tube very shortly turbinate, c. 2 mm high and c. 3 mm wide at the apex; limb erect, cylindrical, shortly exceeding the tube; spines 2, divergent, 5–10 mm long; radicular tubercle prominent; seed horizontal; radicle ascending. **Pearl copperburr. Fig. 20F.**

S.A.: LE, GT, FR, EA, EP (W side of Flinders Ranges), YP; W.A.; N.T.; Qld; N.S.W. Found on heavy slightly saline soil. Flowers and/or fruits: probably all months, especially Apr.–Oct.

29. **Sclerolaena longicuspis** (F.Muell.) A.J. Scott, *Feddes Repert.* 89: 113 (1978). — *Bassia longicuspis* F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 74 (1891). — **Illustr.:** *Pl. W. N.S.W.* 254 (1982); F. Kutsche & B. Lay, *Fieldguide Pl. Outback S. Austral.* 206 (2003).

Rounded glabrous perennial to 60 cm high; leaves slender, trigonous in cross section, 2–3 cm long. **Flowers** solitary; perianth glabrous outside, woolly within; stamens 5. **Fruiting** perianth glabrous outside; attachment broad and expanded, the base somewhat spreading around the branch; tube cylindrical, narrowing towards the apex, c. 5 mm high and wide at the base; wall very thick, somewhat spongy on the outside, woody within; limb conical, c. 2 mm high, erect or inflexed at the tip; spines 2 (rarely to 4) + 1 (rarely 2), slender, ascending; lateral pair 20–30 mm long; adaxial radicular pair with one 5–10 mm long, the other minute or up to 2 mm long (or the longer radicular spine absent); 1 or 2 long abaxial spines sometimes present or these represented by a small tubercle. **Long-spined poverty-bush. Fig. 20G, PL. 16M.**

S.A.: NW, LE, GT, FR, EA; N.T.; Qld; N.S.W. Frequently found on hills in stony soil. Flowers and/or fruits: Mar.–Nov.

30. **Sclerolaena minuta** (Ising) A.J. Scott, *Feddes Repert.* 89: 113 (1978) — *Bassia minuta* Ising, *Trans. Roy. Soc. S. Austral.* 88: 89 (1964)

Low shrub to 20 cm high, branching from base; branches pilose; leaves flattened, narrowly ovate to very narrowly oblong, 5–10 mm long, villous. **Flowers** solitary; perianth villous; stamens 5. **Fruiting** perianth villous; attachment basal and oblique, minute; tube turbinate 1.5–3 mm long; apex truncate, slightly concave but with erect membranous limb in centre; spines 2, lateral, ascending 0.5–1.5 mm long, a pair of minute radicular tubercles also present or these developing short spines; seed and radicle erect.

S.A.: LE; W.A.; N.T.; Qld.

This species was recently discovered on Cordillo Downs Station.

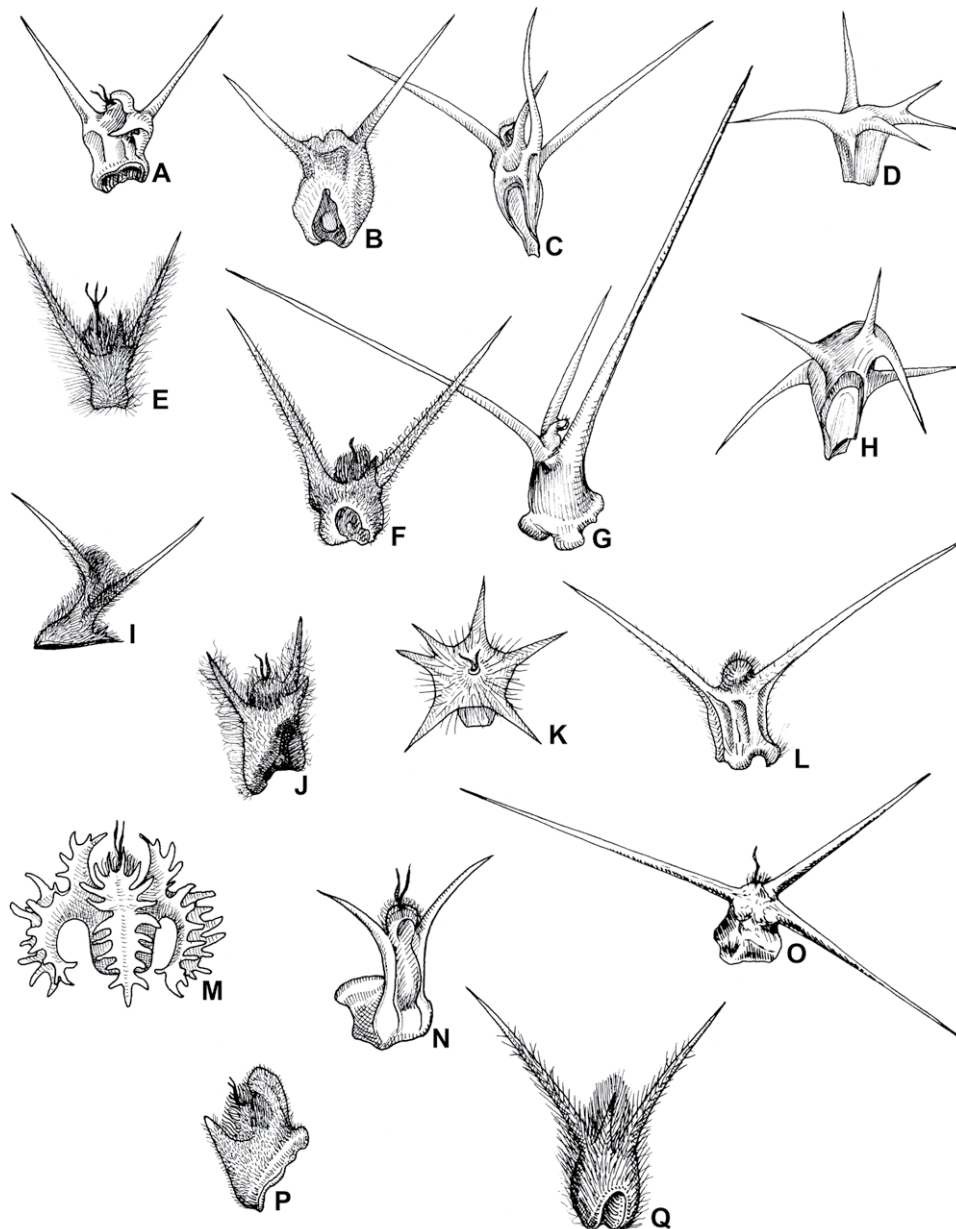


Fig. 20. *Sclerolaena* fruits: A. *S. glabra*; B. *S. holtiana*; C. *S. intricata*; D. *S. johnsonii*; E. *S. lanicuspis*; F. *S. limbata*; G. *S. longicuspis*; H. *S. muricata* var. *muricata*; I. *S. obliquicuspis*; J. *S. parallelicuspis*; K. *S. parviflora*; L. *S. patenticuspis*; M. *S. symoniana*; N. *S. tatei*; O. *S. tricuspis*; P. *S. uniflora*; Q. *S. ventricosa*. Illustration reproduced from *Flora of South Australia* 1: 299, Fig. 170 (1986), mainly based on *Flora of Central Australia* 68, Fig. 88 (1981).

31. ***Sclerolaena muricata*** (Moq.) Domin, *Biblioth. Bot.* 89: 623 (1921).

Rounded annual or perennial to 1 m high, intricately and divaricately branched, glabrous to villous or woolly; leaves flat, linear to narrow-oblong or elliptic, 5–15 (–25) mm long. **Flowers** solitary, glabrous to villous or minutely woolly; stamens 4. **Fruiting** perianth hard, glabrous to villous or minutely woolly; base truncate, very oblique, circular; tube very shortly cylindrical, c. 2 mm high and wide, steeply ascending, rounded at the apex; spines 3 + 2 or 3 + 1, 2 lateral, 1 abaxial, and a short adaxial radicular pair (or sometimes only 1 of the pair developed), the abaxial and lateral spines 5–10 mm long, the radicular spines 1–2 mm long; seed oblique to horizontal. **Five-spined bassia, black (or prickly) roly-poly.**

The following varieties evidently grade into each other.

1. Plant glabrous or almost so; leaves linear to very narrow-oblong..... 31a. ***S. muricata* var. *muricata***
- 1: Plant variously pubescent
 2. Leaves and branches sparsely appressed-hirsute; leaves narrowly elliptic to elliptic .
..... 31b. ***S. muricata* var. *semiglabra***
 - 2: Branches minutely woolly, leaves villous, flat, linear to very narrowly elliptic..... 31c. ***S. muricata* var. *villosa***

- 31a. **Sclerolaena muricata** (Moq.) Domin var. **muricata** — *Anisacantha muricata* Moq., *Chenop. Monogr. Enum.* 84 (1840); *A. quinquecuspsis* F.Muell., *Defin. Austral. Pl.* 52 (1855); *Chenolea quinquecuspsis* (F.Muell.) F.Muell., *Fragm.* 10: 91 (1876); *Bassia quinquecuspsis* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882).
Plant glabrous (or almost so), glaucous; leaves flat, linear to narrow-elliptic, 5–15 (–25) mm long. **Fruiting** perianth glabrous. **Fig. 20H**.
S.A.: NW, LE, GT, FR, MU, SL; N.T.; Qld; N.S.W.; Vic. Flowers: arid/or fruits: Mar.–Dec.
- 31b. **Sclerolaena muricata** var. **semiglabra** (Ising) A.J.Scott, *Feddes Repert.* 89: 113 (1978). — *Bassia quinquecuspsis* var. *semiglabra* Ising, *Trans. Roy. Soc. S. Austral.* 88: 97 (1978).
Plant sparsely appressed-hirsute at least when young; leaves elliptic to narrow-elliptic, 5–10 mm long. **Fruiting** perianth sparsely woolly when young.
S.A.: ?NW, FR, NL, MU, SL; Qld; N.S.W.; Vic. Flowers and/or fruits: not available.
Identification of specimens from NW needs to be confirmed.
- 31c. **Sclerolaena muricata** var. **villosa** (Benth.) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 533 (1934). — *Anisacantha muricata* var. *villosa* Benth., *Fl. Austral.* 5: 199 (1870); *Bassia quinquecuspsis* var. *villosa* (Benth.) J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 39: 828 (1915).
Branches sparsely woolly; leaves linear to narrow-elliptic, villous. **Fruiting** perianth sparsely woolly.
S.A.: NL, MU, YP, SL, SE; Qld; N.S.W.; Vic. Flowers and/or fruits: Apr.–May, Jul., Oct.–Dec.
(Rare status in S.A.)
32. **Sclerolaena obliquicuspsis** (R.H.Anderson) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 533 (1934). — *Bassia obliquicuspsis* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 337 (1923). — **Illustr.:** *Pl. W. N.S.W.* 255 (1982); G.R.Cochrane *et al.*, *Fl. & Pl. Victoria*, fig. 146 (1968); A.A.Mitchell & D.G.Wilcox, *Pl. Arid Shrubl. W. Austral.* 65 (1988); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 203 (2003).
Small shrub c. 30 cm high; branches closely woolly; leaves linear to narrow-elliptic, 6–10 mm long, obtuse, fleshy, closely woolly to appressed-pilose, the hairs minutely asperulate. **Flowers** solitary; perianth shortly and closely woolly; stamens 5. **Fruiting** perianth closely woolly; attachment basal, narrowly elliptic, c. 4 mm long, shortly spurred along the stem above and below the tube; tube broadly oblong, c. 2 mm high; limb erect but inconspicuous; spines 2, obliquely spreading in different vertical planes, the radicular spine inclined abaxially and the other adaxially, c. 5 mm long, tomentose towards the base; radicular tubercle small, at the base of the abaxial spine; seed and radicle erect. **Limestone copperburr, oblique-spined bassia. Fig. 20I, Pl. 17A–B**.
S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP; W.A.; N.T.; N.S.W.; Vic. Flowers and/or fruits: probably in all months.
This species grades into both *S. brevifolia* and *S. patenticuspsis*.
33. **Sclerolaena parallelicuspsis** (R.H.Anderson) A.J.Scott, *Feddes Repert.* 89: 114 (1978). — *Bassia parallelicuspsis* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 331 (1923); *Austrobassia parallelicuspsis* (R.H.Anderson) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 532 (1934).
Rounded perennial to 20 cm high; branches woolly; leaves slender, semiterete, 7–15 mm long, silky-villous, fleshy. **Flowers** solitary; perianth densely woolly-villous; stamens 5. **Fruiting** perianth closely woolly; tube oblong, c. 3 mm high and wide, curved upwards, dorsiventrally compressed, expanded into a hollow base, with an elliptic attachment, c. 5 mm long; limb short, erect, obscured by the indumentum; spines 2, lateral, parallel and erect, 1–3 mm long, somewhat obscured by the indumentum; radicular tubercle prominent, adjacent to 1 of the spines; seed and radicle oblique. **Western copperburr. Fig. 20J**.
S.A.: NW, LE, GT, FR, EA; N.T.; Qld; N.S.W. Flowers and/or fruits: June–Nov.

34. **Sclerolaena parviflora** (R.H.Anderson) A.J.Scott, *Feddes Repert.* 89: 114 (1978). — *Bassia parviflora* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 347 (1923). — **Illustr.:** *Pl. W. N.S.W.* 256 (1982).

Erect woody perennial to 30 cm high, sparsely appressed-hirtellous; branches slender; leaves narrowly ellipsoid and 2–3 mm long or slender and subterete and to 6 mm long, fleshy. **Flowers** solitary, perianth hirtellous, stamens 5. **Fruiting** perianth hard, very shortly cylindrical or broadly turbinate, smooth or ribbed, c. 1 mm high and 1.5 mm wide, sparsely appressed-hirtellous to glabrous, glossy; apex truncate; base rounded, sometimes hollowed; attachment circular, limb depressed and inconspicuous; spines 4 + 2, 1–2 mm long (the radicular pair often shorter than the others), radiating; seed horizontal. **Mallee copperburr, small-flower bassia. Fig. 20K, Pl. 17C.**

S.A.: NW, LE, NU, GT, EA, EP, NL, MU; W.A.; N.T.; N.S.W.; Vic. Flowers and/or fruits: Feb.–Oct.

35. **Sclerolaena patenticuspis** (R.H.Anderson) Ulbr., *Natiirl. Pflanzenfam.* ed. 2, 16c: 534 (1934). — *Bassia patenticuspis* R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 338 (1923). *Sclerolaena diacantha* var. *longispina* Benth., *Fl. Austral.* 5: 195 (1870), partly.

Rounded perennial c. 20 cm high; branches pubescent with short curled cottony hairs; leaves linear to semiterete, 5–10 mm long, villous with simple hairs. **Flowers** solitary, perianth shortly villous; stamens 5. **Fruiting** perianth shortly and sparsely pilose; attachment oblique, circular or elliptic; tube shortly oblong, c. 1.5 mm high and wide, sometimes spreading at the base, adaxial surface concave, abaxial surface flat or convex; limb erect, c. 1 mm high; spines 2, laterally placed, ascending in nearly the same vertical plane, 4–7 mm long (rarely very reduced or absent); radicular tubercle very small and on the adaxial side of one of the spines; seed and radicle erect. **Spearfruit copperburr, spear-fruit bassia. Fig. 20L.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP; W.A.; N.T.; N.S.W.; Vic. Flowers and/or fruits: probably all months, especially Jul.–Oct.

A rather polymorphic species. Ising (1964) noted a form found principally in the Nullarbor Plain in which 1 or both spines were weakly developed, or were represented merely by small tubercles. In this variant the development of the spines is very variable even on the same plant.

36. **Sclerolaena stelligera** (F.Muell.) S.W.L.Jacobs — *Kochia stelligera* (F.Muell.) Benth., *Fl. Austral.* 5: 189 (1870); *Bassia stelligera* (F.Muell.) F.Muell., *Iconogr. Austral. Salsolac. Pl.* 7: t. 68 (1891); *Stelligera endecaspinis* A.J.Scott, *Feddes Repert.* 89:115 (1978). — **Illustr.:** *Pl. W. N.S.W.* 257 (1982).

Straggly shrub to 0.5 m high; branches woolly; leaves linear, somewhat fleshy, 5–10 mm long, woolly-villous. **Flowers** solitary, perianth urceolate, shortly 5-lobed; stamens 5. **Fruiting** perianth subglobular, hard with an obvious radicular tube, attachment circular, c. 2.5 mm diam., glabrous apart from the woolly ciliate margins to the lobes; apex with a narrow horizontal wing, c. 3 mm diam. (including spines), margin from crenate-dentate to c. 11-spined; seed horizontal, circular. **Star-fruit bassia, star copperburr, starred bluebush. Fig. 21.**

S.A.: MU; Qld; N.S.W.; Vic. Flowers and/or fruits: all months.

37. **Sclerolaena symoniana** (Ising) A.J.Scott, *Feddes Repert.* 89: 114 (1978). — *Bassia symoniana* Ising, *Trans. Roy. Soc. South Australia* 88: 75 (1964).

Rounded shrub c. 30 cm high; branches velvety; leaves linear, trigonous, to 30 × 2–3 mm, silky, succulent.

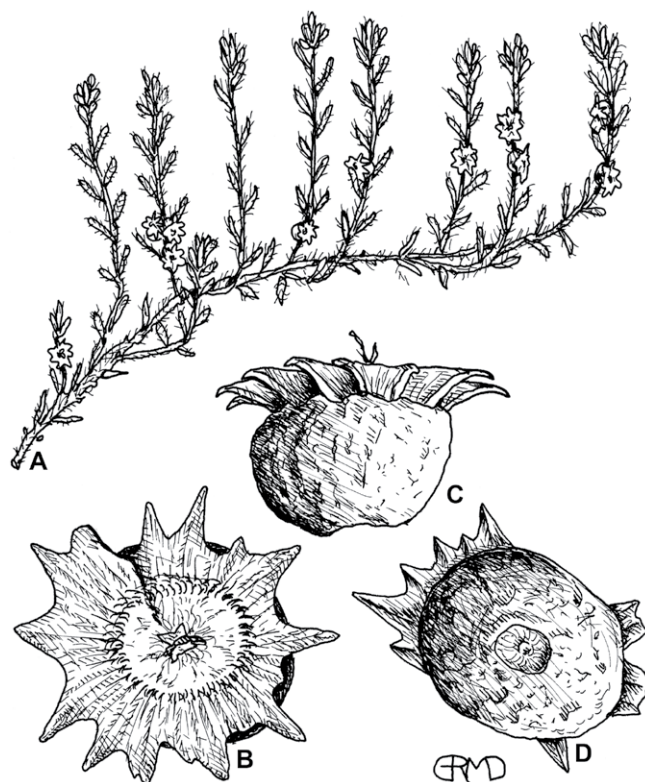


Fig. 21. *Sclerolaena stelligera*: A, twig; B–D, three views of fruit. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 291, Fig. 165 (1986).

Flowers in pairs; perianth pubescent, 5-lobed; stamens 5. **Fruiting** perianth hard, sparsely pubescent; base solid, truncate, c. 1.5 mm high and wide, attachment circular, c. 2 mm diam.; tube shortly cylindrical, c. 1 mm high, bearing 2 series of appendages; appendages opposite the perianth-segments 5, erect, lanceolate, 2–3 mm long, spiny; appendages between the segments 4–12, recurved, fan-shaped, c. 3 mm long, fimbriate, with pungent spines; seed horizontal; radicle centrifugal. **Fig. 20M.**

S.A.: NW, NU, GT; W.A.; N.T. Found on sandy margins of salt lakes. Flowers and/or fruits: all months.

Closely related to *S. fimbriolata* (F.Muell.) A.J.Scott, and possibly conspecific with that species.

(Vulnerable status in S.A.)

38. **Sclerolaena tatei** (F.Muell.) A.J.Scott, *Feddes Repert.* 89: 114 (1978). — *Bassia tatei* F.Muell., *Victorian Naturalist* 7: 66 (1890); *Austrobassia tatei* (F.Muell.) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 532 (1934). — **Illustr.:** F.Muell., *Iconogr. Austral. Salsolac. Pl.* t. 71 (1891); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 125 (2003).

Rounded perennial c. 50 cm high, predominantly dioecious; branches closely woolly; leaves opposite or subopposite, suborbicular (when short) to semiterete, 5–15 mm long, thick and fleshy with a broad sessile base, shortly appressed-villous, the hairs slightly asperulous. **Flowers** solitary; perianth sparsely pilose; male flower: stamens 5, pistillode with stigmas shortly exerted; female flower: stamens absent, pistil with stigmas slender and long-exserted. **Fruiting** perianth thin and weakly crustaceous, red to straw-coloured; tube oblong, c. 3 mm long and 2 mm wide, very compressed dorsiventrally, glabrous, curving upwards, expanded into a broad spongy hollow base c. 3 mm diam.; limb shortly pubescent, erect, forming a short crest; spines 2, lateral, parallel and erect, to 1 mm long, sometimes with a small radicular spine adjacent to 1 of the lateral, or spines absent; seed and radicle erect. **Fig. 20N, Pl. 17D–E.**

S.A.: LE, GT, FR, EA. Found mainly between Lake Torrens and the Flinders Ranges. Flowers and/or fruits: Jul.–Oct.

39. **Sclerolaena tricuspis** (F.Muell.) Ulbr., *Natürl. Pflanzenfam.* ed. 2, 16c: 534 (1934). — *Anisacantha tricuspis* F.Muell., *Defin. Austral. Pl.* 51 (1855); *Chenolea tricuspis* (F.Muell.) F.Muell., *Fragm.* 10: 92 (1876); *Bassia tricuspis* (F.Muell.) R.H.Anderson, *Proc. Linn. Soc. New South Wales* 48: 335 (1923). — **Illustr.:** *Pl. W. N.S.W.* 257 (1982); G.R.Cochrane *et al.*, *Fl. Pl. Victoria*, fig. 145 (1968).

Shrub to 1 m high, glabrous apart from the pubescence in the leaf axils; leaves slender, terete, 10–20 mm long. **Flowers** solitary; perianth glabrous or sparsely puberulent; stamens 5. **Fruiting** perianth glabrous, standing almost at right angles to the branch or ascending; base horizontal, expanded; tube shortly cylindrical, c. 2 mm high and wide; limb conical; spines 3, symmetrically placed around the apex of the tube, slender, spreading, c. 10 mm long; seed and radicle horizontal to slightly oblique. **Streaked poverty-bush, three-spined bassia, giant redburr. Fig. 20O.**

S.A.: LE, FR, MU; Qld; N.S.W.; Vic. Flowers and/or fruits: probably all months.

40. **Sclerolaena uniflora** R.Br., *Prodr.* 410 (1810). — *Bassia uniflora* (R.Br.) F.Muell., *Syst. Census Austral. Pl.* 1: 30 (1882).

Perennial herb to 20 cm high branches closely and densely tomentose; leaves congested, narrowly oblong, broader towards the apex, c. 10 mm long, thick, densely silky-pubescent, fawn but becoming grey with age. **Flowers** solitary, perianth closely tomentose; stamens 5. **Fruiting** perianth depressed-globose to pear-shaped, closely tomentose; tube c. 2.5 mm high and wide including the hollow base which occupies the lower two-thirds; attachment oblique, circular, c. 1.5 mm diam.; limb inconspicuous, incurved; spines 2, laterally placed, to 1 (–2) mm long, erect and almost parallel, one or both sometimes absent; tubercle prominent, adjacent to a spine, slightly exceeding the limb; seed horizontal; radicle ascending. **Bassia. Fig. 20P.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL, KI; W.A.; N.T.; N.S.W.; Vic. Flowers and/or fruits: probably in all months.

Very similar to *S. diacantha* with which it may intergrade. *S. ×aellenii* (Ising) A.J.Scott, *Feddes Repert.* 89: 111 (1978), is probably a hybrid between *S. uniflora* and *Threlkeldia diffusa*. (Basionym: *Bassia aellenii* Ising, *Trans. Roy. Soc. South Australia* 88: 88, 1964).

41. **Sclerolaena ventricosa** (J.M.Black) A.J.Scott, *Feddes Repert.* 89: 114 (1978). — *Bassia ventricosa* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 46: 566 (1922). — **Illustr.:** *Pl. W. N.S.W.* 259 (1982).

Compact perennial c. 30 cm high; branches loosely woolly; leaves slender, terete or semiterete, 10–15 mm long, appressed-villous to glabrous. **Flowers** solitary; perianth tomentose; stamens 5. **Fruiting** perianth pilose; attachment small, circular, c. 0.5 mm diam.; tube barrel-shaped to shortly cylindrical, rounded at the base, c. 3 mm high and wide, faintly ribbed; limb erect, conical, c. 1.5 mm high, not hardened; spines 2 + 1 or 2 + 2 (rarely 3 + 2); the 2 major spines laterally placed, ascending to divergent, c. 5 mm long; the radicular spines 1 or 2, adaxially placed, up to 1 mm long or reduced to a small tubercle; seed horizontal; radicle ascending **Salt copperburr.** **Fig. 20Q.**

S.A.: LE, GT, FR, EA, EP; Qld; N.S.W.; Vic. Flowers and/or fruits: mainly June-Oct.

Sclerolaena xlanata (Ising) A.J. Scott, *Feddes Repert.* 89: 113 (1978), is possibly a hybrid involving *S. ventricosa*. (Basionym: *Bassia lanata* Ising, *Trans. Roy. Soc. South Australia* 93: 121, 1969).

21. SUAEDA

Forssk. ex Scop., *Introd. Hist. Nat.* 333 (1777).

(From the Arabic name for *Suaeda aegyptiaca*.)

Herbs or small shrubs, glabrous to sparsely puberulent; leaves alternate, narrow and succulent, entire. **Flowers** in axillary clusters of 1–3 or more, subtended by 2 or 3 small scarious scale-like bracteoles; perianth succulent, slightly to deeply 5-lobed, unchanged or becoming enlarged and sometimes crustaceous in fruit; stamens 5, hypogynous or attached to the perianth tube; ovary free from or rarely united to the perianth, hemispherical to conical. **Pericarp** membranous or slightly succulent; seed horizontal or erect, lenticular; embryo in a plane spiral; perisperm slight or absent; testa crustaceous or membranous. **Seablites.**

A genus of over 100 species most of which are found in the Northern Hemisphere. 5 species occur in Australia of which 2 are endemic.

1. Ovary adnate to the lower half of the perianth; seed erect 1. **S. aegyptiaca**
 1: Ovary free from the perianth; seed horizontal or both horizontal and erect
 2. Leaves without a pellucid margin, acute or obtuse; perianth rounded on the back but not inflated; seeds all horizontal 2. **S. australis**
 2: Leaves with a pellucid margin, acute; perianth becoming inflated; seed both horizontal and erect 3. **S. baccifera**

1. ***Suaeda aegyptiaca** (Hasselq.) Zohary, *J. Linn. Soc., Bot.* 55: 635 (1957). — *Chenopodium aegyptiacum* Hasselq., *Iter Palaest.* 460 (1757). *S. baccata* Forssk., *Fl. Aegypt.-Arab.* 69 (1775), *nom. inval.*; *S. baccata* Forssk. ex J.F.Gmel., *Syst. Nat.* ed. 13[bis], 2: 503 (1791).

Decumbent to erect annual or perennial branching from the base, glabrous (or sparsely puberulent when young); leaves semiterete, incurved, obtuse, c. 10 × 1 mm. **Flowers** in axillary clusters forming long dense spicate inflorescences. **Fruiting** perianth turbinate, connate in the basal half to the semi-inferior ovary; lobes spongy-baccate, inflated; free portion of the ovary narrow-conical, truncate; stigmas 3, slender, c. 0.5 mm long, white when dry; style minute; seed erect, broadly ovate, c. 1.5 mm long; testa glossy, black.

S.A.: *EP, *NL. Native to North Africa and Arabia. Found around salt marshes. Flowers and/or fruits: probably all year.

This species is generally referred to as an annual herb, but evidently living for 10 or more years in S.A. Established in Pt Pirie from 1923, and more recently in Pt Augusta and Whyalla.

2. **Suaeda australis** (R.Br.) Moq., *Ann. Sci. Nat.* 23: 318 (1831). — *Chenopodium australe* R.Br., *Prodr.* 407 (1810); *S. maritima* var. *australis* (R.Br.) Domin, *Biblioth. Bot.* 89: 626 (1921). *Chenopodium insulare* J.M.Black, *Trans. Roy. Soc. South Australia* 69: 309 (1945).

Rounded perennial branching from the base, glabrous; leaves slender and semiterete and c. 30 mm long to thick and fusiform and c. 10 mm long, acute or obtuse, succulent. **Flowers** in axillary clusters, bisexual or sometimes



Fig. 22. A–C, *Suaeda baccifera*: A, branch; B, fruit; C, seed. **D–G, *S. australis***: D, branch; E, male flower; F, female flower; G, fruit. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 309, Fig. 173 (1986).

unisexual. **Fruiting** perianth divided to near the base, depressed-spherical, c. 3 mm diam.; lobes succulent, rounded on the back; ovary free, depressed-globular passing into a stout style, c. 0.5 mm long; stigmas 2 or 3, slender; seed horizontal, lenticular, c. 1 mm diam.; testa smooth, glossy, reddish-brown; perisperm slight, on the upper and lower side of the embryo. **Austral seablite**. **Fig. 22D–G, Pl. 17G–L.**

S.A.: LE, EP, NL, MU, YP, SL, KI, SE; W.A.: Qld; N.S.W.; Vic.; Tas. Found in coastal saltmarshes. Flowers and/or fruits: all months, especially Jan.–June.

A very variable species that has sometimes been treated as a variant of *S. maritima* (L.) Dumort., a polymorphic Northern Hemisphere annual. Populations from near the Murray River in S.A. and neighbouring N.S.W. and Vic. correspond closely to *S. maritima* and may represent an introduction of that species.

3. ****Suaeda baccifera*** Pall., *Ill. Pl.* 48, t. 41 (1803). — **Illustr.:** *Pl. W. N.S.W.* 280 (1982), as *Suaeda* sp.

Procumbent to suberect annual or short-lived perennial, to 0.5 m high, glaucescent, glabrous; leaves narrow-oblong (plano-convex) to semiterete, acute, sometimes bristle-tipped, 8–15 × c. 1.5 mm, pellucid on the margin, congested on lateral branches. **Flowers** bisexual and female, in axillary clusters forming slender dense inflorescences with somewhat flexuose branches. **Fruiting** perianth depressed-globular, to 3.5 mm diam., lobed to near the base; segments hooded, eventually inflated, retaining their shape on drying; ovary free, narrow-conical, with a truncate apex; seed erect or horizontal, circular to broad-elliptic, biconvex, c. 1 mm wide; testa crustaceous, glossy, a dark reddish-brown to black. **Fig. 22A–C, Pl. 17M.**

S.A.: *GT, *EP, *NL, *SL, *SE; *W.A.; *N.S.W.; *Vic. Native to Russia. Grows in heavy slightly saline soil in disturbed situations. Flowers and/or fruits: Jan.–May.

22. TECTICORNIA Hook.f.

in Benth. & Hook.f., *Gen. Pl.* 3: 65 (1880).

(Latin *tectum*, roof, referring to the bracts; and *cornu*, horn, alluding to relationship to *Salicornia*.)

Pachycornia Hook.f. in Benth. & Hook.f., *Gen. Pl.* 3: 65 (1880); *Sclerostegia* Paul G.Wilson, *Nuytsia* 3: 17 (1980); *Halosarcia* Paul G.Wilson, *Nuytsia* 3: 28 (1980).

Glabrous annual or perennial herbs or shrubs, appearing leafless; branches of cylindrical, barrel-shaped or obovoid segments (internodes); vegetative articles (segments) succulent, very shortly bilobed at the apex, the lobes representing the reduced opposite leaves; apex rounded or truncate, margins entire or ciliate. **Inflorescence** a terminal or lateral spike-like thyse comprising opposite pairs of (1–) 3 (–7) flowered cymules in the axils of bracts or scattered among vegetative articles; bracts opposite, fused or occasionally free, succulent; flowers sessile, bisexual or andromonoecious (bisexual central floret with male lateral florets), rarely dioecious or female only; perianth gamopetalous, lobes 2–3, adaxial lobe absent; stamens 1, abaxial or absent. **Fruiting** perianth membranous, spongy, pithy, crustaceous or corneous; pericarp free or fused to the perianth; fruits exposed above subtending bract or covered, free or fused to lateral fruits, apex acute or truncate; seed circular to ovoid, with or without a beak; testa membranous to crustaceous, smooth or ornamented; perisperm abundant. **Samphires**.

38 species all occurring in Australia, but with *T. australasica* extending to New Guinea and Java, and two subspecies of *T. indica*, widespread on mainland Australia, but also in southern Asia and East Africa.

The previous edition of the Flora (Wilson 1986) treated *Halosarcia*, *Pachycornia* and *Sclerostegia* as separate genera. These are now incorporated into *Tecticornia* (Shepherd & Wilson 2007).

1. Leaf lobes prominent with a clear lateral line in upper two thirds; spikes broadly ovoid 20. **T. triandra**
- 1: Leaf lobes obscure, without a clear lateral line; spikes, narrow cylindrical, ellipsoid or ovoid
 2. Cymules 3–flowered, andromonoecious (bisexual central floret with male lateral florets)
 3. Flowers in spikes with opposite bracts free from each other; central floret much larger than lateral ones in each cymule; perianth apex truncate..... 4. **T. disarticulata**
 - 3: Flowers in spikes with opposite bracts united, or the flowers in axils along the branches; florets equal in size in each cymule; perianth apex acute
 4. Perianth fleshy; style hard and protruding in fruit (especially when dry) 1. **T. arbuscula**
 - 4: Perianth membranous; style not protruding in fruit
 5. Vegetative articles and bracts dissimilar; mature bracts becoming thick and woody; pericarp woody, embedded in lignified stem axis..... 19. **T. tenuis**
 - 5: Vegetative articles and bracts similar; mature bracts becoming pithy; pericarp crustaceous, adherent to stem axis
 6. Vegetative article lobes markedly denticulate; mature bracts cylindrical 11. **T. medullosa**
 - 6: Vegetative article lobes entire; mature bracts globular to ovoid 12. **T. moniliformis**
 - 2: Cymules 3–7 flowered, bisexual
 7. Opposite bracts of flowering spike free or almost free from each other
 8. Spikes lateral (rarely a small terminal spike) sessile and at right angles to the axis..... 22. **T. verrucosa**
 - 8: Spikes terminal
 9. Seed pale brown, with small tuberculate bumps over the outer margin 5. **T. flabelliformis**
 - 9: Seed white to pale brown with prominent uneven scale-like ribs all over ..
..... 17. **T. pterygosperma** subsp. **pterygosperma**
 - 7: Opposite bracts of flowering spike united
 10. Perianth apex rounded to truncate
 11. Seed white, with scale-like ribs
 12. Spikes long and slender, even in outline; seed with smooth ribs on the outer margin, white to pale brown 9. **T. lepidosperma**
 - 12: Spikes short, undulate in outline; seed with uneven ribs all over, white to cream..... 17. **T. pterygosperma** subsp. **pterygosperma**
 - 11: Seed brown to dark reddish brown with various ornamentation
 13. Seed a dark reddish-brown to black, covered with dense bumps in concentric ribs..... 14. **T. pergranulata**
 - 13: Seed brown, variously tuberculate with small bumps on the outer margin
 14. Bracts denticulate or ciliolate; cymules 3–7-flowered

15. Cymules 3-flowered; seed with small bumps on the outer margin..... 7. **T. halocnemoides**
- 15: Cymules 3–7-flowered; seed concentrically ridged on the outer margin..... 15. **T. pluriflora**
- 14: Bracts entire; cymules 3-flowered
16. Branches and spikes very slender, smooth in outline (resembling Casuarinaceae branchlets); fruit apex mammillate 10. **T. lylei**
- 16: Branches undulate in outline
17. Fruitlets falling entire (not tearing at the base to expose the seed); abaxial perianth lobe external 6. **T. fontinalis**
- 17: Fruitlets tearing at the base to expose the seed; abaxial perianth lobe internal..... 7. **T. halocnemoides**
- 10: Perianth dorsiventrally flattened at the apex
18. Margins of articles and of bracts denticulate or ciliate
19. Perianth in fruit pithy; pericarp horny all over; fruitlets entire (not torn at the base)..... 8. **T. indica**
- 19: Perianth thin in fruit, membranous or cartilaginous; pericarp membranous (at least towards the base); fruitlets tearing at the base to expose the seed..... 13. **T. nitida**
- 18: Margins of articles and bracts entire
20. Perianth pithy in fruit; pericarp horny (at least towards the apex)..... 8. **T. indica**
- 20: Perianth various (but not pithy) in fruit
21. Perianth papery or soft at maturity; fruitlets free from each other 3. **T. cupuliformis**
- 21: Perianth crustaceous at maturity; fruitlets free or united
22. Pericarp thickened forming an elliptic cap positioned along the outer axis of the seed 2. **T. calyptrata**
- 22: Pericarp thinly crustaceous surrounding the seed sometimes absent towards the base
23. Spike 1–3 (7) nodes long; vegetative growth continuing at apex; fruitlets united laterally 18. **T. syncarpa**
- 23: Spike > 4 nodes long, vegetative growth not continuing at apex; fruitlets free
24. Spike outline even to slightly undulate; bract margin truncate or undulate, cup-shaped at the fruiting stage; fruitlets crustaceous, areolate to muricate; spikes terminal..... 16. **T. pruinosa**
- 24: Spike outline uneven; bract margin strongly undulate, shrivelled at the fruiting stage; fruitlets spongy to crustaceous sometimes glossy; spikes lateral, sometimes terminal.. 21. **T. undulata**

1. **Tecticornia arbuscula** (R.Br.) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 325 (2007). — *Salicornia arbuscula* R.Br., *Prodr.* 411 (1810); *Arthrocnemum arbuscula* (R.Br.) Moq., *Chenop. Monogr. Enum.* 113 (1840); *Sclerostegia arbuscula* (R.Br.) Paul G.Wilson, *Nuytsia* 3: 20 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 81, fig 13A–D (1980).

Much branched shrub to 2 m high, with ascending branches; articles obovoid, c. 5 mm long, shortly lobed. **Spikes** of 2–6 articles, succulent; bracts united in opposite pairs and almost enclosing the flowers; flowers vertical to axis, intimately fused to each other; lateral (male) flowers smaller than the central (bisexual) flower. **Perianth** shrivelled, weak; pericarp thick and hard, deltoid in lateral view and passing into the hard persistent exerted style; seed elliptic, c. 1.5 mm long; mature spike persisting for some time and eventually breaking up into its separate articles. **Shrubby glasswort. Fig. 23A–C, Pl. 18A–C.**

S.A.: EP, NL, MU, YP, SL, KI, SE; W.A.; N.S.W.; Vic.; Tas. Principally a species of coastal salt marshes. Flowers and/or fruits: all months.

2. **Tecticornia calyptрата** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 325 (2007). — *Halosarcia calyptрата* Paul G.Wilson, *Nuytsia* 3: 62 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 100, fig. 32 (1980).

Divaricately-branched shrub to 1 m high; branches slender; articles barrel-shaped to obovoid, c. 6 mm long, 3 mm diam., dull to glaucous; lobes rounded, entire. **Spikes** terminal (sometimes continuing growth vegetatively) or sessile and axillary, narrowly cylindrical, 10–20 mm long (rarely to 40 mm); axis thick and woody; bract pairs shortly barrel-shaped, c. 3 mm high, truncate; flowers obscured, fused to each other; perianth vertical to axis, succulent, dorsiventrally compressed towards apex, splitting at anthesis into lateral halves. **Fruiting** spike persistent; bracts and perianth crustaceous; pericarp thick and crustaceous at apex forming a cap to seed, membranous towards base; style base hard and persistent; seed ovoid, 1 mm long, testa thin, pale brown.

S.A.: EP; W.A.; N.T.

Grows in open depressions on plains in low shrubland on silty clay loams.

3. **Tecticornia cupuliformis** K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 326 (2007). — *Halosarcia cupuliformis* Paul G.Wilson, *Nuytsia* 3: 61 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 100, fig. 32 (1980).

Small shrub c. 25 cm high; branches slender; articles narrow-cylindrical, c. 10 mm long; lobes rounded, shortly acuminate, entire. **Spikes** terminal, narrow-cylindrical, to 80 mm long, c. 4 mm diam.; bract-pairs cup-shaped, loosely imbricate when dry; lobes obtuse and shortly acuminate; flowers obscured, adherent to each other and to the upper bract, vertical to axis; perianth succulent, divided on the abaxial surface into lateral halves; apex dorsiventrally compressed. **Fruitlets** eventually free; perianth weakly pithy, separating into lateral halves; pericarp membranous; seed ovate, c. 1.2 mm long; testa membranous, minutely tuberculate over the embryo, pale brown. **Pl. 18D–G.**

S.A.: LE; Qld. Commonly occurs on gibber plains in depressions or along drainage lines especially on gypseous clays. Flowers and/or fruits: Jan.

(Vulnerable status in S.A.)

4. **Tecticornia disarticulata** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 326 (2007). — *Sclerostegia disarticulata* Paul G. Wilson, *Nuytsia* 3: 19 (1980). — **Illustr.:** P.G.Wilson, *Nuytsia* 3: 80, fig. 12 (1980).

Divaricately branched rounded shrub to 1.5 m high; articles barrel-shaped to obovoid, 3–6 mm long, dull to bright-green (often black when dry). **Spikes** narrow-cylindrical, mostly 5–10 mm long, 3–4 mm diam.; opposite bracts free from each other (rarely slightly united); flowers horizontal to the spike axis, intimately fused to each other; apex (outer exposed surface) of each triad truncate, triangular; lateral (male) flowers small, fused to large central (bisexual) flower. **Pericarp** broadly obovoid, c. 1.7 mm long, horny all over, surrounded by the thin succulent perianth; seed ovoid, c. 1.5 mm long; mature spike breaking up into separate bracts and triads (the latter composed of the fruit fused to the small male flowers); pericarp eventually splitting longitudinally to release the seed. **Fig. 23D–E, Pl. 18H.**

S.A.: NW, LE, NU, GT, FR, EA, EP, YP, ?SL; W.A.; N.T.; N.S.W. Usually found in strongly alkaline or slightly saline soil. Flowers and/or fruits: June–Dec., Feb.

5. **Tecticornia flabelliformis** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 326 (2007). — *Halosarcia flabelliformis* Paul G. Wilson, *Nuytsia* 3: 52 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 92, fig. 24G–H (1980).

Woody perennial to 20 cm high; branches ascending; articles narrow-obovoid to barrel-shaped, c. 5 mm long, c. 2.5 mm wide, dull to glossy; lobes almost truncate, entire. **Spikes** terminal, cylindrical, 20–40 mm long; opposite bracts free from each other; flowers horizontal to the spike axis, free; perianth succulent; apex truncate; lateral lobes prominent; abaxial lobe very small, overlapped by the laterals. **Fruiting** spike eventually disarticulating into separate axis, bracts, perianth halves and pericarps with the enclosed seed; perianth translucent; pericarp membranous; seed broadly elliptic, flat, c. 1.8 mm long; testa thin, translucent, with several rows of small tubercles over the embryo. **Pl. 18I–M.**

S.A.: EP, NL, YP, SL; W.A.; Vic. Found on coastal salt flats commonly in areas subject to periodic flooding. Flowers and/or fruits: Jan.–May.

(Vulnerable status in S.A.)

6. **Tecticornia fontinalis** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 326 (2007). — *Halosarcia fontinalis* Paul G.Wilson, *Nuytsia* 3: 39 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 92, fig. 24C–E (1980).

Shrub to 70 cm high; branchlets slender; articles bluntly lobed, entire; spikes terminal, slender, 30–80 mm long, c. 3–5 mm diam. **Flowers** free, adaxial surface horizontal to slightly ascending to the spike axis; apex rounded; lateral lobes short; abaxial lobe semicircular, outside the lateral lobes; perianth and ovary succulent. **Fruiting** perianth shrivelled, pithy or chartaceous at the apex, membranous towards the base; pericarp membranous, fused to the perianth; seed ovate, c. 1 mm long; testa crustaceous, ridged over the embryo, otherwise smooth, a dark reddish-brown; fruitlets shed entire, the seed enclosed by and adherent to the pericarp.

S.A.: LE. Usually found around saline springs. Flowers and/or fruits: Apr.–Sep.

7. **Tecticornia halocnemoides** (Nees) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 326 (2007). — *Arthrocnemum halocnemoides* Nees in Lehm., *Pl. Preiss.* 1: 632 (1845); *Halosarcia halocnemoides* (Nees) Paul G.Wilson, *Nuytsia* 3: 31 (1980).

Spreading or erect shrubs to 0.5 m high; articles globular to obovoid, mostly 3–5 mm long, lobes entire; spikes terminal, the articles circular or compressed; opposite bracts united, undulate to truncate. **Flowers** free from each other and from the bracts, exposed at the apex, adaxial surface horizontal, abaxial surface vertical to the spike axis; perianth succulent; apex truncate to rounded; lateral lobes prominent; abaxial lobe small and within the lateral lobes. **Fruiting** perianth either soft and becoming shrivelled on drying or firm, chartaceous and translucent, free from the bracts; pericarp thin, intimately fused to the perianth; seed discoid, ovate to circular, c. 1 mm long; testa crustaceous, reddish-brown, tuberculate (sometimes papillate) in concentric rows over the embryo otherwise granular or smooth; fruitlets eventually breaking away from the axis with the seed protruding at the torn base. **Grey samphire, grey glasswort.**

A highly variable taxon which is considered by some authors to consist of several species. The following subspecies represent the more obvious of the numerous variants.

1. Spikes slender, to 8 cm long, even in outline; seed semicircular, smooth 7b. **T. halocnemoides** subsp. **longispicata**
- 1: Spikes to 2 cm long, undulate or even in outline; seed smooth or granular
 2. Articles narrow-cylindrical to narrowly barrel-shaped; spikes slender, even in outline 7c. **T. halocnemoides** subsp. **tenuis**
 - 2: Articles obovoid (often broadly so), spikes undulate in outline. 7a. **T. halocnemoides** subsp. **halocnemoides**

- 7a. **Tecticornia halocnemoides** subsp. **halocnemoides** — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 87, fig.18A–B (1980).

Articles narrowly obovoid to subglobular, 2–5 mm long, usually glossy, entire. **Spikes** of 2–14 articles, undulate in outline. **Seed** flattened, broadly ovate to suborbicular; testa tuberculate over the embryo, elsewhere granular. **Pl. 19A–C.**

S.A.: NW, LE, NU, GT, EA, EP, NL, MU, YP, SL, SE; W.A.; Vic. Found over a wide range of seasonally waterlogged saline habitats. Flowers: and/or fruits: all months.

- 7b. **Tecticornia halocnemoides** subsp. **longispicata** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Halosarcia halocnemoides* subsp. *longispicata* Paul G.Wilson, *Nuytsia* 3: 34 (1980).

Articles barrel-shaped, c. 5 mm long; 2.5 mm diam., entire. **Spikes** slender, cylindrical, even in outline, 2–8 cm long, c. 3 mm diam. **Seed** semicircular, tuberculate over the embryo, otherwise smooth.

S.A.: NW, LE, GT, FR, EA, EP, NL, SL; W.A.; N.T.; Qld.; N.S.W. Flowers and/or fruits: all months.

- 7c. **Tecticornia halocnemoides** subsp. **tenuis** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Halosarcia halocnemoides* subsp. *tenuis* Paul G. Wilson, *Nuytsia* 3: 36 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 87, fig. 19E–F (1980).

Branchlets slender; articles narrowly barrel-shaped, c. 5 × c. 2 mm, dull (not glaucous) to glossy, entire. **Spikes** almost cylindrical, 10–25 mm (rarely to 70 mm) long. **Seed** suborbicular, finely tuberculate over the embryo, otherwise granular.

S.A.: NW, LE, NL; W.A.; N.T.; Qld. Found around inland salt lakes. Flowers and/or fruits: May–June (2 records).

8. **Tecticornia indica** (Willd.) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Salicornia indica* Willd., *Neue Schriften Ges. Naturf. Freunde Berlin* 2: 111 (1799); *Halosarcia indica* (Willd.) Paul G.Wilson, *Nuytsia* 3: 63 (1980). — **Illustr.:** K.A.Williams, *Native Pl. Queensl.* 2: 151 (1984).

Decumbent perennial to stout erect shrub; articles cylindrical to obovoid, frequently glaucous; margin entire or ciliolate. **Spikes** terminal, smooth and cylindrical and up to 4 cm long or ovoid and up to 2 cm long; bract-pairs truncate or deeply lobed, margin entire or ciliolate; flowers coalescent or free, completely enclosed or with the apex exposed, vertical to the spike axis; apex rounded or obtuse; perianth thin or fleshy; lateral lobes large; abaxial lobe within the laterals, minute or equal to them in size. **Fruiting** spike leathery, corky or spongy; fruitlets laterally compressed; perianth soft and spongy; pericarp hard and horny all over, adherent to the perianth, eventually splitting in the sagittal plane; seed ovate to circular; testa membranous, very pale-brown; spike disarticulating with age; bracts and perianth frequently swelling when wet.

T. indica differs markedly in its anatomy from all other members of the Salicornieae as it has a modified Kranz anatomy (utilising the C4 photosynthetic pathway) comprising a single layer of palisade cells interspersed with clear cells and a layer of thick-walled isodiametric chlorenchymatous cells. A very variable taxon which is considered by some authors to consist of several species. This is partly because, except for Australia, each country contains only one of the variants; in Australia all variants occur and intergrade with each other. The following subspecies represent the more obvious of the numerous variants.

1. Spike cylindrical or ellipsoid, lowest ring of bracts small; vegetative articles truncate or shallowly lobed 8b. **T. indica** subsp. **leiostachya**
1. Spike ovoid, lowest ring of bracts large and deeply lobed; vegetative articles deeply lobed 8a. **T. indica** subsp. **bidens**

- 8a. **Tecticornia indica** subsp. **bidens** (Nees) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Arthrocnemum bidens* Nees in Lehm., *Pl. Preiss.* 1: 632 (1845); *Salicornia bidens* (Nees) Benth., *Fl. Austral.* 5: 204 (1870); *Halosarcia indica* subsp. *bidens* (Nees) Paul G.Wilson, *Nuytsia* 3: 67 (1980). — **Illustr.:** E.R.Rotherham *et al.*, *Fl. Pl. N.S.W. & S. Queensl.* fig. 457 (1975), as *Pachycornia tenuis*.

Robust shrub to 2 m high; articles thick, obovoid, 5–10 mm long; lobes prominent, keeled towards the apex, usually ciliolate. **Spikes** ovoid, grey with age, the lowest bract pair larger and more deeply lobed than those above. **Perianth** spongy; pericarp hard and horny all over.

S.A.: NW, LE, GT, EA, EP, MU, YP, SL; W.A.; N.T.; Vic. Found in moderately saline areas both coastal and inland. Flowers and/or fruits: all months.

- 8b. **Tecticornia indica** subsp. **leiostachya** (Benth.) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Salicornia leiostachya* Benth., *Fl. Austral.* 5: 203 (1870); *Arthrocnemum leiostachyum* (Benth.) Paulsen, *Dansk Bot. Ark.* 2, 8: 61 (1918); *Halosarcia indica* subsp. *leiostachya* (Benth.) Paul G.Wilson, *Nuytsia* 3: 66 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 66, fig. 9 (1980).

Small decumbent to erect shrub; articles cylindrical to obovoid, to 10 mm long, slightly lobed, ciliolate. **Spikes** ellipsoid to cylindrical, 5–40 mm long, smooth in outline, the lowest bract pair not exceeding those above it. **Perianth** soft and spongy; pericarp hard and horny all over. **Brown-head samphire, brown-head glasswort.**

S.A.: NW, LE, NU, GT, FR, EA, EP, NL, MU, YP, SL, SE; W.A.; N.T.; Qld; N.S.W.; Vic. Malaysia. Found on the coast and around inland salt lakes. Flowers and/or fruits: all months.

9. **Tecticornia lepidosperma** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Halosarcia lepidosperma* Paul G.Wilson, *Nuytsia* 3: 47 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 91, fig. 23D–F (1980).

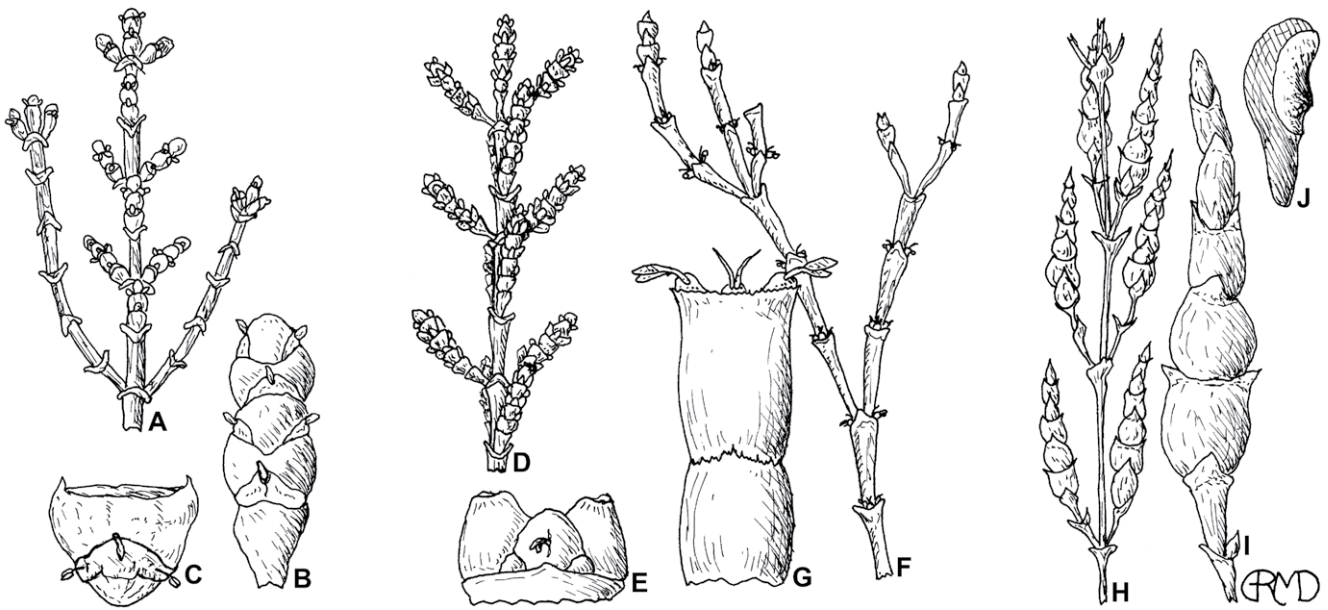


Fig. 23. A–C, *Tecticornia arbuscula*: A, twig; B, spike; C, portion of spike. D–E, *T. disarticulata*: D, branch; E, portion of spike. F–G, *T. medullosa*: F, branch; G, portion of spike. H–J, *T. tenuis*: H, branch; I, spike; J, seed. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 307, Fig. 171 (1986).

Erect shrub to 1 m high; branches slender, erect; articles obovoid to cylindrical, 5–10 mm long, entire, slightly glaucous. **Spikes** terminal, slender, cylindrical, to 50 mm long, 3.5–5 mm diam.; flowers almost free, horizontal to slightly vertical to the spike axis; apex truncate and broadly oblong; perianth succulent; abaxial lobe large and semicircular, overlapping the lateral lobes. **Fruiting** perianth not or scarcely exceeding the bracts, succulent and eventually spongy, shrivelled on drying or firm and papery on the outside; pericarp membranous and fused to the perianth; fruitlets eventually tearing away from the axis exposing the seed at its base; seed suborbicular, c. 1.5 mm long, white or pale-fawn when dry; outer testa raised on the margin to form 5–7 concentric scale-like ribs with transverse corrugations.

S.A.: EP, YP, SE; W.A. Found in slightly saline soil. Possibly an introduction in S.A. Flowers and/or fruits: Mar.–May (2 records).

(Rare status in S.A.)

10. ***Tecticornia lylei*** (Ewart & Jean White) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Salicornia lylei* Ewart & Jean White, *J. Proc. Roy. Soc. New S. Wales* 42: 195 (1909); *Arthrocnemum lylei* (Ewart & Jean White) J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 43: 359 (1919); *Halosarcia lylei* (Ewart & Jean White) Paul G.Wilson, *Nuytsia* 3: 49 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 100, fig. 23A–C (1980).

Erect shrub to 1 m high, with erect slender branches; branchlets very slender; articles cylindrical, c. 3 mm long, dull, lobes not ciliate. **Spikes** terminal, slender, to 20 mm long, c. 4 mm diam.; bracts short, with the flowers exposed; flowers free, horizontal to the spike axis; apex quadrate, truncate; perianth succulent; abaxial lobe overlapped by the laterals; fruitlets protruding from the bracts; perianth firm and pithy. **Pericarp** convex and crustaceous at the apex, protruding slightly from the perianth to give a mammillate appearance; seed broadly elliptic, 1–1.5 mm long; testa crustaceous, reddish-brown, concentrically granular over the embryo.

S.A.: NU, GT, EP; W.A.; ?N.S.W.; Vic. Found around salt-lakes and other somewhat saline and seasonally waterlogged localities. Flowers and/or fruits: Nov.–June (few records).

11. ***Tecticornia medullosa*** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Sclerostegia medullosa* Paul G.Wilson, *Nuytsia* 3: 24 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 83, fig. 15 (1980); F.Kutsche & B.Lay, *Fieldguide Pl. Outback S. Austral.* 126 (2003).

Much branched shrub to 1 m high; articles cylindrical, 4–5 mm long, 2–3 mm diam., papillose (when dry), becoming pithy with age, acutely lobed, with a denticulate margin. **Flowering** articles identical to and interspersed amongst vegetative ones; flowers vertical to the spike axis, dorsiventrally flattened distally, united in the lower two-thirds; perianth membranous. **Fruiting** articles cylindrical, pithy; perianth membranous; pericarp hard and brittle, c. 2.5 mm long, adherent to the woody axis; seed ellipsoid, c. 2.5 mm long; fruit released on decay of

surrounding bract tissue. **Fig. 23F–G.**

S.A.: LE, GT, EP; Qld; N.S.W. Found in heavy soil on flood plains. Flowers and/or fruits: probably all months.

12. **Tecticornia moniliformis** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Sclerostegia moniliformis* Paul G.Wilson, *Nuytsia* 3: 22 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 81, fig. 13E–H (1980).

A much branched shrub c. 1 m high; articles obovoid, c. 5 mm long. **Spikes** continuing growth vegetatively, of 1 or 2, rarely to 6, articles; bracts similar to vegetative articles enclosing flowers; flowers almost vertical to stem axis, dorsiventrally flattened distally, coalescent to each other in lower two-thirds; perianth membranous. **Fruiting** spike dry, sometimes moniliform; bracts broadly obovoid to spherical, pithy, 5–6 mm diam., completely obscuring flowers; perianth membranous; pericarp crustaceous, adhering to spike axis; style weak, not exerted; seed ovoid, c. 1.5 mm long; bracts of mature spikes eventually disintegrating and sloughing off with enclosed fruit.

S.A.: EP, YP; W.A.; Vic.

Occurs in low shrublands often dominated by chenopods in swampy areas on alluvial or calcareous plains in on sandy clay loams.

13. **Tecticornia nitida** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 327 (2007). — *Halosarcia nitida* Paul G.Wilson, *Nuytsia* 3: 38 (1980).

Shrub c. 0.5 m high; articles glossy, c. 5 mm long; margin entire to crenulate; lobes shortly acuminate. **Spikes** terminal; bract-pairs similar to (but slightly shorter than) the vegetative articles; flowers free, vertical to the spike axis, dorsiventrally compressed and slightly winged towards the apex; perianth thin (when dry), apex rounded to acuminate. **Pericarp** ellipsoid, papery, with a membranous base; seed ovoid, c. 1 mm long; testa very thin, pale-brown, concentrically granular over the embryo, otherwise smooth; fruitlets eventually tearing away from the axis and exposing the seed.

S.A.: LE, GT, EA, EP; Vic. Found in strongly saline or gypseous soils. Flowers and/or fruits: Sep.–Dec.

14. **Tecticornia pergranulata** (J.M.Black) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Arthrocnemum halocnemoides* var. *pergranulatum* J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 43: 359 (1919); *Halosarcia pergranulata* (J.M.Black) Paul G.Wilson, *Nuytsia* 3: 40 (1983).

Erect spreading or decumbent shrub or perennial herb to 50 cm high; articles cylindrical to obovoid, dull or glaucous; lobes rounded, entire. **Spikes** terminal, to 5 cm long; flowers free or variously fused to each other and to the upper bract; adaxial surface horizontal, abaxial surface vertical to the spike axis; perianth succulent, apex curved or truncate; abaxial lobe prominent and either within or outside the laterals. **Fruiting** perianth fleshy, spongy or chartaceous, with a pithy interior; pericarp fused (and similar) to the perianth; seed broadly ovate to circular, c. 1 mm diam., testa crustaceous, concentrically ribbed all over; fruitlets either persistent or breaking away from the axis.

1. Flowers free from each other and from the upper bract; lower perianth lobe obvious; spikes erect
2. Spikes undulate in outline; articles somewhat compressed; lower perianth lobe obvious..... 14c. **T. pergranulata** subsp. **pergranulata**
2: Spikes slender, terete; lower perianth lobe short 14b. **T. pergranulata** subsp. **elongata**
1: Flowers more or less fused to each other and to the upper bract; lower perianth lobe insignificant; spikes spreading..... 14a. **T. pergranulata** subsp. **divaricata**

- 14a. **Tecticornia pergranulata** subsp. **divaricata** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Halosarcia pergranulata* subsp. *divaricata* Paul G.Wilson, *Nuytsia* 3: 45 (1980).

Erect shrub to 1 m high; articles cylindrical to obovoid, greyish-green; spikes divaricate, usually on very short branchlets, cylindrical, 1–3 cm long. **Flowers** fused to each other and to the upper bract; apex truncate, with the centre slightly raised; perianth with prominent imbricate lateral lobes and a very thin semicircular abaxial lobe. **Fruitlets** remaining attached to the spike.

S.A.: LE, GT, FR (E shore Lake Torrens), EA, EP, MU, ?YP (Lower Broughton); N.T.; Qld; N.S.W.; Vic. Found predominantly in only moderately saline claypans. Flowers and/or fruits: probably all months.

The identity of specimens from YP needs to be confirmed.

- 14b. **Tecticornia pergranulata** subsp. **elongata** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Halosarcia pergranulata* subsp. *elongata* Paul G.Wilson, *Nuytsia* 3: 43 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 90, fig. 22D–E.

Erect to decumbent perennial to 25 cm high; articles barrel-shaped, glaucous. **Spikes** slender, cylindrical, to 6 cm long; flowers free; perianth more or less truncate; lobes more or less equal, the abaxial semi-orbicular and slightly overlapping the laterals.

S.A.: NW, LE, GT; W.A.; N.T.; Qld. Found on the margin of salt lakes. Flowers and/or fruits: all months.

- 14c. **Tecticornia pergranulata** (J.M.Black) K.A.Sheph. & Paul G.Wilson subsp. **pergranulata** — **Illustr.:** P.G.Wilson, *Nuytsia* 3: 90, fig. 22A–C.

Erect shrub c. 0.5 m high; articles obovoid, dull or glaucous. **Flowers** free; perianth with a curved apex; abaxial lobe large, semicircular.

S.A.: NW, LE, NU, GT, EA, EP, NL, MU, YP, SL, KI, SE; W.A.; Qld; N.S.W.; Vic. Found on coasts or in estuaries, swamps and on the margins of salt lakes. Flowers and/or fruits: all months.



Fig. 24. *Tecticornia triandra*: A, twig; B, enlarged spike. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 285, Fig. 162C (1986).

15. **Tecticornia pluriflora** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Halosarcia pluriflora* Paul G.Wilson, *Nuytsia* 3: 39 (1980).

Shrubs to 1 m high; branchlets slender; articles acutely lobed, denticulate; spikes terminal, slender. **Flowers** 3–7 in each of the opposite bracts (when over 3 the lateral ones reduced in size), free, adaxial surface horizontal, abaxial surface vertical to the spike axis; perianth succulent towards the apex, thin at the base; apex rounded; lobes 3, irregular, denticulate; ovary thin. **Fruiting** perianth pithy or chartaceous; pericarp membranous, fused to the perianth; seed semicircular, c. 1 mm long, ribbed over the embryo, otherwise smooth, a dark reddish-brown; mature fruitlets eventually breaking away from the axis to expose the seed at its base.

S.A.: LE, GT, FR, EA, EP; N.S.W. Found on margins of salt lakes and springs. Flowers and/or fruits: all months.

16. **Tecticornia pruinosa** (Paulsen) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Arthrocnemum pruinatum* Paulsen, *Dansk Bot. Ark.* 2, 8: 63 (1918); *Halosarcia pruinosa* (Paulsen) Paul G.Wilson, *Nuytsia* 3: 54 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 95, fig. 27D–F.

Shrub to 1 m high; articles obovoid, 3–8 mm long, often pruinose; lobes rounded, entire. **Spikes** terminal, occasionally continuing growth vegetatively, narrow-cylindrical, 1.5–3.5 (rarely to 10) cm long, 3–5 mm diam., bracts shortly barrel-shaped, closely overlapping and obscuring the flowers; flowers free with age, vertical to the spike axis; apex dorsiventrally compressed, acute; perianth thin but fleshy; lateral lobes large, conduplicate; abaxial lobe small and included. **Fruiting** perianth spongy, retaining their shape; fruitlets totally enclosed, free; perianth brittle, muricate on the outside; pericarp free, thinly crustaceous towards the apex, membranous or absent towards the base; seed ovoid, c. 1 mm long; testa membranous, with faint concentric granulation over the embryo, pale-brown; perianth eventually splitting in the medial sagittal plane to release the seed. **Pl. 19D.**

S.A.: NW, LE, NU, GT, EP, NL, YP, SL; W.A.; N.T.; N.S.W.; Vic. Found in moderately saline soil both on the coast and inland. Flowers and/or fruits: all months.

17. **Tecticornia pterygosperma** (J.M.Black) K.A.Sheph. & Paul G.Wilson subsp. **pterygosperma**, *Austral. Syst. Bot.* 20: 328 (2007). — *Arthrocnemum halocnemoides* var. *pterygospermum* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 60: 166 (1936); *Halosarcia pterygosperma*, (J.M.Black) Paul G.Wilson, *Nuytsia* 3: 48 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 114–115, figs 47–47 (1980); G.F.Craig, *Pilbara Coastal Fl.* 50 (1983).

Spreading shrub to 0.5 m high; branches slender; articles narrow- to broad-obovoid, c. 5 mm long, dull or glaucous, entire or ciliate. **Spikes** terminal, to 30 mm long; bract-pairs united; flowers free or adherent, adaxial surface horizontal, abaxial surface vertical to the spike axis; apex truncate, quadrate to transversely oblong; perianth succulent; abaxial lobe semicircular, overlapping the lateral lobes, entire or denticulate; fruiting spikes with thin shrivelled bracts between the disjunct whorls of fruitlets. **Fruitlets** readily shed when mature with the enclosed seed; perianth glossy, hollow; pericarp membranous; seed thick, ovoid, c. 1.5 mm long, pale-fawn to cream; outer testa raised into corrugated scale-like ribs over the whole seed.

S.A.: LE, NU, FR, EA, EP, NL, MU, YP; W.A.; N.S.W.; Vic. Found near the margin of salt lakes. Flowers and/or fruits: probably all months.

18. **Tecticornia syncarpa** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Halosarcia syncarpa* Paul G.Wilson, *Nuytsia* 3: 56 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 97, fig 29E–G.

Decumbent to erect shrub 0.2–1 m high; articles broadly obovoid, c. 5 mm long, glossy or dull, bluntly to acutely lobed, apiculate; margin entire or denticulate. **Spikes** sessile or terminal on the lateral branchlets, continuing growth vegetatively, articles 1–10, similar at flowering to the vegetative articles; flowers coalescent, almost completely obscured by the bracts; vertical to the spike axis; perianth with thick lateral walls; apex strongly dorsiventrally flattened; lateral lobes large, conduplicate and imbricate; abaxial lobe minute. **Fruiting** spike intercalary; fruitlets fused laterally to each other; perianth with leathery or crustaceous lateral walls, pericarp free from the perianth, spongy to crustaceous; seed ovoid, c. 1.2 mm long, testa membranous, pale-brown, concentrically granular over the embryo; seed released enclosed in the pericarp through the longitudinal splitting of the perianth.

S.A.: EP, MU, YP, SL, KI, SE; W.A.; Vic. Either coastal or on the margin of salt lakes. Flowers and/or fruits: probably all months.

19. **Tecticornia tenuis** (Benth.) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Salicornia tenuis* Benth., *Fl. Austral.* 5: 204 (1870); *Pachycornia tenuis* (Benth.) J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 43: 363 (1919); *Sclerostegia tenuis* (Benth.) Paul G.Wilson, *Nuytsia* 3: 22 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 82, fig. 14 (1980); *Pl. W. N.S.W.* 277 (1982).

Divaricately branched shrub to 0.6 m high; branchlets slender; articles narrow-turbinate to cylindrical, c. 10 mm long, pale-green, apical lobes with a broad scarious entire margin. **Spikes** slender, c. 20 mm long, of 5–10 articles, usually continuing growth vegetatively for at least 1–2 cm; bracts similar to (although shorter than) the vegetative articles, completely enclosing the flowers; flowers vertical to the spike axis, c. 4 mm long, dorsiventrally flattened distally, coalescent in the lower two-thirds to each other, perianth membranous. **Fruiting** spike narrow-ellipsoid, woody, covered by the shrivelled remains of bracts or these soft, pithy and persistent; perianth membranous; pericarp thick and woody, eventually embedded in the growing woody spike axis; style not exerted; seed narrow-ovoid, 2.5–3 mm long, eventually released after death and decay of the branch. **Slender glasswort. Fig. 23H–J, Pl. 19E–F.**

S.A.: NW, LE, NU, GT, FR, EA, EP, MU, SL; W.A.; N.T.; Qld; N.S.W.; Vic. Found in heavy somewhat saline soil. Flowers and/or fruits: Apr.–Oct.

It is questionable, whether the species is native in the SL region.

20. **Tecticornia triandra** (F.Muell.) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Arthrocnemum triandrum* F.Muell., *Fragm.* 1: 139 (1859); *Salicornia triandra* (F.Muell.) Druce, *Rep. Bot. Exch. Club* 2: 644 (1917); *Pachycornia triandra* (F.Muell.) J.M.Black, *Fl. S.Austral.* 206 (1924). *Salicornia robusta* F.Muell., *Fragm.* 6: 251 (1868), *nom. illeg.*; *P. robusta* (F.Muell.) Baillon, *Hist. Pl.* 9: 184 (1887), *nom. illeg.* — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 79, fig.

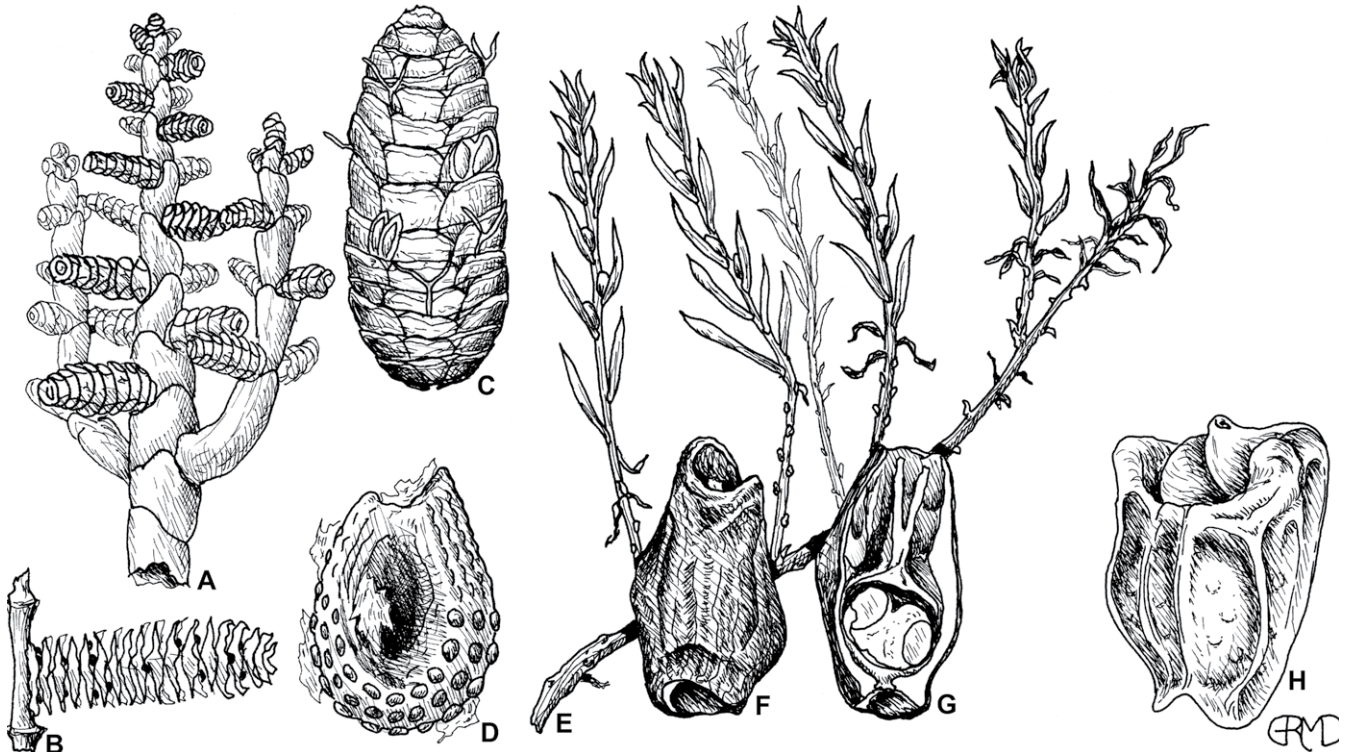


Fig. 25. A–D, *Tecticornia verrucosa*: A, branch; B, lateral fruiting spike; C, terminal inflorescence; D, seed. **E–G, *Threlkeldia diffusa*:** E, twig; F, fruit; G, fruit in cross section. **H, *Threlkeldia inchoata*,** fruit. Illustration by G.R.M. Dashorst, from *Flora of South Australia* 1: 311, Fig. 174 (1986).

11 (1980); *Pl. W. N.S.W.* 277 (1982); E.R.Rotherham *et al.*, *Fl. Pl. N.S.W. & S. Queensl.* fig. 455 (1975); G.R.Cochrane *et al.*, *Fl. Pl. Victoria* fig. 183 (1968); A.Kapitany, *Austral. Succ. Pl.* 186–187 (2007).

Divaricately branched bright-green shrub to 50 cm high; internodes 1–2 cm long, with thick rigid acute lobes c. 3 mm long and ciliolate towards their base, opposite ciliolate grooves arising at the junction of the lobes and running the length of the internode. **Spikes** broadly ovoid, more or less 4-sided, 1–2 cm long; bracts congested, lobes acicular, divaricate; flowers vertical to the spike axis, c. 4 mm long; perianth dorsiventrally compressed, membranous. **Fruiting** spike axis and the base of the bracts thick and woody; pericarp thick and horny, fused to and apparently sunken in the woody axis; seed orbicular, c. 2 mm diam., testa smooth, pale brown; released after decay of the spike. **Desert glasswort. Fig. 24.**

S.A.: NW, EP, MU; W.A.; N.T.; N.S.W.; Vic. Found in heavy slightly saline soil. Flowers: and/ or fruits: Jul.–Jan.

21. ***Tecticornia undulata*** (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson, *Austral. Syst. Bot.* 20: 328 (2007). — *Halosarcia undulata* Paul G.Wilson, *Nuytsia* 3: 58 (1980). — **Illustr.:** Paul G.Wilson, *Nuytsia* 3: 97, fig. 29A–D (1980).

Shrub to 50 cm high; articles broadly barrel-shaped, c. 7 mm long, dull to glaucous; lobes rounded (rarely acuminate), entire. **Spikes** terminal or sessile and axillary, conical to cylindrical, 10–35 mm long; 3–5 mm, rarely to 9 mm, diam., outline undulate; bract pairs short, closely imbricate, convex, margin undulate, entire; flowers totally enclosed, more or less free, vertical to the spike axis, strongly dorsiventrally flattened at the apex; perianth fleshy but soon becoming brittle; lateral lobes large, conduplicate and imbricate. **Fruitlets** free, dorsiventrally flattened; perianth thin, usually crustaceous; pericarp membranous or crustaceous at the apex, absent towards the base; seed ovoid, c. 1 mm long; testa thin, pale-brown; bract pairs eventually breaking away, the fruitlets falling entire.

S.A.: LE; W.A.; N.T. Found in saline or gypseous soil. Flowers and/or fruits: all year.

Only known in S.A. from a single collection from Dalhousie Springs.

22. ***Tecticornia verrucosa*** Paul G.Wilson, *Nuytsia* 1: 284 (1972). — **Illustr.:** Paul G.Wilson, *Fl. Austral.* 4: 303, fig. 53A–E (1984); P.Moore, *Guide Pl. Inland Austral.* 101 (2005); A.Kapitany, *Austral. Succ. Pl.* 200–201 (2007).

Annual or short-lived perennial to 40 cm high, branching at the sometimes woody base; internodes 10–14 mm

long, glaucous. **Inflorescence** of opposite and decussate sessile lateral spikes at right-angles to the branch axis, 10–12 mm long, c. 6 mm diam.; flowers in triads, horizontal to the spike axis. **Seed** broadly and bluntly elliptic to suborbicular, plano-convex to concavo-convex, c. 1.8 mm long, finely verrucose, brown to black. **Fig. 25A–D, Pl. 19G–H.**

S.A.: NW; W.A.; N.T. Found in inland clay pans and (in W.A.) tropical coastal marshes. Flowers and/or fruits: all months.

The seeds are eaten by Aborigines.

23. **THRELKELDIA R.Br.**

Prodr. 409 (1810).

(Named after Caleb Threlkeld, 1676–1728.)

Small woody perennials, glabrous except for the axillary pubescence; leaves alternate, subterete, fleshy. **Flowers** axillary, solitary, bisexual; perianth fleshy, glabrous; stamens 3–5. **Fruiting** perianth tubular to urceolate, to 3 mm long, succulent or dry, woody at least within, without spines or wings, glabrous except for the ciliate lobes; pericarp thin, brittle above; seed horizontal to vertical; embryo annular, radicle erect; perisperm central.

A genus of 2 species endemic to Australia.

This genus has been variously circumscribed. The two species that are here recognised do not appear to be particularly closely related; both have close affinities with species of *Sclerolaena*, from which genus they are formally excluded due to the absence of spines.

1. Fruiting perianth ovoid to urceolate, succulent outside; tube extending upwards to cover the lobes..... 1. **T. diffusa**
- 1: Fruiting perianth obovoid, laterally compressed, dry; perianth lobes exposed at the apex..... 2. **T. inchoata**

1. **Threlkeldia diffusa** R.Br., *Prodr.* 410 (1810).

Much branched prostrate to erect perennial to 30 cm high, sparsely pilose in leaf axils otherwise glabrous; leaves obovoid and c. 5 mm long, to slender and subterete and 20–30 mm long, acute, succulent. **Flowers:** perianth tube cylindrical, c. 1 mm high, lobes 3, membranous, c. 0.5 mm high, puberulent; stamens 3. **Fruiting** perianth ovoid to urceolate, 1.5–2.5 mm high, succulent outside, woody within; tube extending upwards to form a fleshy cup-shaped outgrowth c. 0.5 mm high obscuring and overlapping the perianth lobes and on drying forming 3 (rarely 4) short knobs between the segments; seed horizontal to slightly oblique; radicle erect. **Coast bonefruit. Fig. 25E–G, Pl. 19I–K.**

S.A.: NU, FR, EP, NL, MU, YP, SL, KI, SE; W.A.; Vic.; Tas. Found in coastal and estuarine salt marshes and occasionally around inland salt lakes. Flowers and/or fruits: principally May–Nov.

2. **Threlkeldia inchoata** (J.M.Black) J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 40: 60 (1916). — *Bassia inchoata* J.M.Black, *Trans. & Proc. Roy. Soc. South Australia* 38: 463 (1914); *T. obliqua* J. Black, *Trans. & Proc. Roy. Soc. South Australia* 39: 95 (1915), *nom. illeg.*

Rounded much branched perennial to 30 cm high, minutely pubescent in the leaf axils otherwise glabrous; leaves slender-terete, c. 15 mm long, acute. **Flowers:** tube fleshy, c. 1 mm high, lobes united, membranous c. 0.5 mm high, undulate, ciliate; stamens 5. **Fruiting** perianth obovoid, 3–4 mm long, laterally compressed, hard, c. 5 ribbed (the radicular rib prominent), apex oblique and gibbose over the radicle, shallowly rimmed around the central erect membranous perianth lobes, base concave; seed and radicle erect. **Tall bonefruit. Fig. 25H.**

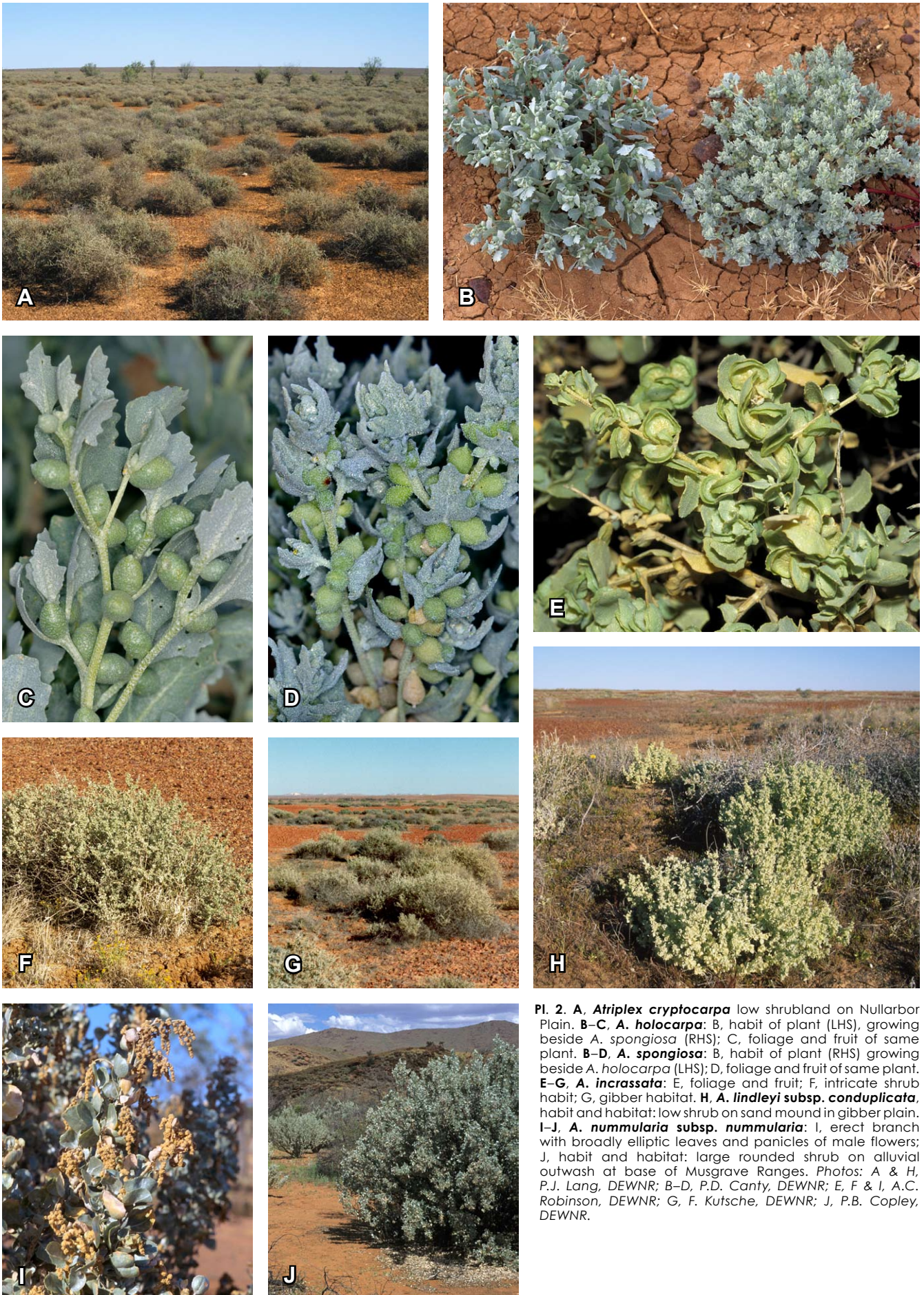
S.A.: NW, LE; N.T.; N.S.W. Found in somewhat saline soil often near creeks. Flowers and/or fruits: all months.

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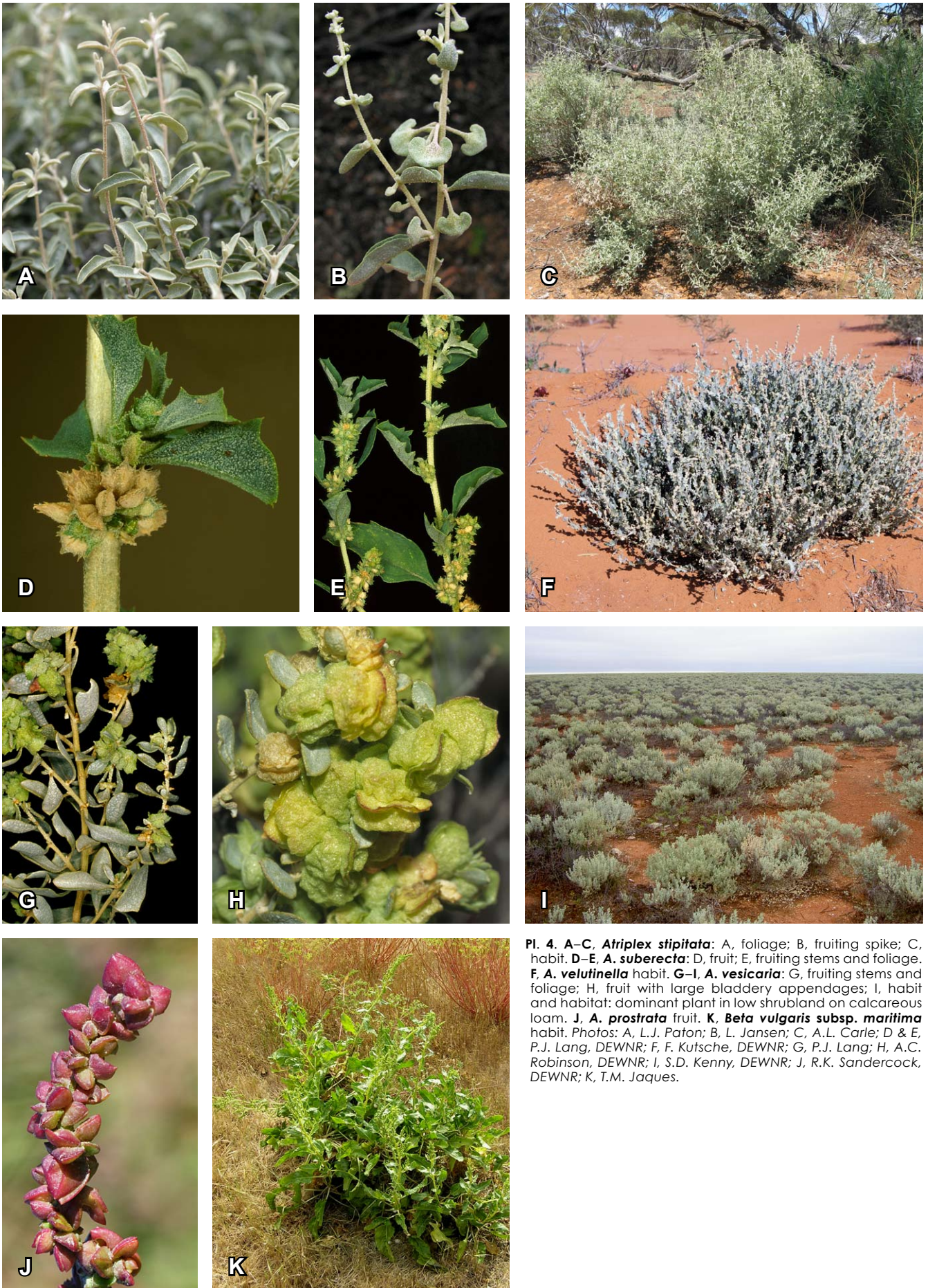
Pl. 1. A–C, *Atriplex acutibractea* subsp. *acutibractea*: A, flowers and immature fruit; B, foliage; C, habit. D–E, *A. angulata*: D, habit; E, stem with fruit. F–I, *A. australasica*: F, habit; G, flowers; H, fruit; I, leaves. J–L, *A. cinerea*: J, male flowers; K, habitat; band of shrubs along coastal fore-dune; L, foliage and panicles of male flowers. Photos: A–C, L. Jansen; D & E, A.C. Robinson, DEWNR; F–I, D.E. Murfet; J–L, T.M. Jaques.



Pl. 2. **A, *Atriplex cryptocarpa*** low shrubland on Nullarbor Plain. **B–C, *A. holocarpa***: B, habit of plant (LHS), growing beside *A. spongiosa* (RHS); C, foliage and fruit of same plant. **B–D, *A. spongiosa***: B, habit of plant (RHS) growing beside *A. holocarpa* (LHS); D, foliage and fruit of same plant. **E–G, *A. incrassata***: E, foliage and fruit; F, intricate shrub habit; G, gibber habitat. **H, *A. lindleyi* subsp. *conduplicata***, habit and habitat: low shrub on sand mound in gibber plain. **I–J, *A. nummularia* subsp. *nummularia***: I, erect branch with broadly elliptical leaves and panicles of male flowers; J, habit and habitat: large rounded shrub on alluvial outwash at base of Musgrave Ranges. Photos: A & H, P.J. Lang, DEWNR; B–D, P.D. Canty, DEWNR; E, F & I, A.C. Robinson, DEWNR; G, F. Kutsche, DEWNR; J, P.B. Copley, DEWNR.



Pl. 3. A–D, *Atriplex paludosa* subsp. *cordata*: A, female flowers and a fruit with entire margin; B, leaves; C, habit; D, fruit with lateral teeth. E–F, *A. quinii*: E, habit; F, fruit and glomerules of male flowers; G–I, *A. rhagodioides*: G, habit; H, panicle of mostly male flowers; I, fruit. J–L, *A. semibaccata*: J, leaves; K, ripe fruit; L, habit. Photos: A & D, T.M. Jaques; B, C, & G–I, L. Jansen; E & F, A.C. Robinson; J, L.J. Paton; K, D.E. Murfet; L, P.J. Lang.



PL. 4. A–C, *Atriplex stipitata*: A, foliage; B, fruiting spike; C, habit. D–E, *A. suberecta*: D, fruit; E, fruiting stems and foliage. F, *A. velutinella* habit. G–I, *A. vesicaria*: G, fruiting stems and foliage; H, fruit with large bladdery appendages; I, habit and habitat: dominant plant in low shrubland on calcareous loam. J, *A. prostrata* fruit. K, *Beta vulgaris* subsp. *maritima* habit. Photos: A, L.J. Paton; B, L. Jansen; C, A.L. Carle; D & E, P.J. Lang, DEWNR; F, F. Kutsche, DEWNR; G, P.J. Lang; H, A.C. Robinson, DEWNR; I, S.D. Kenny, DEWNR; J, R.K. Sandercock, DEWNR; K, T.M. Jaques.



Pl. 5. A–D. *Chenopodium album*: A, habit; B, flowers; C, mature leaves showing lower surface (LHS) with some silvery-white mealliness due to vesicular hairs, and upper surface (RHS); D, fruiting panicles. **E–F. *C. auricomum*:** E, habit; bushes with lush growth and flowers after rains; F, stems showing upper leaves and flowering panicles. **G–H. *C. curvispicatum*:** G, foliage and drooping panicles with flowers, fruit and persistent perianth; H, ripe fruit with spreading perianth. **I–J. *C. desertorum* subsp. *desertorum*:** I, habit; J, flowers and leaves. **K–L. *C. desertorum* subsp. *microphyllum*:** K, habit: semi-prostrate plant seen from above; L, leaves and flowers. *Photos:* A, A.C. Robinson; B–D, P.J. Lang; E, P.J. Lang, DEWNR; F, P.D. Canty, DEWNR; G, H & J, L.J. Paton; I & K, L. Jansen; L, A.L. Carle.



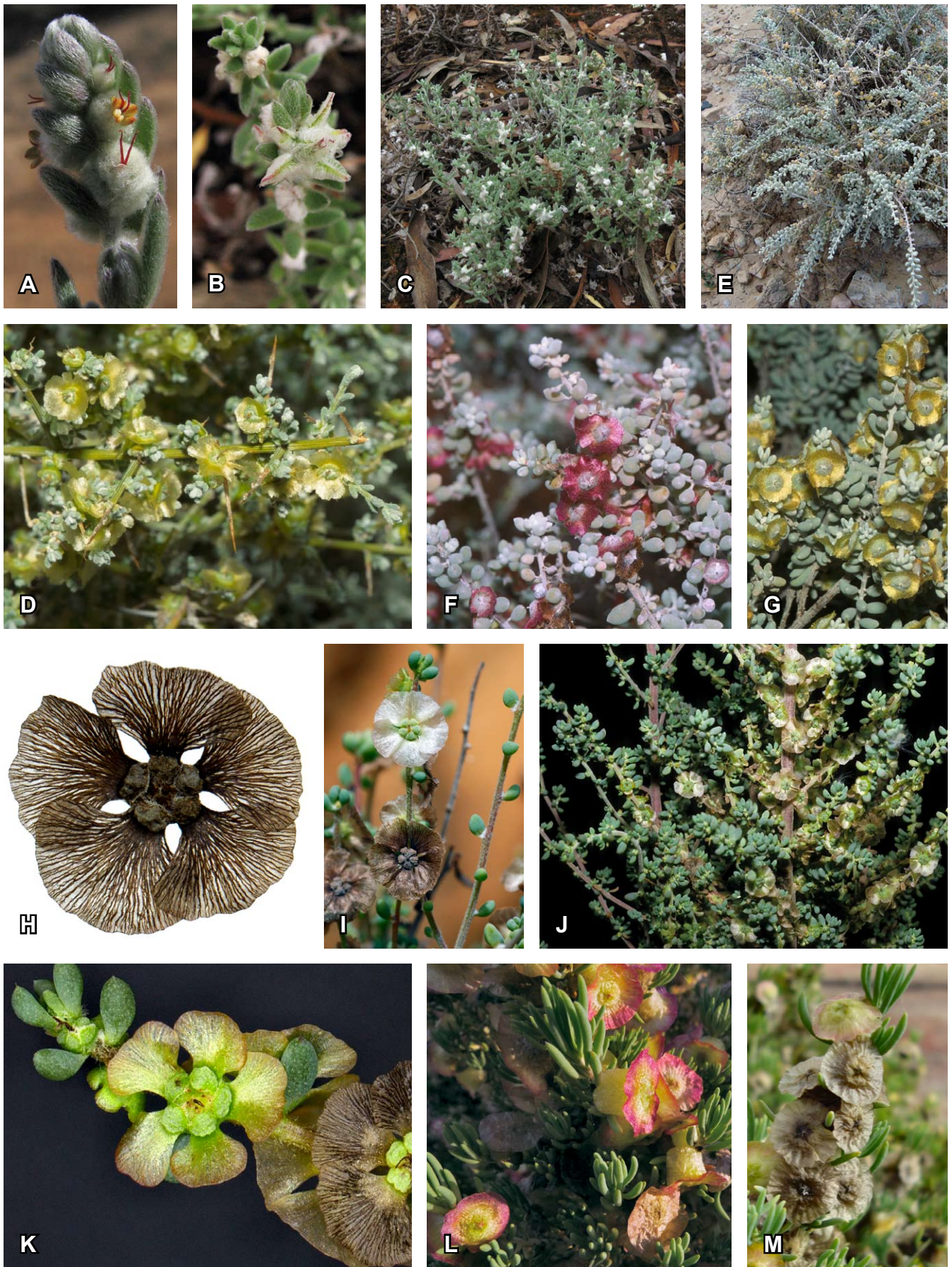
Pl. 6. A–B. *Chenopodium gaudichaudianum*: A, leaves; B, panicle with mature fruit. C–G, *C. glaucum*: C, habit: sprawling plants aging yellow and pink; D: young prostrate plant; E, leaf, showing mealy underside; F, inflorescence, showing glomerules of glabrous flowers; G, habit, plant with erect and scrambling stems. H–K, *C. murale*: H, leaf upper side; I, leaf lower side; J, inflorescence from above; K, foliage and fruiting inflorescences. L–M, *C. nitriaceum*: L, flowering stems; M, panicle in flower. Photos: A & B, P.J. Lang; C–G, T.M. Jaques; H–J, L. Jansen; K, D.E. Murrel; L & M, A.C. Robinson, DEWNR.



Pl. 7. **A–C.** *Dissocarpus biflorus* var. *biflorus*: A–B, habit; C, leaves and infructescences. **D–F.** *D. fontinalis*: D, flowering stems and foliage; E, leaves and infructescences; F, habit and habitat: scattered low shrubs on Moon Plain near Coober Pedy. **G–L.** *D. paradoxus*: G, young inflorescence with stamens and styles protruding; H, leaves and older inflorescence; I & J, foliage and immature infructescences; K, habit; L, low shrubland dominated by *D. paradoxus*. Photos: A, F. Kutsche, DEWNR; B & C, A.C. Robinson, DEWNR; D & F, P.J. Lang, DEWNR; E & J, P.D. Canty DEWNR; G & L, R.K. Sandercock, DEWNR; H, I & K, G.N. Carle.



Pl. 8. **A**, *Dysphania glomulifera* subsp. *glomulifera*, stems with glomerules of flowers in leaf axils. **B**, *D. kalpari*, habit. **C–F**, *D. pumilio*: **C**, habit: erect plant in fruit; **D**, semi-prostrate plant from above; **E**, foliage; **F**, detail of leaves and fruiting glomerule. **G**, *Einadia nutans* subsp. *eremaea*, foliage and fruit. **H–I**, *E. nutans* subsp. *nutans*: **H**, foliage and fruit; **I**, developing and mature fruit. **J–L**, *Enchylaena tomentosa* var. *tomentosa*: **J**, plant with fruiting perianth ripening to yellow; **K**, branchlet showing tomentose stem and fruit ripening from green to red; **L**, habit. Photos: **A**, **C** & **F**, D.E. Murfet; **B**, A.C. Robinson, DEWNR; **D**, L. Jansen; **E** & **K**, T.M. Jaques; **G**, A.C. Robinson; **H** & **J**, P.J. Lang; **I**, A.L. Carle; **L**, R.K. Sandercock, DEWNR.



Pl. 9. A–C, *Eriochiton sclerolaenoides*: A, flowers with protruding stamens and styles; B, fruit; C, habit. D, *Maireana aphylla*, branchlet, showing spines, fruit and foliage; E–G, *M. astrotricha*: E, habit; F & G, variation in leaves and fruit colour. H–K, *M. brevifolia*: H, mature fruit; I, fruiting branchlets with widely spaced leaves; J, stems with dense foliage and fruit; detail of shoot showing glabrous leaves, sparsely woolly stem and developing fruit. L–M, *M. campanulata*: L, foliage and fruit, showing spongy tube; M, mature fruit with dried wings. Photos: A & B, L. Jansen; C, A.L. Carle; D, F & G, A.C. Robinson, DEWNR; H & K, P.J. Lang, DEWNR; I, J.G. Conran; J & L, D.E. Murfet; M, D.J. Duval, DEWNR.



Pl. 10. A–B, *Maireana carnososa*: A, habit; B, stems, with flowers and developing fruit. C, *M. coronata*, fruiting stem. D–F, *M. enchylaenoides*: D, flowering stem; E, habit; F, leaves and fruit. G–I, *M. eriantha*: G, flowering stems; H, foliage and fruit; I, habit and habitat: young shrub on rocky slope. J–L, *M. erioclada*: J, leaves and fruit; K, stem with dried mature fruit and an immature fruit showing horizontal and vertical; wings; L, habit: shrubs in fruit. Photos: A & B, D.J. Duval, DEWNR; C, E & F, D.E. Murfet; G, I & J, P.J. Lang, DEWNR; H, A.C. Robinson, DEWNR; K, L. Jansen; L, G.N. Carle.



Pl. 11. A, *Maireana georgei*, foliage and fruit with radicular slit. B–C, *M. integra*: B, fruiting stem; C, habit. D, *M. lobiflora*: leaves, flowers and fruit. E–F, *M. microcarpa*: E, foliage and developing fruit; F, habit and habitat: shrub in depression on gibber plain. G–I, *M. oppositifolia*: G, detail of fruit; H, foliage and fruit; I, habit and habitat: erect shrubs on salt lake fringe. J–L, *M. pentatropis*: J, fruit; K, foliage; L, habit: erect shrub on disturbed soil in mallee. Photos: A, K.L. Graham, DEWNR; B & E, P.J. Lang; C & F, P.J. Lang, DEWNR; D, L. Jansen; G–I, T.M. Jaques; J, D.C. Paton; K & L, A.L. Carle.



PL. 12. A. *Maireana pentagona*, habit. B. *M. planifolia*, fruit. C–D. *M. pyramidata*: C, fruit; D, habit and habitat: fruiting and non-fruiting bushes dominating shrubland on open plain with emergent *Myoporum platycarpum*. E–F. *M. radiata*: E, fruit; F, habit. G–H. *M. rohrbachii*: G, branchlet showing flowers, fruit and unevenly spaced leaves. I–J. *M. sedifolia*: I, habit and habitat: dominating a low shrubland community on Nullarbor Plain. K. *M. suaedifolia*, stems showing spindly habit and foliage. L. *M. trichoptera*, fruiting stems. Photos: A, D.J. Duval, DEWNR; B, P.J. Lang; C, K.L. Graham, DEWNR; D & G, D.N. Kraehenbuehl; E & F, G.N. Carle; H & L, D.E. Murfet; I, P.D. Canty, DEWNR; J, L.J. Paton; K, P.J. Ainsley, DEWNR.



Pl. 13. A–C, *Maireana trichoptera*: A, stem and leaves; B, fruit; C, habit. D–F, *M. triptera*: D, fruiting branch; E, fruit and leaves; F, habit. G, *M. turbinata*, fruit, showing entire wing. H, *Neobassia proceriflora*, foliage and fruit. I, *Osteocarpum pentapterum*, mature fruit. J–L, *O. acropterum* var. *acropterum*: J, flowering stems; K, fruiting stems; L, habit. Photos: A & C, L.J. Paton; B, S.A. Seed Conservation Centre, DEWNR; D–F, J & L, A.C. Robinson, DEWNR; G & I, D.E. Murfet; H & K, P.D. Canty, DEWNR.



PL. 14. A–B, *Rhagodia candolleana* subsp. *argentea*, foliage and fruit, showing variation in leaf shape. C–F, *R. candolleana* subsp. *candolleana*: C, foliage with flowering and fruiting panicles; D, fruit; E, leaves, showing grey sheen on lower surface; F, habit: shrub on coastal sand. G–I, *R. crassifolia*: G, foliage and fruiting panicle; H, habit and habitat: fine-leaved shrub under mallee; I, stem with fruiting panicle, showing sub-terete leaves. J–L, *R. parabolica*: J, foliage with flowering and fruiting panicles; K, leaf; L, habit and habitat: large rounded shrub on calcareous loam in open woodland. Photos: A & B, P.D. Canty, DEWNR; C, D, F, & J, R.K. Sandercock; E, T.M. Jaques; G, H, K & L, L. Jansen.



PL. 15. A–B, *Rhagodia preissii* subsp. *preissii*: A, flowering panicle and foliage; B, habit. C. *R. ulicina*, flowering branchlets, showing divaricate spinescent habit. D–F, *Salsola australis*: D, flowering spikes; E, fruit; F, habit. G–I, *Sarcocornia blackiana*: G, flowering spikes; H, fruiting plant; I, vegetative articles and dried fruiting spike. J–L, *S. quinqueflora*: J, flowering spikes; K, vegetative articles and remains of fruiting spike; L, habit. Photos: A, D.C. Paton; B, A.L. Carle; C, E, F, H, J & L, R.K. Sandercock, DEWNR; D, P.J. Lang; G, I, & K, T.M. Jaques.



Pl. 16. **A**, *Sclerolaena bicornis* var. *bicornis*, foliage and fruit. **B–E**, *S. blackiana*: **B**, glabrescent branchlets with fruit; **C**, branchlets with flowers and fruit; **D**, habit & habitat: densely villous shrub growing in cracking clay soil; **E**, habitat: young plants in gypseous country with breakaways. **F**, *S. brachyptera*, habit. **G**, *S. convexula*, foliage and fruit. **H–I**, *S. decurrens*: **H**, branchlets with flowers and developing fruit; **I**, habit. **J**, *S. diacantha*, foliage and fruit. **K**, *S. intricata*, foliage and fruit. **L**, *S. lanicuspis*, foliage and fruit. **M**, *S. longicuspis*, foliage and fruit. Photos: **A**, **C** & **F–I**, A.C. Robinson, DEWNR; **B**, **D**, **L** & **K**, P.D. Canty, DEWNR; **E**, A.C. Robinson; **J**, G.N. Carle; **M**, F. Kutsche, DEWNR.



PL. 17. **A–B, *Sclerolaena obliquicuspis***: A, habit & habitat: dominant in patch of low shrubland, Nullarbor Plain; B, leaves and immature fruit. **C, *S. parviflora***, leaves and fruit. **D–E, *S. tatei***; D, leaves and fruit; E, flowering branchlet of medium-sized shrub on gibber plain habitat. **F, *Suaeda uniflora***, habit and habitat: low shrub on coastal cliff. **G–L, *Suaeda australis***: G, branchlet with axillary clusters of flowers; H, foliage, showing colour variation; I & J, habit and habitat: I, erect shrubs in *Melaleuca* Low Woodland near salt lake; rounded spreading shrubs in estuarine low shrubland; K, leaves and fruit. **M, *S. baccifera***: fruiting branchlets, showing crowded bristle-tipped leaves. Photos: A, P.J. Lang, DEWNR; B, P.J. Lang; C, A.L. Carle; D, A.C. Robinson, DEWNR; E, D.E. Murfet; F, W.P. Kutsche; G–J & L, T.M. Jaques; K & M, R.K. Sandercock, DEWNR.



Pl. 18. A–C, *Tecticornia arbuscula*, flowering branchlets with styles protruding; B, fruiting branchlet with persistent style bases; C, habit. D–G, *T. cupuliformis*: D & E, flowering spikes; F & G, habit. H, *T. disarticulata*, flowering spikes with stamens protruding. I–M, *T. flabelliformis*: I & J, branchlets with fruiting spikes; K–M, habit. Photos: A, D, E, Murfet; B, C & K, R.K. Sandercock, DEWNR; D & G, D.J. Duval, DEWNR; E & F, A.C. Robinson DEWNR; H, J.S. Gillen, DEWNR; I, J, L & M, T.M. Jaques.



Pl. 19. A–C, *Tecticornia halocnemoides* subsp. *halocnemoides*, A, vegetative articles from above showing red colouration under stress; B, flowering spikes with styles protruding; C, plant with dried fruiting spikes. D, *T. pruinosa*, vegetative articles and dried fruiting spikes. E & F, *T. tenuis*: E, habit; F, vegetative articles and dried fruiting spikes. G–H: *T. verrucosa*: G, flowering spikes; H, habit. I–K, *Threlkeldia diffusa*: I, leaves and immature fruit; J, ripe fruit; K, habit: spreading plant on coastal sand, with foliage starting to turn purplish under stress. Photos: A, B, & K, T.M. Jaques; C, E, F & J, R.K. Sandercock, DEWNR; D, P.J. Lang; G & H, A.C. Robinson DEWNR; I, L. Jansen.