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New and priority taxa in the genera *Cryptandra* and *Stenanthemum* (Rhamnaceae) of Western Australia

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Abstract

Rye, B.L. New and priority taxa in the genera *Cryptandra* and *Stenanthemum* (Rhamnaceae) of Western Australia. Nuytsia 10 (2): 255-305 (1995). The genus *Stenanthemum* is reinstated, with two new combinations: *Stenanthemum complicatum* (F. Muell.) Rye and *S. divaricatum* (Benth.) Rye. The following new Rhamnaceae taxa, some of which have conservation significance, are described and illustrated: *Cryptandra apetala* var. *anomala* Rye, *C. arbutiflora* var. *borealis* Rye, *C. arbutiflora* var. *intermedia* Rye, *C. arbutiflora* var. *pygmaea* Rye, *C. aridicola* Rye, *C. congesta* Rye, *C. distigma* Rye, *C. graniticola* Rye, *C. intonsa* Rye, *C. minutifolia* Rye, *C. minutifolia* subsp. *brevistyla* Rye, *C. nola* Rye, *C. polyclada* subsp. *aequabilis* Rye, *C. recurva* Rye, *C. wilsonii* Rye, *Stenanthemum bilobum* Rye, *S. cristatum* Rye, *S. emarginatum* Rye, *S. intricatum* Rye, *S. limitatum* Rye, *S. mediale* Rye, *S. nanum* Rye, *S. newbeyii* Rye, *S. notiale* Rye, *S. notiale* subsp. *chamelum* Rye, *S. petraeum* Rye, *S. poicilum* Rye, *S. reissekii* Rye and *S. stipulosum* Rye. A few additional species of *Cryptandra* and *Stenanthemum* that are presently included on the Priority Flora List are also illustrated.

Introduction

Cryptandra and *Stenanthemum* are the two largest genera of the family Rhamnaceae in Western Australia, but the latter name is scarcely known because it has not been used for taxa in this state since the 1920s. *Stenanthemum* is accepted here in the sense that it was originally circumscribed by Reissek (1858), and not as reduced by Bentham (1863) to exclude those species with a short floral tube. Although generic limits in the south-western Australian Rhamnaceae have yet to be fully defined, Kevin Thiele (pers. comm.), who is studying the generic boundaries throughout Australia, agrees with the need to reinstate the genus *Stenanthemum*. The short-flowered *Stenanthemum* species that Bentham transferred to *Spyridium* and long-flowered species that have since been included in *Cryptandra* are too closely related to be placed in separate genera. There is no clearly defined separation of flower length between the two categories and there are no correlating characters that can be used to distinguish them. Both *Cryptandra* and *Spyridium* also have short- and long-flowered species among their typical members.

An earlier paper (Rye 1995) dealing with *Spyridium* and *Trymalium* species outlines the main distinguishing characteristics of those genera. *Spyridium* has often been confused with the two genera treated here but differs in its disc, fruit and aril. Typical *Cryptandra* and *Stenanthemum* species can

be distinguished from one another by differences in their vegetative characters, inflorescence, disc and degree of superiority of the ovary in fruit. In Western Australia there are approximately 19 species in *Cryptandra* with these typical features and 21 in *Stenanthemum*. At least ten further species are of uncertain generic placement as they have unique characters or unusual combinations of characters. New genera will probably be needed to accommodate some of these uncertain taxa, which will be dealt with in a later paper after the generic boundaries in the family have been examined further.

The purpose of this paper is to provide scientific names, descriptions and illustrations for new Western Australian taxa in the genera *Cryptandra* and *Stenanthemum* and to give information on any additional members of these genera that are currently listed on the Priority Flora List. Publication of keys and distribution maps is intended for a later paper, together with a complete listing of Rhamnaceae for Western Australia.

Materials and methods

Type specimens were borrowed from LD, MEL and W and specimens of taxa extending into South Australia were borrowed from AD. Unless otherwise indicated, all specimens cited were housed at PERTH. All measurements, habitat information, flowering times and other data were obtained from the herbarium specimens. To avoid unnecessary repetition of characters in the descriptions of new taxa, a list of implicit characters was prepared, the individual descriptions only mentioning these characters if they differed from the usual state for their genus. The implicit characters are relevant to those Western Australian species listed as included in this study and should not be taken as generic characters for the genus as a whole.

Conservation codes were assigned to the taxa using the standards adopted by the Western Australian Department of Conservation and Land Management for its Priority Flora List and Gazetted Rare Flora List. These codes are defined at the end of each "Nuytsia" issue.

Results

Species included in the genus *Cryptandra* Sm.

Apart from the species listed below, the following Western Australian species are considered to be typical of the genus *Cryptandra*: *C. leucopogon* Meisn. ex Reissek, *C. monticola* Rye & Trudgen, *C. myriantha* Diels, *C. nutans* Steud. and *C. spyridioides* F. Muell. There are also many members of the genus in eastern Australia.

Implicit characters for *Cryptandra*

Indumentum white or clear. *Stipules* persistent, each pair shortly united at the base on lower (abaxial) side of petiole, meeting but free on the upper side of petiole. *Petioles* protruding from the connate base of the stipules, glabrous. *Leaves* entire, with recurved to revolute margins partially to completely concealing the lower surface; upper surface green. *Bracts* brown, glabrous or subglabrous inside. *Flowers* subtended by one or more whorls of bracts, all or the lower ones of each branchlet also subtended by a leaf and its paired stipules. *Floral tube* extended into a free tube above the ovary

summit. *Disc* occurring at or near the junction of the free floral tube and ovary, undulate with 5 lobes opposite the sepals, expanding and becoming circular in fruit, densely stellate-hairy. *Ovary* 3-celled, densely stellate-hairy. *Style* glabrous throughout or with a few stellate hairs at the extreme base; stigmatic lobes 3, minute, spreading. *Fruit* a schizocarp; fruitlets crustaceous, dehiscing over the summit and down inner surface, with an open basal attachment forming a basal hole when the fruitlet is shed from the plant. *Seeds* with a dark blackish base seated on an aril, uniformly coloured above; aril succulent, whitish-translucent, with one inner (adaxial) and two lateral lobes.

Cryptandra apetala Ewart & Jean White, Proc. Roy. Soc. Victoria 22: 93, pl. 21 (1909). *Type:* Cowcowing, Western Australia, September, *M. Koch* 1596 (*n.v.*, illustration seen).

Cryptandra apetala var. **anomala** Rye, var. nov.

Cryptandrae apetalae var. *apetalae* floribus petalis instructis recedit.

Typus: 5 miles [8 km] W of Hines Hill, Great Eastern Highway, Western Australia, 20 August, 1961, *A.S. George* 2664 (*holo:* PERTH 01514121; *iso:* CANB).

Shrub 0.15-0.5 m high. *Young stems* sparsely to densely minutely stellate-hairy, sometimes also with longer simple hairs 0.2-0.3 mm long. *Stipules* 0.5-1 mm long, acute to long-acuminate, minutely ciliate; outer surface often with minute hairs along the midvein, rarely with scattered minute stellate hairs throughout. *Petioles* 0.3-0.4 mm long. *Leaf blades* usually narrowly elliptic or narrowly oblong-elliptic, 2.1-2.8 x 0.5-1 mm acute, the apex erect (not recurved); lower surface partially to completely concealed, densely to very densely stellate-hairy and usually with a few simple hairs 0.2-0.3 mm long along the midvein; upper surface very sparsely to densely minutely stellate-hairy. *Floral bracts c.* 6, very broadly ovate, 0.6-1 mm long, obtuse or acute, minutely ciliate; outer surface usually minutely hairy along the midvein. *Flowers* 1-5 per branchlet, in a spike-like or head-like cluster 3-5 mm wide, white to cream or pink and white (the sepals sometimes white with pink tips). *Floral tube* 0.7-0.9 mm long (enlarging to 1.5-1.7 mm in fruit), densely minutely stellate-hairy; adnate portion of tube 0.3-0.5 mm long, more densely hairy than free portion; free portion of tube 0.4-0.5 mm long. *Sepals* 0.6-0.8 mm long, densely minutely stellate-hairy and with simple hairs 0.2-0.3 mm long at apex. *Petal claw* 0.2-0.4 mm long. *Disc* with hairs *c.* 0.1 mm long. *Ovary summit* with hairs 0.1-0.2 mm long. *Style* 0.4-0.5 mm long. *Schizocarp* slightly less than half inferior (*c.* four-sevenths inferior), 2-2.5 x 1.5-1.8 mm; superior portion densely stellate-hairy, the apex protruding well above the base of the sepals. *Seeds* not seen at maturity. (Figure 1A-E)

Other specimens examined. WESTERN AUSTRALIA: Hyden, 6/9/1966, *M. Barrow* 21; between Corrigin and Quairading, 4/10/1933, *W.E. Blackall* 3248; near Wyalkatchem, 10/1937, *W.E. Blackall*; 3-5 km E of Merredin on Great Eastern Highway, 29/9/1981, *R. Spjut, G. White & R. Phillips* 7234; Kwolyin, 11/1920, *E.H. Wilson & D.A. Herbert* 157; 1 km S of Lake King township, 9/8/1968, *P.G. Wilson* 6944.

Distribution. Extends from near Wyalkatchem and Merriden south east to Lake King, southern Western Australia.

Habitat. Variously recorded from "yellow sand over laterite", "heath" and "*Eucalyptus* woodland and *Acacia* bushland".

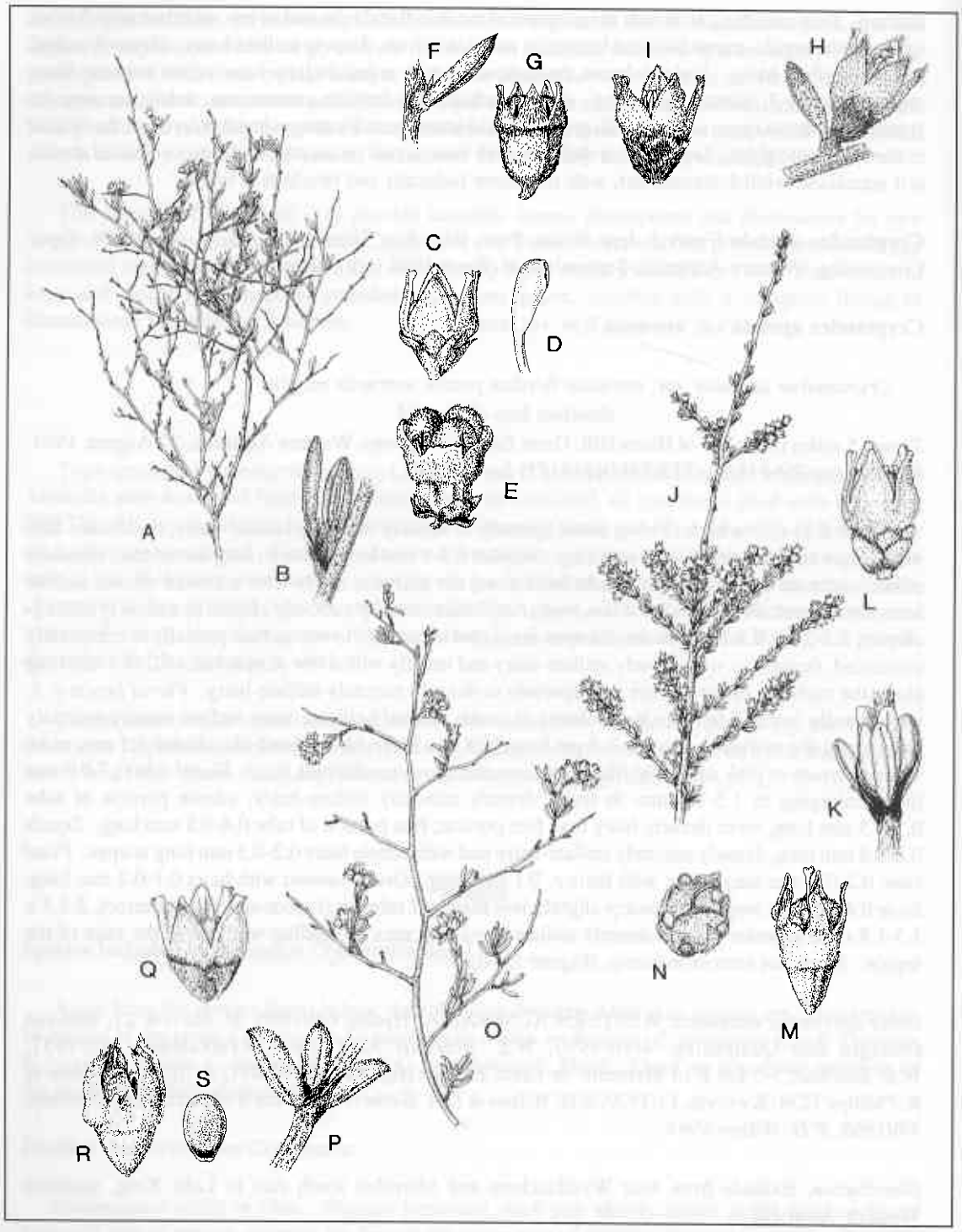

Figure 1. A-E. *Cryptandra apetala* var. *anomala.* A - flowering branch (x1), B - portion of stem with leaf cluster (x7), C - flower and bracts (x10), D - petal (x30), E - schizocarp and bracts (x7); F,G - simple-haired variant of *C. apetala* var. *apetala.* F - stipules and leaf (x10), G - schizocarp (x8); H,I - stellate-haired variant of *C. apetala* var. *apetala*, flower and bracts (x10), I - stipules, leaf and flower (x10); J-N - *C. distigma.* J - flowering branch (x1), K - leaf cluster (x6), L - flower and bracts (x8), M - schizocarp (x8), N - schizocarp from top view splitting in half (x8); O-S - *C. recurva.* O - flowering branch (x1), P - leaf cluster (x6), Q - flower with bracts (x8), R - schizocarp (x7), S - seed (x7). Drawn from *M. Barrow* 21 (A-E), *A. Fairall* 1763 (F,G), *Y. Chadwick* 1735 (H), *R.J. Cranfield* 2332 (I), *K.R. Newbey* 8821 (J-L), *A.S. George* 5842 (M,N), *K.R. Newbey* 6108 (O-Q) and *M.A. Burgman* 3773 (R,S).

Flowering period. August-October. Fruits recorded September-November.

Conservation status. Not presently listed as a priority taxon, but it may need monitering as it occurs in wheatbelt areas where there are few remnant patches of bushland and is not known from any conservation reserves. It has a geographic range of approximately 300 km.

Etymology. From the Greek *anomalos* - inconsistent or deviating from the normal rule, referring to the anomaly of this variety having petals but belonging to a species named *apetala*.

Notes. This variety is distinguished by its distinct geographical range and presence of petals from the apetalous typical variety. Two specimens (*W.E. Blackall* 4001, 8/1930) of var. *apetala* do have a few flowers with petals attached, but these petals are abnormal, being reduced in size and apparently easily shed. Both normal and abnormal petals have a long claw, a character distinguishing *C. apetala* from two related species, *C. nutans* and *C. recurva*.

Cryptandra apetala Ewart & Jean White var. **apetala**

Variants. Very variable in indumentum. There are two main variants, which probably intergrade.

1. Simple-haired variant. This variant is distinguished by the simple hairs on the young stems and upper surface of the leaves but one specimen also has some stellate hairs on the stems. (Figure 1F,G)

2. Stellate-haired variant. This variant is similar to *C. apetala* var. *anomala* except that it generally lacks petals, although a couple of specimens have a few flowers with reduced petals. As there are no unopened buds on these specimens, it is not known whether only some flowers have petals, or whether all flowers have petals to begin with and these petals are shed after the flowers open. A few specimens differ from the rest in having ferruginous hairs on the bracts. (Figure 1H,I)

Distribution. Extends from Nerren Nerren Station (north of Kalbarri National Park) south east to Barker Lake.

Flowering period. June-September. Fruits July-November.

Conservation status. Widespread, with a range of *c.* 720 km, including two nature reserves. The simple-haired variant might be at risk, however, as it is not known from any nature reserves and has not been collected since 1974. It has been recorded from three localities in the Lake Moore-Cowcowing area, with a range of at least 75 km.

Cryptandra arbutiflora Fenzl in Endl., Fenzl, Benth. & Schott, Enum. Pl. Hueg. 26-27 (1837). - *Wichurea arbutiflora* (Fenzl) Nees ex Reissek, Pl. Preiss. 2: 290 (1848). *Type:* Swan River, [Western Australia], *Huegel* (W).

Implicit characters for the species. Branchlets tending to be spinescent. *Young stems* with simple hairs. *Stipules* glabrous. *Leaf blades* elliptic to linear, usually acute, with an erect to recurved mucro. *Floral bracts* usually 7-10 per flower, broadly or very broadly ovate, *c.* 1 mm long, acute, glabrous, entire at first but often becoming lacerate. *Flowers* (1)2-many per branchlet, in a loose spike- or raceme-like cluster 5.5-9 mm wide and up to 20 mm long, glabrous. *Petals* subsessile or with a claw *c.* 0.1 mm long. *Disc* with hairs *c.* 0.2 mm long. *Schizocarp* with the superior portion concealed within the free floral tube.

Cryptandra arbutiflora Fenzl var. **arbutiflora**

Conservation status. Widespread and not considered to be at risk.

Cryptandra arbutiflora var. **borealis** Rye, var. nov.

A aliis varietatibus *Cryptandrae arbutiflorae* pilis caulis brevissimis recurvis vel retrorsis differt.

Typus: 17 km from Northampton on Port Gregory road, Western Australia, 8 August 1994, *S. Patrick* 1966 (*holo:* PERTH 04159810; *iso:* CANB).

Shrub erect or spreading, 0.25-1 m high. *Young stems* with coarse, recurved or retrorse hairs up to 0.1 mm long. *Stipules* 1.5-2.2 mm long, acute. *Petioles* 0.5-1.2 mm long. *Leaf blades* 4-8(14) x 0.6-2(2.5) mm, glabrous on both surfaces. *Flowers* white at first, turning pink or rarely red with age. *Floral tube* 1.2-1.8(2.3) mm long (enlarging to 2-2.5(3) mm in fruit); adnate portion of tube 0.2-0.4 mm long; free portion of tube 1.0-1.5(2.0) mm long. *Sepals* 1.0-1.8 mm long. *Ovary summit* usually sparsely hairy. *Style* 1.7-2.8 mm long; stigmatic lobes *c.* 0.2 mm long. *Schizocarp* up to half (two-fifths to half) inferior, 2.2-2.8 x 1.5-1.7 mm; superior portion usually with a few large stellate hairs, the hairy disc located directly above the junction between the ovary and free floral tube and usually touching it. *Seeds* 1.3-1.6 x 0.7-1.1 mm, orange brown. (Figure 2A-C)

Selected specimens examined. WESTERN AUSTRALIA: Kalbarri National Park, 20/7/1967, *A.M. Ashby* 2165; Wokatherra Hill, 22/8/1983, *R.J. Cranfield* 2685; 3 miles [5 km] W of Casuarina, 5/8/1976, *R.J. Hnatiuk* 760338; *c.* 15.4 km S of Northampton along North West Coastal Highway, 21/8/1983, *C.M. Lynch* 28; Oakajee Reserve, 7/8/1994, *S. Patrick* 1953; 25 km S of Murchison River and 10 km N of Hutt along North West Coastal Highway, 11/9/1981, *R. Spjut & C. Edson* 7054; Spalding Park Reserve, Chapman River, 26/6/1981, *K.E. Watson* 109.

Distribution. Extends from Kalbarri south to Geraldton and also recorded at Casuarina, southern Western Australia.

Habitat. Occurs in sand over sandstone, limestone, quartz or other types of rocks.

Flowering period. May-August. Fruits recorded July-September.

Conservation status. Not considered to be at risk at present.

Etymology. From the Latin *borealis* - northern, this variety occupying the northern part of the species range.

Notes. The other varieties of *Cryptandra arbutiflora* all differ from var. *borealis* in having patent or spreading, usually longer, hairs on the stems, and each differs in at least one other character, such as leaf indumentum or flower length.

Cryptandra arbutiflora var. **intermedia** Rye, var. nov.

A aliis varietatibus *Cryptandrae arbutiflorae* pagina infera foliorum juvenium dense stellato-pubescentibus differt.

Typus: 2 km SW of Jurien Bay turnoff from Brand Highway, 3.7 km W along track opposite Marchagee track, Western Australia, 2 July 1992, *R.J. Cranfield & P. Spencer* 8283 (*holo:* PERTH 02847515; *iso:* CANB).

Shrub erect, 0.3-0.7 m high. *Young stems* with coarse or fine, patent or spreading hairs, the larger ones usually 0.2-0.3 mm long but sometimes minute. *Stipules* 0.8-1.4 mm long, attenuate to acuminate. *Petioles* 0.4-1.2 mm long. *Leaf blades* 3-9 x 0.6-2 mm; lower surface densely stellate-hairy at first, sometimes becoming glabrous; upper surface often with simple patent hairs, the larger hairs 0.2-0.3 mm long, sometimes glabrous. *Flowers* usually white, rarely pink. *Floral tube* 1.5-2.6(3) mm long (enlarging to 2-4 mm in fruit); adnate portion of tube *c.* 0.4 mm long; free portion of tube 1.2-2.8 mm long. *Sepals* 1.2-1.7 mm long. *Ovary summit* usually with scattered stellate hairs, sometimes more densely hairy or glabrous. *Style* 1-1.7 mm long; stigmatic lobes *c.* 0.2 mm long.

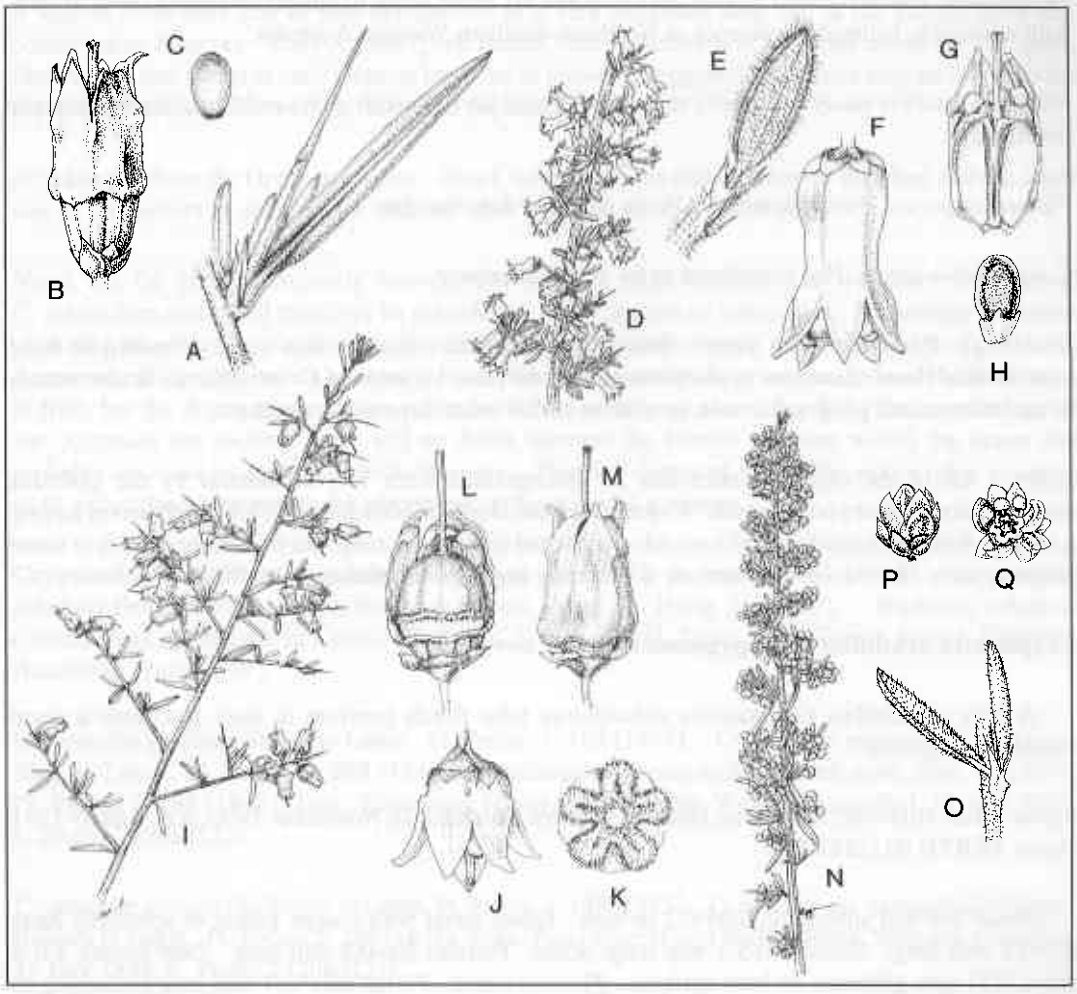

Figure 2. A-C - *Cryptandra arbutiflora* var. *borealis*. A - spinescent branchlet(x7), B - fruit (x6), C - seed (x7); D-H - *C. arbutiflora* var. *intermedia*. D - flowering stem (x1), E - stipules and undersurface of leaf (x7), F - flower with bracts (x7), G - dehisced fruitlet (x7), H - inner surface of seed and aril (x7); I-M - *C. arbutiflora* var. *pygmaea*. I - fruiting branch (x1), J - flower with bracts (x8), K - top view of disc (x15), L - schizocarp with bracts (x8), M - schizocarp, showing the disc separated from the floral tube (x8); N-Q - *Cryptandra arbutiflora* var. *tubulosa* (*C. glabrata* type). N - branch with very young flower buds (x1), O - leaf cluster (x6), P - young flower bud and bracts (x6), Q - disc surrounded by parts of opened bud and bracts (x6). Drawn from *Spjut & Edson* 7054 (A,B), *F.W. Went* 27 (C), *E.A. Griffin* 4823 (D-F), *E.A. Griffin* 2395 (G,H), *A.R. Annels* 1291 (I), *E. Wittwer* 1563 (J,K), *A.R. Annels* 1281 (L,M), and *L. Preiss* 2420b, type specimen from LD (N-Q).

Schizocarp largely superior to half inferior (one-fifth to half inferior), 2.2-2.6 x 1.5-1.7 mm; superior portion stellate-hairy or sometimes glabrous, the hairy disc located directly above the junction between the ovary and free floral tube and usually touching it. *Seeds* 1.3-1.5 x 0.6-0.8 mm, sometimes uniformly coloured but usually orange brown or reddish brown centrally, the central area surrounded by darker spots or a darker boundary, the margin often more yellowish brown. (Figure 2D-H)

Selected specimens examined. WESTERN AUSTRALIA: 35 miles [56.4 km] W of Watheroo on Badgingarra road, 18/7/1965, *J.C. Anway* 192; off Jurien Rd, 6 km W of Brand Highway, 12/10/1979, *E.A. Griffin* 2393 & 2395; 2.5 km E of Mt Peron, 25/7/1980, *E.A. Griffin* 2745; Yandan Nature Reserve (39571) SE of Cataby, 28/6/1988, *E.A. Griffin* 4860; near Coomallo Creek, 3/8/1976, *R.J. Hnatiuk* 760118; Gingin Cemetery, 7/8/1973, *A. Kanis* 1509; Mt Lesueur, 26/10/1973, *D. Kitchener* 69; near Moora, 4/9/1962, *F.W. Went* 92.

Distribution. Extends from Cockleshell Gully and Mt Peron south to Gingin and east to near Moora, with a possible isolated occurrence at Northam, southern Western Australia.

Habitat. Occurs in sandy or gravelly soils, usually over laterite, rarely over sandstone, often on lateritic breakaways.

Flowering period. June-September. Fruits recorded July-October.

Conservation status. Not considered to be at risk at present.

Etymology. From the Latin *inter* - between and *medius* - middle, this variety tending to have intermediate floral characters in comparison with the other varieties of *C. arbutiflora*. It also occurs in an intermediate geographic area in relation to the other three main varieties.

Notes. All of the other varieties can be distinguished from var. *intermedia* by the glabrous undersurface of their young leaves. A specimen from Northam (*Gregory* 10/1900) with leaves having a stellate-hairy undersurface, falls outside the normal geographic range for this variety and is in some respects more like var. *arbutiflora*, so is presently regarded as intermediate.

Cryptandra arbutiflora var. **pygmaea** Rye, var. nov.

A aliis varietatibus *Cryptandrae arbutiflorae* tubo florali breviore in statu fructifero a disco manifeste disjuncto.

Typus: Muir Highway, Manjimup District, Western Australia, 16 November 1990, *A.R. Annels* 1291 (*holo:* PERTH 03128830).

Shrub low and spreading, 0.05-0.2 m high. *Young stems* with coarse, patent or spreading hairs 0.1-0.2 mm long. *Stipules* 0.5-1 mm long, acute. *Petioles* 0.6-0.8 mm long. *Leaf blades* 3-6 x 0.6-1.5(2) mm, glabrous on both surfaces. *Flowers* white. *Floral tube c.* 1 mm long (enlarging to *c.* 2 mm in fruit); adnate portion of tube *c.* 0.3 mm long; free portion of tube *c.* 0.7 mm long. *Sepals c.* 1.5 mm long. *Ovary* summit glabrous. *Style* 1.5-2 mm long; stigmatic lobes lateral, *c.* 0.3 mm long. *Schizocarp* less than half (one-fifth to one-third) inferior, 2-2.5 x *c.* 1.4 mm; superior portion glabrous, the hairy disc located 0.25-0.4 mm above the junction between the ovary and free floral tube. *Seeds* not seen at maturity. (Figure 2I-M)

Other specimens examined. WESTERN AUSTRALIA: N side of Muir Highway, 150 m E of Ireland Rd, 15/11/1990, *A.R. Annels* 1281; Muir Highway, 20 km E of Manjimup, 16/8/1975, *E. Wittwer* 1563.

Distribution. Restricted to a very small area in the Nyalup-Lake Muir area, east of Manjimup, southern Western Australia.

Habitat. Occurs on shallow clay around granite outcrops, in heath vegetation surrounded by Jarrah forest.

Flowering period. August-October. Fruits recorded November.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 1. This taxon is known from only one or two populations in a very restricted area and is not known from any conservation reserves. Tony Annels (pers. comm.) has collected it at two sites about 0.8 km apart, observing a few plants at each location but none in between, suggesting that there may be two discrete populations rather than a single scattered population.

Etymology. From the Greek *pygmaios* - dwarf, referring to the small stature of the plant and the small size of its flowers in comparison with the other varieties of *C. arbutiflora*.

Notes. As far as it is currently known, this taxon is more distinct than the other varieties of *C. arbutiflora* and could therefore be regarded as a new species or subspecies. It is usually a smaller plant than the other varieties and has shorter flowers owing to the shorter free portion of the floral tube. A more significant difference appears to be the distinct separation between the disc and the floral tube in fruit, but the degee of separation varies, as it does within var. *borealis*. If further populations of var. *pygmaea* are located, these will no doubt increase the known variation within the taxon and probably decrease its apparent 'distinctiveness'. The high degree of variability within other varieties of *C. arbutiflora* also argues for placement of the taxon as a variety.

Cryptandra arbutiflora var. **tubulosa** (Fenzl) Benth., Fl. Austral. 1: 444 (1863). - *Cryptandra tubulosa* Fenzl in Endl., Fenzl, Benth. & Schott, Enum. Pl. Hueg. 26 (1837). - *Wichurea tubulosa* (Fenzl) Nees ex Reissek in Lehm., Pl. Preiss. 2: 291 (1848). *Type:* King George Sound, [Western Australia], *Huegel* (W).

Cryptandra glabrata Steud. in Lehm., Pl. Preiss. 1: 188 (1845). - *Cryptandra miliaris* Reissek *nom. illeg.* in Lehm., Pl. Preiss. 2: 288 (1848), *C. miliaris* var. *psilophylla* Reissek *nom. illeg.* in Lehm., Pl. Preiss. 2: 288 (1848). *Type:* Pointwater [Point Walter, Perth, Western Australia], 17 July 1839, *L. Preiss* 2420a (LD).

Cryptandra lasiophylla Steud. in Lehm, Pl. Preiss. 1: 188 (1845). - *C. miliaris* var. *lasiophylla* (Steud.) Reissek in Lehm., Pl. Preiss. 2: 288 (1848). *Type:* Pointwater [Point Walter, Perth, Western Australia], 17 July 1839, *L. Preiss* 2420b (LD).

Conservation status. Var. *tubulosa* is known from many populations with a range of over 300 km, including some on nature reserves, so is not considered to be at risk. However, it was mistakenly included twice on the 1990 Priority Species List, under the names *Cryptandra miliaris* and

C. tubulosa, the latter described as an extinct taxon from King George Sound. As *C. miliaris* was an illegitimate name, the earlier name of *C. glabrata* was adopted for the 1994 Priority Species List, at which stage it was thought to be a distinct species known only from the type specimens.

Notes. Typical var. *tubulosa* has a coastal distribution extending from Perth southwards and occurring near Northcliffe on the south coast. Although King George Sound was given as the type locality, there are no recent collections from that area and it appears that the cited locality referred vaguely to a large region of southern Western Australia rather than the specific sound near Albany.

An atypical variant with a glabrous or relatively sparsely hairy disc (Figure 2N-Q) was originally given two species names, *Cryptandra glabrata* and *C. lasiophylla*, which were later combined under a further name *C. miliaris*. This variant does not appear to be sufficiently distinct to be given a separate varietal name and is reduced here to a synonym of *C. arbutiflora* var. *tubulosa*. It has not been collected since the original specimens were taken in 1839 from Point Walter, Perth, despite a recent search at the type locality, where the vegetation is now much degraded. The nature of this taxon was obscure because the type specimens were collected in early bud and lacked mature flowers and fruits. However, its vegetative characters, inflorescence type and glabrous flower buds match *C. arbutiflora*. Judging from the most advanced flower bud found on the type specimens, the flowers would be elongate at maturity like those of *C. arbutiflora*.

Although descriptions in several early works, such as Bentham (1863), indicate that the Point Walter taxon has a glabrous disc, contrasting with the densely hairy disc of *Cryptandra arbutiflora*, only one of the type specimens (*L. Preiss* 2420a) has a glabrous disc. The other specimen (*L. Preiss* 2420b) is intermediate, having a hairy, but not densely hairy, disc. A more obvious difference between the two type specimens is that one has hairy leaves and the other glabrous leaves. Variation in leaf indumentum is one of many variable characters known in most varieties of the highly polymorphic species, *C. arbutiflora*. Certainly, the occurrence of a glabrous disc alone does not warrant recognition of a distinct species. Infra-specific variation in the disc indumentum is known in a number of other Western Australian Rhamnaceae species.

Cryptandra aridicola Rye, sp. nov.

Cryptandrae minutifoliae arcte affine sed basi floris minus pubescenti, costi tubi floralis epilosi, unguibus petalorum longioribus differt.

Typus: Edjudina Station, Western Australia, 9 July 1989, *H. Pringle* 2380 (*holo:* PERTH 01177591; *iso:* CANB, MEL).

Shrub usually spreading, 0.3-0.8 m high. *Branchlets* not spinescent. *Young stems* densely hairy at first with a matted white indumentum, soon becoming glabrous. *Stipules* 0.8-1.3 mm long, acute to acuminate, ciliate. *Petioles* 0.2-0.3 mm long, concealed by united base of stipule pair. *Leaf blades* appearing sessile, narrowly oblong-elliptic, 1.4-3.6 x 0.6-0.7 mm, with a recurved mucro; lower surface concealed; upper surface minutely papillose or glabrous. *Floral bracts* 12-16, broadly ovate to broadly obovate, 2.5-3.5 mm long, obtuse, minutely or sometimes distinctly ciliate, the cilia 0.1-0.2 mm long; outer surface glabrous; inner surface hairy along the midvein or central area in the distal half. *Flowers* solitary or few (usually 2-7) per branchlet, in a spike-like cluster 10-18 mm wide, white or occasionally pink. *Floral tube* 2.5-3.5 mm long (enlarging to 3.4 mm or more in fruit); adnate portion of tube 0.4-0.6 mm long, densely stellate-hairy on basal half, glabrous or sparsely stellate-hairy

on distal half; free portion of tube 2.1-2.9 mm long, glabrous or subglabrous on basal half, becoming moderately densely hairy towards the summit between the glabrous ribs, the indumentum similar to that on base of sepals. *Sepals* 2.7-3.7 mm long, densely stellate-hairy and with larger simple hairs at least towards the apex; simple hairs 0.4-0.6 mm long. *Petal claw* 0.5-0.8 mm long. *Disc* with hairs 0.1-0.3 mm long. *Ovary summit* with hairs 0.2-0.5 mm long. *Style* 3.5-5 mm long. *Schizocarp* about half inferior, *c.* 3.3 x 2.2 mm; superior portion concealed within the free floral tube, moderately densely hairy. *Seeds* not seen at maturity. (Figure 3A-E)

Selected specimens examined. WESTERN AUSTRALIA: 16 km E of Bullabulling, 23/8/1939, *W.E. Blackall* 4068; Cundeelee, 1967, *P. Boswell* A21; Boulder Valley, 30/8/1901, *W.D. Campbell*; 19 miles [30.6 km] E of White Cliffs Homestead, E of Laverton, 2/7/1963, *A.S. George* 4567; 21 km E of Cosmo Newberry, 28/7/1974, *A.S. George* 12197; 32 km E of Zanthus, 30/6/1966, *D.W. Goodall* 174/2886; Coolgardie, 9/1899, *R. Helms*; 21 km SE of Sinclair Soak, 6/8/1980, *K.R. Newbey* 6953; 3 km S of Emu Rocks, 22/7/1992, *D.J. Pearson* 1898; Kalgoorlie Nickel Smelter, 30/6/1992, *R. Spencer* 253; Fraser Range, 13/9/1965, *B.L. Turner* 5573.

Distribution. Extends from Anketell Station and near Cosmo Newberry south to near Bank Rock and Fraser Range, southern Western Australia.

Habitat. Occurs in sand or clayey sand, on plains or on rocky ridges or hills.

Flowering period. July-September. Fruits recorded August-September.

Conservation status. Not considered to be at risk at present.

Etymology. From the Latin *aridus* - dry and *-cola* - inhabitant, referring to the arid habitat in which the species occurs.

Notes. Very closely related to *Cryptandra minutifolia*, which differs in being densely hairy throughout on the adnate portion of the floral tube, being hairy on the ribs on the free portion of the tube and in its shorter petal claws and usually shorter style.

Cryptandra congesta Rye, sp. nov.

Cryptandrae myrianthae simile sed bracteis magis manifeste ciliatis, tubo florali longiore, apice styli magis integro differt.

Typus: Mt Lindesay, Western Australia, 10 April 1990, *G.J. Keighery* 11278 (*holo:* PERTH 01177575; *iso:* CANB, MEL).

Shrub low and spreading, 0.1-0.2 m high. *Branchlets* not spinescent. *Young stems* with simple appressed or antrorse hairs 0.1-0.3 mm long. *Stipules* 0.6-1 mm long, acute, glabrous outside or with a few short hairs along midvein, usually with a few cilia. *Petioles* 0.5-0.7 mm long. *Leaf blades* narrowly ovate or narrowly oblong, 2-3.3 x 0.6-0.9 mm, obtuse to acute; lower surface glabrous on the visible midvein, densely hairy on the usually concealed sides; upper surface glabrous, minutely papillose-toothed on the margins especially towards apex. *Floral bracts* 4-6 per flower, ovate, *c.* 2 mm long, acute or attenuate, prominently ciliate, the longest cilia 0.3-0.6 mm long; outer surface often hairy along the midvein. *Flowers* usually 5-12 per branchlet, in a head-like cluster 5-8.5 mm wide,

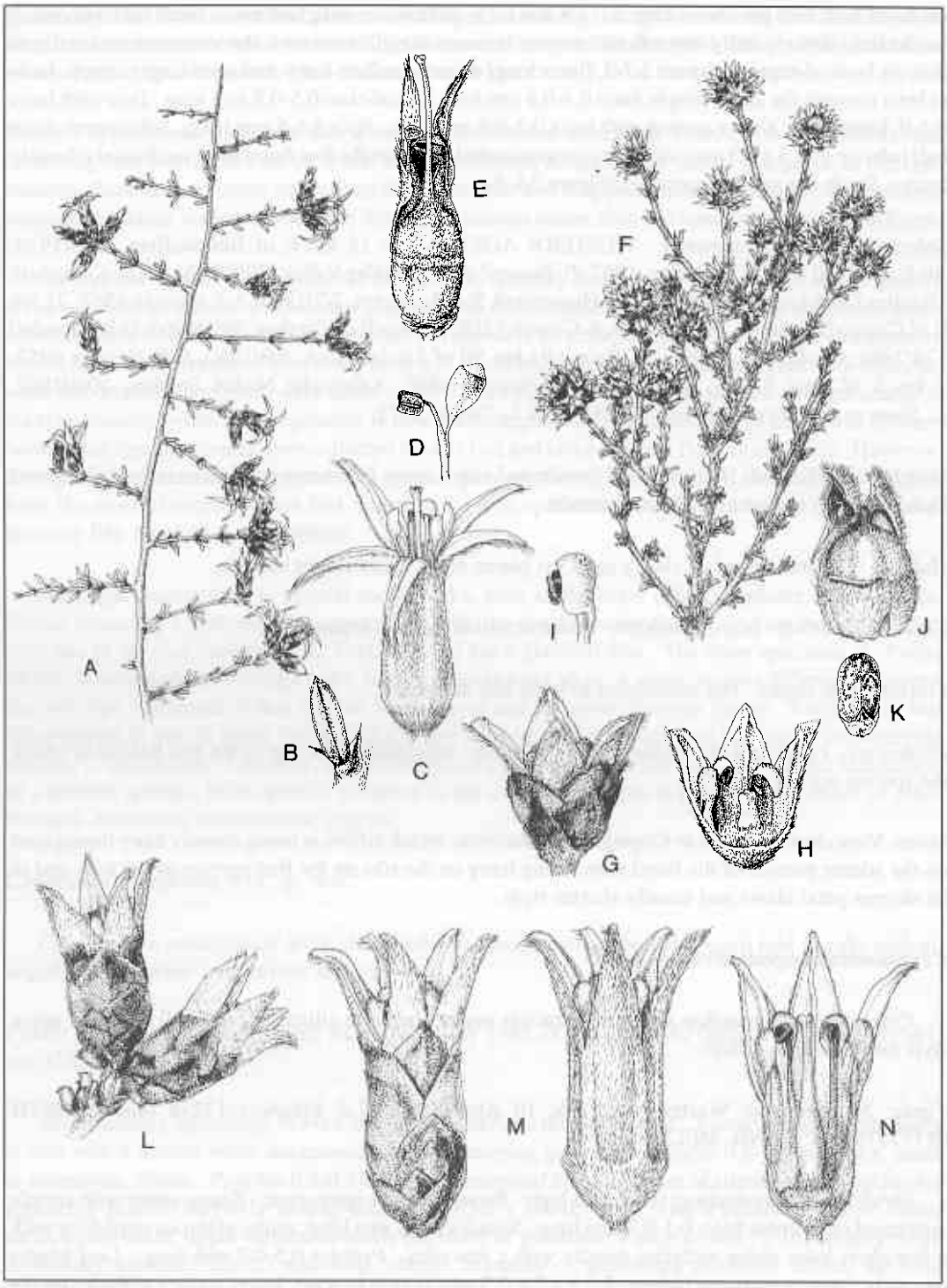

Figure 3. A-E - *Cryptandra aridicola*. A - flowering branch (x1), B - stipules and undersurface of leaf (x5), C - flower (x6), D - petal and stamen (x12), E - fruit (x6); F-K - *C. minutifolia* subsp. *brevistyla*. F - flowering branch (x1), G - mature flower with bracts (x7), H - flower dissected open (x7), I - petal and stamen (x15), J - schizocarp (x7), K - inner surface of seed and aril (x7.5); L-N - *C. minutifolia* subsp. *minutifolia*. L - leaves and flower cluster (x5), M - young flower with and without bracts (x7), N - young flower dissected open (x7). Drawn from *A.S. George* 12197 (A-D), *P.G. Wilson* 12080 (E), *K.R. Newbey* 5110 (F-I), *C.A. Gardner* 2/11/1943 (J,K) and *L. Haegi* 1829 (L-N).

white. *Floral tube* 1.3-1.7 mm long (enlarging to *c.* 2 mm in fruit), glabrous; adnate portion of tube 0.4-0.5 mm long; free portion of tube 0.9-1.2 mm long. *Sepals* 0.8-1.8 mm long, glabrous towards base, becoming densely hairy towards apex, with a mixture of short stellate hairs and simple hairs *c.* 0.3 mm long. *Petal claw* 0.1-0.2 mm long. *Disc and ovary summit* with fine tangled hairs 0.2-0.3 mm long. *Style c.* 1.8 mm long, with some minute papillae or minute simple hairs; stigmatic surfaces lateral, scarcely forming lobes. *Schizocarp c.* half inferior, *c.* 1.8 x 1.4 mm; superior portion concealed within the free floral tube, hairy. *Seeds c.* 1.4 x 0.75 mm, pale to medium orange-brown. (Figure 4A-D)

Other specimens examined. WESTERN AUSTRALIA: Mt Lindesay walk track, 14/4/1992, *B.G. Hammersley* 574; Little Lindesay, 8/10/1994, *B.G. Hammersley* 1192; Denbarker State forest, 8/10/1994, *B.G. Hammersley* 1198.

Distribution. Known from a small area north of Denmark, southern Western Australia.

Habitat. Occurs in coarse sand around granite sheets or outcrops.

Flowering and fruiting period. April-October.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 2. This species is known from several locations in a proposed national park, its known range being about 5 km. In this very restricted area, the species is fairly abundant (B.G. Hammersley pers.comm.).

Etymology. From the Latin *congestus* - crowded, referring to the densely clustered flowers.

Notes. Similar to *Cryptandra myriantha* in having glabrous a floral tube but *C. myriantha* differs in its less prominently ciliate bracts, shorter floral tube and distinctly 3-lobed style apex. *Cryptandra congesta* may be more closely related to species with floral tubes of a similar length, such as *C. polyclada* and *C. wilsonii*, but these can be distinguished readily by their more hairy flowers.

Cryptandra distigma Rye, sp. nov.

Cryptandrae nutans arcte affine sed ungue petali longiori, lobis stigmaticis duobus, ovario 2-cellularibus differt.

Typus: Kirgella Rocks Station, 1.5 km south of causeway, Western Australia, 14 July 1989, *H. Pringle* 2419 (*holo:* PERTH 01166034; *iso:* CANB, MEL).

Shrub 0.5-1.5 m high. *Branchlets* not spinescent. *Young stems* with a dense indumentum of fine matted hairs *c.* 0.3 mm long. *Stipules* 0.7-1.5 mm long, acute to acuminate, ciliate; outer surface often with hairs along midvein. *Petioles* 0.1-0.3 mm long. *Leaf blades* narrowly oblong-elliptic or narrowly obovate, obtuse, 1.3-2.4 x 0.5-0.6 mm; lower surface concealed; upper surface glabrous. *Floral bracts* 3-6 per flower, ovate to very broadly ovate, 0.8-1.2 mm long, acute or obtuse, with cilia 0.05-0.2 mm long; outer surface glabrous or with short hairs mainly along the midvein. *Flowers* usually 3-15 per branchlet, in a spike-like or head-like cluster 4-8 mm wide, white or cream. *Floral tube* 0.8-1.3 mm long (enlarging to 2-2.3 mm in fruit), minutely stellate-hairy, usually also with short simple hairs 0.2-0.4 mm long; adnate portion of tube 0.4-0.7 mm long, very densely hairy, usually with large hairs mainly towards the summit; free portion of tube 0.4-0.6 mm long, densely or moderately densely hairy.

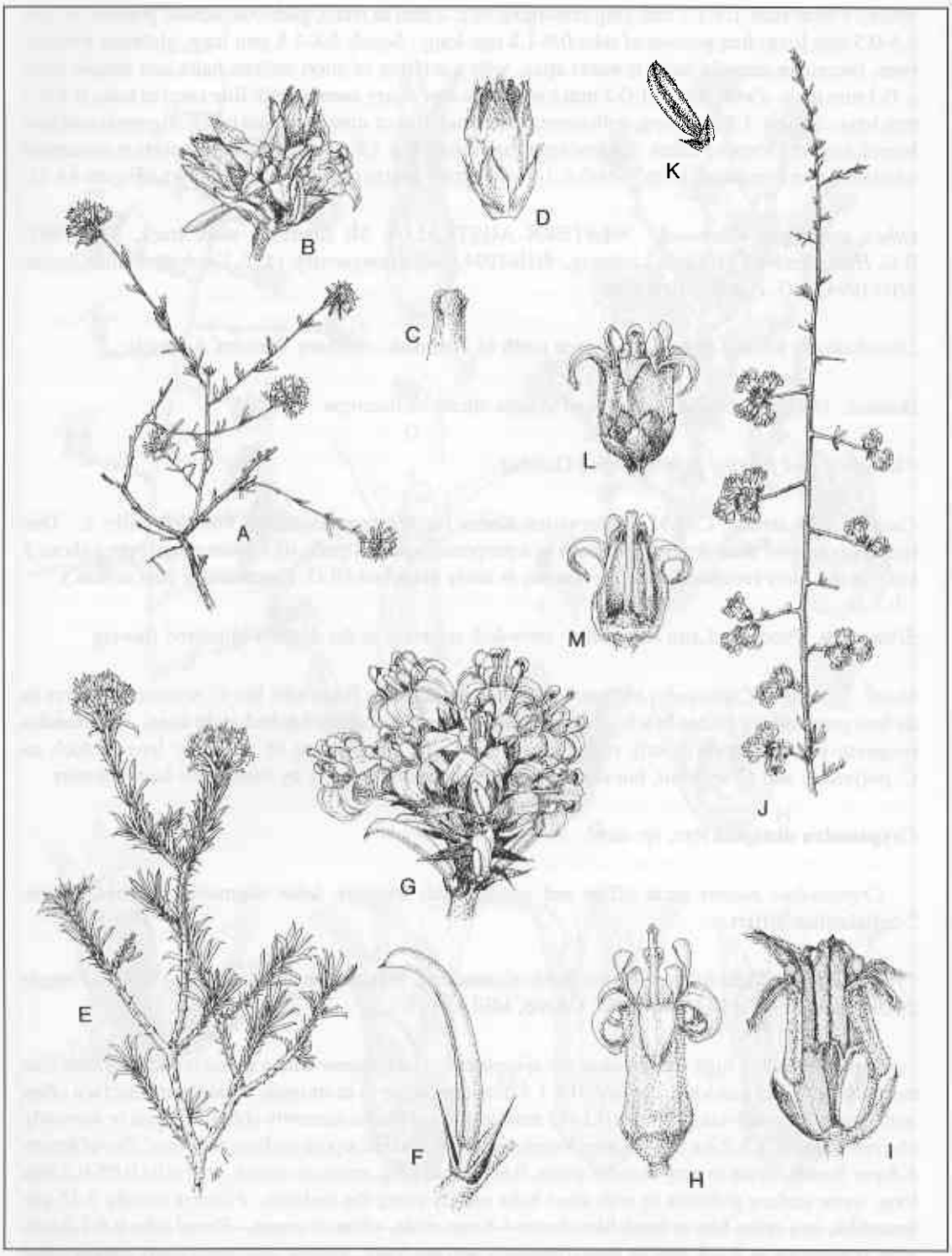

Figure 4. A-D *Cryptandra congesta.* A - flowering branch (x1), B - flower cluster (x6), C - stigma (x20), D - young schizocarp and bracts (x8); E-I - *C. intonsa.* E - flowering branch (x1), F - stipules and leaf (x7.5), G - flower cluster (x4), H - flower (x7.5), I - dehisced schizocarp (x6); J-M - *C. nola.* J - flowering branch (x1), K - stipules and undersurface of leaf (x6), L - flower and bracts (x7.5), M - flower dissected open (x7.5). Drawn from *G.J. Keighery* 11278 (A-D), *V. English* 149 (E-H), *V. English* 986 (I) and *G.J. Keighery & J.J. Alford* 2048 (J-M).

Sepals 0.9-1.3 mm long, with an indumentum similar to that on free portion of floral tube or sometimes with more long simple hairs. *Petal claw* 0.2-0.3 mm long. *Disc* with hairs 0.1-0.2 mm long. *Ovary* 2-celled; summit with hairs (0.1)0.2-0.3 mm long. *Style* 0.7-1.3 mm long; stigmatic lobes 2. *Schizocarp* slightly less than half inferior, 2.4-2.8 x 1.3-1.4 mm; superior portion rather densely stellate-hairy, the apex protruding above the base of the sepals. *Seeds* not seen at maturity. (Figure 1J-N)

Selected specimens examined. WESTERN AUSTRALIA: Streich Mound, 25 miles (40.2 km) N of Cundeelee Mission, 17/6/1970, *K.M. Allan* 287; 11.5 km N of Clyde Hill, 21/6/1983, *M.A. Burgman* 1418 & *S. McNee*; 10 km E of Queen Victoria Springs, 2/7/1966, *D.W. Goodall* 2990; 10.5 km ESE of Widgiemooltha, 17/8/1981, *K.R. Newbey* 8566; 2 km E of Wallaroo, 17/9/1981, *K.R. Newbey* 8821; 25 km NNE of Queen Victoria Spring, 21/9/1989, *D.J. Pearson* 718; *c.* 30 km SSW of Coolgardie, 3 km NW of Gnarlbine Rock, 18/9/1979, *J. Taylor* 580, *M.D. Crisp & R. Jackson.*

Distribution. Extends from Kirgella Rocks Station south to Widgiemooltha and from Wallaroo east to Queen Victoria Spring Nature Reserve, with an isolated record from north of Clyde Hill, southern Western Australia.

Habitat. Usually occurs in sand, recorded from sandplain and dunes, also one record from clay. Where noted, the soil colour was given as yellow in most cases, red in two cases.

Flowering period. June-September. Fruits September-October.

Conservation status. Not considered to be at risk at present.

Etymology. From the Greek *dis* - double and *stigma* - mark or pollen-receiving surface, referring to the two stigmatic lobes.

Notes. Closely related to *Cryptandra nutans*, which differs in its shorter petal claw, 3 stigmatic lobes and 3-celled ovary, also tending to have a coarser, more spreading stem indumentum and flowers borne in terminal clusters on more prominent and more erect branchlets. *C. distigma* has a very fine, appressed and matted indumentum on the stems and flowers borne more along short lateral branchlets. *C. nutans* also has a distinct geographical range, occurring from Geraldton to Albany and extending eastwards on or near the south coast to Cocklebiddy.

Apart from *Cryptandra spyridioides*, *C. distigma* is the only typical Western Australian member of the genus to have a 2-celled ovary, but there are two atypical species, *C. intratropica* W. Fitzg. and *C. mutila* Nees ex Reissek, with this characteristic. There is also an unnamed atypical species with a 1-celled ovary.

Cryptandra glabriflora Benth., Fl. Austral. 1: 441 (1863). *Type:* Murchison River, [Western Australia], *Oldfield* (MEL 227037).

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 2. Known only from Kalbarri National Park, collected from four specific and several vague localities within the park, the most recent collections in 1994. (Figure 5A-E)

Notes. Readily distinguished from the common and widespread species *Cryptandra myriantha*, which was previously regarded as a synonym, by its spinescent branchlets, shorter free portion of the floral tube and very large hairs on the summit of the schizocarp.

Cryptandra graniticola Rye, sp. nov.

Cryptandrae myrianthae arcte affine sed granitico consociato, indumento cauli tenuiore magis inplexo, ramuli pluremque spinescentibus, sepalis minus pubescentibus differt.

Typus: 5 miles [8 km] north of Norseman, Western Australia, 8 August 1951, *R.D. Royce* 3483 (*holo:* PERTH 01505971; *iso:* CANB, MEL).

Shrub 0.4-1.5 m high. *Branchlets* usually tending to be spinescent. *Young stems* with a matted indumentum of long fine hairs, the largest hairs *c.* 0.3 mm long. *Stipules* 0.5-1 mm long, acute to acuminate, often with a few short hairs along midvein, ciliate. *Petioles* 0.3-0.6 mm long. *Leaf blades* linear to narrowly obovate, 2-4.7 x 0.3-0.5 mm, usually obtuse, sometimes with a short mucro; lower surface glabrous on the visible midvein, densely hairy on the usually concealed sides; upper surface glabrous. *Floral bracts* 5-8 per flower, ovate or broadly ovate, 1-1.5 mm long, acute or obtuse, ciliate, the cilia up to 0.2 mm long; outer surface glabrous. *Flowers* usually 2-10 per branchlet, in a spike-like or head-like cluster 5-8 mm wide, white. *Floral tube* 0.8-1.0 mm long (enlarging to *c.* 1.6 mm in fruit), glabrous; adnate portion of tube 0.4-0.6 mm long; free portion of tube 0.4-0.5 mm long. *Sepals* 1.1-1.6 mm long, largely glabrous but usually with a few simple appressed hairs towards apex, sometimes sparsely hairy on distal half; hairs up to 0.2 mm long. *Petal claw* 0.2-0.3 mm long. *Disc* with hairs 0.1-0.2 mm long. *Ovary summit* with hairs *c.* 0.2 mm long. *Style* 1-1.3 mm long; stigmatic lobes 3(4). *Schizocarp* slightly less than half inferior, *c.* 2.2 x 1.5 mm; superior portion densely stellate-hairy, the apex protruding above the base of the sepals. *Seeds c.* 1.3 x 0.7 mm, orange brown. (Figure 5F-J)

Selected specimens examined. WESTERN AUSTRALIA: Near Norseman, on road towards Coolgardie, 5/9/1968, *E.M. Canning*; Jimberlana Hill, 10/10/1976, *R.J. Chinock* 3333; Peak Charles, 15/9/1976, *L. Haegi* 961; Peak Eleanora, Peak Charles National Park, 8/11/1979, *K.R. Newbey* 6395; 23 km SE of Sinclair Soak, *c.* 75 km NE of Norseman, 7/8/1980, *K.R. Newbey* 6966; 1.8 km S of Peak Charles road on the road to Peak Eleanora, 17/9/1985, *P.J. Poli* 25; near southern end of Lake Cowan, 24/7/1967, *P.G. Wilson* 6053.

Distribution. Extends from Mt Day east to near Lake Cowan and with an isolated occurrence near Ravensthorpe, southern Western Australia.

Habitat. Occurs in shallow sandy soil overlying granite or occasionally quartzite, often on granite outcrops or hills.

Flowering period. July-October. Fruits recorded October-November.

Conservation status. Not considered to be at risk.

Etymology. From the modern word *granite* - combined with the Latin *-cola* - inhabitant, referring to its occurrence in granitic habitats.

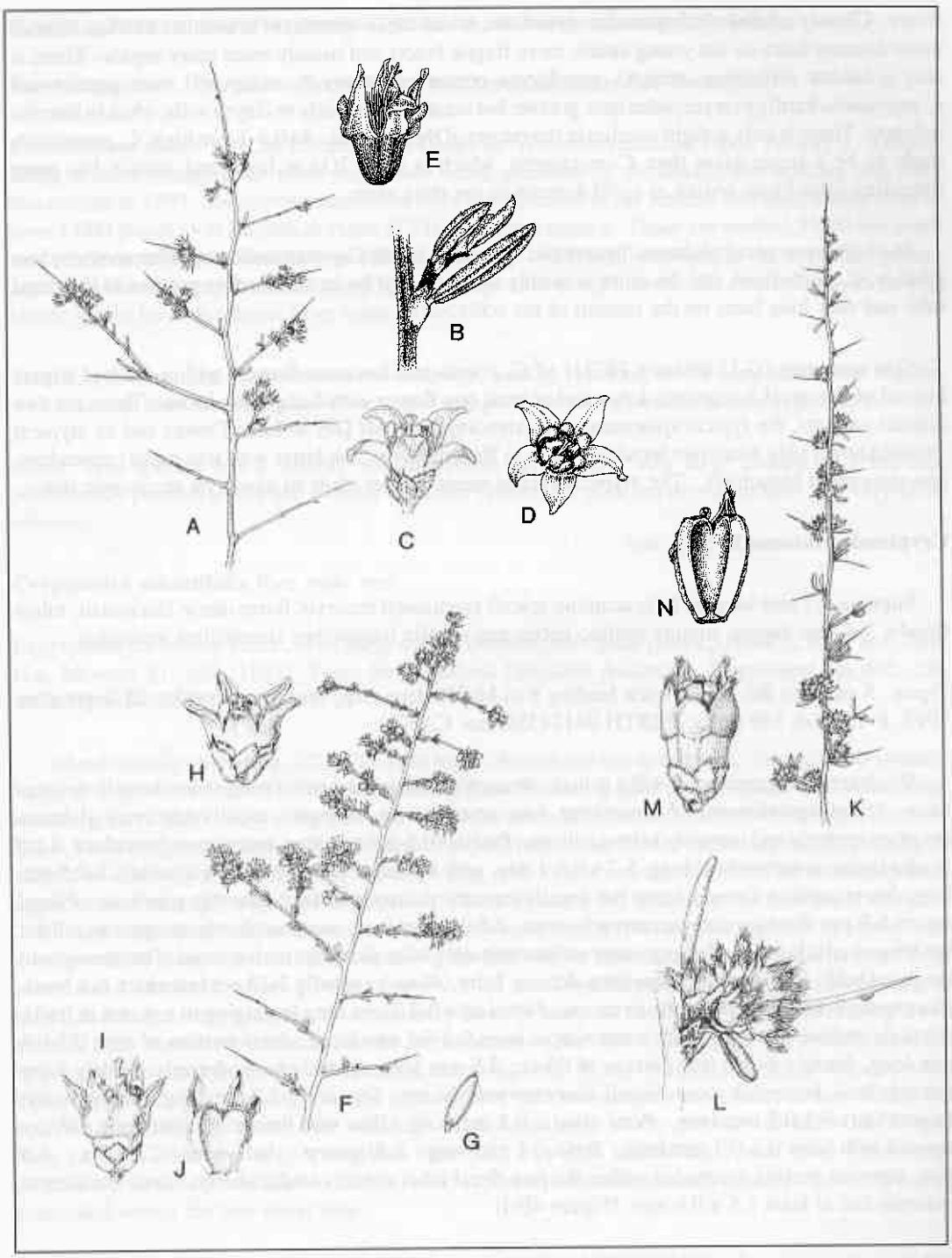

Figure 5. A-E - *Cryptandra glabriflora.* A - flowering branch (x1), B - leaf custer (x6), C - flower and bracts (x6), D - top view of flower (x6), E - schizocarp (x6); F-J - *C. graniticola.* F - flowering branch (x1), G - young leaf (x7), H - flower and bracts (x7), I - schizocarp and bracts (x6), J - dehisced fruitlet (x6); K-N - *C. scoparia* var. *microcephala.* K - flowering branchlet (x1), L - flower cluster (x6), M - schizocarp (x7), N - dehisced fruitlet (x7). Drawn from *D. & B. Bellairs* 1753 (A,B,E), *D. & B. Bellairs* 2300 (C,D), *R.D. Royce* 3483 (F-H), *K.R. Newbey* 6395 (I,J), *H. Demarz* 56 (K,L) and *A.C. Burns* 11 (M,N).

Notes. Closely related to *Cryptandra myriantha*, which lacks spinescent branchlets and has coarser more discrete hairs on the young stems, more fragile bracts and usually more hairy sepals. There is also a habitat difference, with *C. graniticola* occurring mainly in sandy soil over granite and *C. myriantha* hardly ever recorded near granite, but occurring on sandy or clayey soils, often in lateritic habitats. There is only a slight overlap in the ranges of the two taxa. At 0.4-1.5 m high, *C. graniticola* tends to be a larger plant than *C. myriantha*, which is 0.1-0.7(1) m high, and usually has more spreading branchlets, arising at *c.* 90 degrees to the main stem.

In its glabrous or subglabrous flowers and spinescent habit, *C. graniticola* resembles another close relative, *C. glabriflora*, but the latter is readily distinguished by its shorter free portion of the floral tube and very long hairs on the summit of the schizocarp.

One specimen (*G.L. Webster* 18721) of *C. graniticola* has most flowers with a 4-lobed stigma instead of the usual 3 stigmatic lobes and at least one flower with 5 stigmatic lobes. There are two distinct variants, the typical spinescent one extending from Mt Day to Lake Cowan and an atypical variant known only from two localities close to Ravensthorpe, the latter with less widely spreading, non-spinescent branchlets. The atypical variant needs further study to assess its taxonomic status.

Cryptandra intonsa Rye, sp. nov.

Stipulae 4-7 mm longae; folia acumine apicali prominenti recurvo; flores dense fasciculati; tubus floralis 3-4 mm longus, minute stellato-pubescens et pilis longioribus simplicibus instructus.

Typus: S of Rons Rd, near a track leading S to Middle Iron Cap, Western Australia, 28 September 1993, *V. English* 149 (*holo:* PERTH 04174356, *iso:* CANB).

Shrub erect or spreading, 0.3-0.6 m high. *Branchlets* not spinescent. *Young stems* densely stellate-hairy. *Stipules* prominent, 4-6.5 mm long, long-acuminate or -attenuate, usually appearing glabrous but often sparsely and minutely hairy or ciliate. *Petioles* 0.5-0.8 mm long, hairy on undersurface. *Leaf blades* linear or narrowly oblong, 5-7 x 0.6-1 mm, with a prominent recurved apical point 0.2-0.5 mm long; lower surface densely hairy but usually concealed; upper surface minutely papillose. *Floral bracts* 6-9 per flower, ovate or narrowly ovate, 2.5-3.5 mm long, acute or shortly acuminate, ciliate, the longest cilia 0.3-0.4 mm long; outer surface minutely hairy along the midvein and often throughout the distal half. *Pedicels c.* 0.4 mm long, densely hairy. *Flowers* usually 7-15 per branchlet, in a head-like cluster 9-14 mm wide, white to cream. *Floral tube* 3-3.5 mm long (enlarging to *c.* 4 mm in fruit), minutely stellate-hairy and with some simple hairs 0.3-0.4 mm long; adnate portion of tube 0.7-0.9 mm long, densely hairy; free portion of tube *c.* 2.5 mm long, sparsely to moderately densely hairy towards base, becoming more densely hairy towards the top. *Sepals* 1.8-2.3 mm long, densely hairy; largest hairs 0.4-0.5 mm long. *Petal claw c.* 0.2 mm long. *Disc* with hairs *c.* 0.3 mm long. *Ovary summit* with hairs 0.2-0.3 mm long. *Style c.* 4 mm long. *Schizocarp c.* half-inferior, 2.5-3 x *c.* 1.8 mm; superior portion concealed within the free floral tube, densely stellate-hairy. *Seeds* not seen at maturity but at least 1.5 x 0.6 mm. (Figure 4E-I)

Other specimens examined. WESTERN AUSTRALIA: 3.26 km S of Rons Rd and 30 m W of the track leading S to Middle Iron Cap, 29/11/1993, *V. English*; Hatters Hill exploration lease, 7/12/1993, *V. English* 986; Seagull Liquid Acrobat exploration lease, 28/9/1993, *A. O'Connor* 1300.

Distribution. Extends from near Middle Iron Cap south east to near Hatters Hill, southern Western Australia.

Habitat. Occurs in clay with ironstone gravel, in heathland with scattered mallees.

Flowering period. September-December. Fruits recorded November-December.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 1. Despite being a more conspicuous plant than many other members of its family, this species was only discovered in 1993. Extensive populations have been located in the Hatters Hill area, with a total of over 1,000 plants (Val English & Alice O'Connor pers. comm.). These are located 35-40 km south east of the smaller populations near Middle Iron Cap. Although common in the area, the species appears to have a very restricted geographical range and, being known only from sites with mining leases, could be under threat from mining.

Etymology. From the Latin *intonsus* - unshaved, bristly, referring to the long-acuminate stipules which persist after the leaves have been shed and give the young stems a bristly appearance.

Notes. This species has a striking and distinctive appearance, with large conspicuous stipules, prominently pointed leaves and densely clustered flowers. It does not appear to have any very close relatives.

Cryptandra minutifolia Rye, nom. nov.

Cryptandra parvifolia Turcz., *nom. illeg. non Cryptandra parvifolia* (Hook.) Hook.f., Bull. Soc. Imp. Nat. Moscou 31: 459 (1858). *Type:* New Holland [Western Australia], *Drummond* 4th coll. 156 (PERTH 01599313)

Shrub usually spreading, 0.2-0.7(1.2) m high. *Branchlets* not spinescent. *Young stems* densely hairy at first with a matted white indumentum, soon becoming glabrous. *Stipules* 0.8-2 mm long, usually ciliate, often hairy along midvein outside or with hairs more widespread outside. *Petioles* 0.2-0.3 mm long, concealed by united base of stipule pair. *Leaf blades* appearing sessile, oblong to elliptic or narrowly so, 0.8-1.5(2.5) x 0.6-0.8 mm, with a recurved mucro; lower surface concealed; upper surface minutely papillose or glabrous. *Floral bracts* 8-14, broadly ovate to broadly obovate, 2-3.5 mm long, obtuse, ciliate; outer surface glabrous or with a few hairs on midvein or rarely with a hairy central area; inner surface hairy along the midvein or central area in the distal half. *Floral tube* 1.5-3.5 mm long; adnate portion of tube 0.5-0.7 mm long, densely stellate-hairy; free portion of tube 1.0-2.8 mm long, glabrous to moderately densely hairy on basal half, usually becoming more densely hairy towards the summit like the indumentum on the base of the sepals, but sometimes hairy or subglabrous throughout, the indumentum occurring both on and between the ribs or at least on the ribs. *Sepals* 1.5-3.7 mm long, densely stellate-hairy and with larger simple hairs at least along the midvein or towards the apex. *Disc* with hairs 0.1-0.3 mm long. *Ovary summit* with hairs 0.2-0.4 mm long. *Style* 0.7-3.6 mm long, if long then often with a swollen stellate-hairy base up to 1 mm long. *Schizocarp* up to half (one third to half) inferior; superior portion moderately densely or densely hairy, concealed within the free floral tube.

Distribution. Extends from Manmanning east to near Carrabin, south to Dumbleyung and south east to Ravensthorpe Range, southern Western Australia.

Habitat. Occurs on sand or clayey soils, usually on plains, in mallee vegetation or sometimes shrubland.

Flowering period. Mainly June-September. Fruits recorded September-November.

Etymology. From the Latin *minutus* - small and *folium* - leaf, referring to the leaves being very small in relation to the size of the flowers.

Notes. This species and its close relative, *Cryptandra aridicola*, are similar to *C. leucopogon*, which differs in its longer leaves and longer hairs on the sepals and ovary.

Cryptandra minutifolia subsp. **brevistyla** Rye, subsp. nov.

A *Cryptandrae minutifoliae* subsp. *minutifoliae* floribus pluremque multo numerosis, bracteis floralibus minus numerosis, stylis brevioribus differt.

Typus: 2 km SW of Mt Madden, which is 22 km SE of Lake King township, Western Australia, 6 August 1968, *P.G. Wilson* 6813 (*holo:* PERTH 01507540; *iso:* CANB, MEL).

Stipules usually 1.5-2 mm long, acuminate or attenuate. *Leaf blades* 1-3(3.5) mm long. *Floral bracts* (8)9-11(12), 2-3 mm long, usually prominently ciliate, the cilia (0.2)0.4-0.6 mm long. *Flowers* usually 3-10 (sometimes 1 or 2) per branchlet, in a spike-like or head-like cluster 7-11 mm wide, white or occasionally pink. *Floral tube* 1.5-2 mm long (enlarging to 1.8-2.5 mm in fruit); free portion of tube 1.0-1.3 mm long. *Sepals* 1.5-2.6 mm long; simple hairs 0.4-0.6 mm long. *Petal claw* 0.1-0.3 mm long. *Style* 0.7-1.7(2.2) mm long. *Schizocarp* 2-2.5 x 1.5-1.6 mm. *Seeds c.* 1.5 x 0.8-1.1 mm, orange brown with some paler patches laterally or prominently mottled with those colours. (Figure 3F-K)

Selected specimens examined. WESTERN AUSTRALIA: Dunn Rock Nature Reserve, 15/4/1984, *D.J. Backshall* 92; 26 miles [41.9 km] W of Coolgardie, 9/3/1970, *E.M. Bennett* 3265; Lake Barker Reserve, 11/1971, *W.H. Butler*; 1.3 km SSW of Griggs Rd on Fields Rd, 14/9/1992, *G.F. Craig* 2124; 320 mile peg [*c.* 13 km W of Bullabulling], Great Eastern Highway, 10/10/1974, *H. Demarz* 5269; *c.* 75 km ENE of Norseman, 9/9/1973, *N.N. Donner* 4655; Fitzgerald River below Roes Rock, 14/7/1970, *A.S. George* 10016; Kumarl, 8/1935, *L.A. Horbury* 76; 19 km SSW Queen Victoria Rock, 24/9/1993, *G.J. Keighery* 12954; Pingrup, 27/8/1964, *F. Lullfitz* 3655; Frank Hann National Park, 6/8/1978, *D. Monk* 241; Bendering Reserve A20338, 25/5/1975, *B.G. Muir* 274; 26 km SE of Karonie, 12/8/1981, *K.R. Newbey* 8500.

Distribution. Extends from west of Coolgardie south west to Stirling Range and from there east to near Karonie, southern Western Australia.

Conservation status. Not considered to be at risk at present.

Etymology. From the Latin *brevis* - short and *stylus* - style, the style usually being very short in relation to the size of the flowers.

Notes. Usually easily distinguished from subsp. *minutifolia*, which has fewer larger flowers and more numerous floral bracts so that the the flowers appear to be more discrete, and has longer floral tubes, styles and sepals. Subsp. *minutiflora* also tends to have shorter stipules and leaves. Despite their fairly major differences, the two taxa do not appear to have diverged quite to the point of becoming separate species. In the area where they overlap, some specimens are somewhat intermediate, especially the

Pingrup specimen (*F. Lullfitz* 3655) included here, with the style 2-2.2 mm long, and another specimen noted under the other subspecies.

Cryptandra minutifolia Rye subsp. **minutifolia**

Stipules 0.8-1.2(1.5) mm long, acute or acuminate. *Leaf blades* 0.8-1.5(2.5) mm long. *Floral bracts* 12-14, 2.5-3.5 mm long, with cilia 0.2-0.3 mm long. *Flowers* solitary or few (usually 2-5) per branchlet, in a spike-like cluster 9-14 mm wide, white. *Floral tube* 2.5-3.5 mm long (enlarging to 3 mm or more in fruit); free portion of tube 1.8-2.8 mm long. *Sepals* 2.7-3.7 mm long; simple hairs 0.2-0.4 mm long. *Petal claw* 0.2-0.4 mm long. *Style* 2.5-3.6 mm long. *Schizocarp* not seen at maturity. (Figure 3L-N)

Selected specimens examined. WESTERN AUSTRALIA: Kulin, 9/1946, *A. Ashley* 72; Hyden, 7/9/1966, *M. Barrow* 72; 184 miles [*c.* 6 km W of Carrabin] on Great Eastern Highway, 6/9/1966, *E.M. Bennett* 715; Nungarin, 28/7/1953, *H.F. & M. Broadbent* 1119; 12 km E of Kings Rock, 5/10/1975, *M.L. Clark* 213; Nungarin, 24/8/1930, *C.A. Gardner* 197; Dumbleyung, 18/6/1920, *C.A. Gardner* 518; *c.* 1 km E of Babakin, NE of Corrigin, 18/8/1979, *L. Haegi* 1829; 1 mile [0.6 km] SW of Manmanning, 1/8/1992, *B.H. Smith* 1603; 1 km S of Lake King township, 9/8/1968, *P.G. Wilson* 6939.

Distribution. Extends from Manmanning east to near Carrabin, south to Dumbleyung and south east to Ravensthorpe Range, southern Western Australia.

Conservation status. Not considered to be at risk at present.

Notes. The leaves are very short in subsp. *minutifolia*, except for an odd specimen from Kellerberrin (*A.E. Lankester* 4/9/1897) with leaves 2-2.5 mm long. A specimen from Ravensthorpe Range (*E.M. Bennett* 2396) with a relatively short style, *c.* 2.5 mm long, appears to belong to this taxon because of its long floral tube and 13 bracts per flower, but has more numerous flowers than usual, so is somewhat intermediate between this and subsp. *brevistyla*.

Cryptandra nola Rye, sp. nov.

Cryptandrae arbutiflorae simile sed caulibus foliis floribusque stellato-pilosis, petiolis brevioribus, unguibus petalorum longioribus differt.

Typus: 1.4 km E of railway crossing E of Mullewa, Western Australia, 6 August 1994, *S. Patrick* 1945 (*holo:* PERTH 04160169; *iso:* CANB, MEL).

Shrub erect or spreading, 0.3-1 m high. *Branchlets* spinescent. *Young stems* minutely and inconspicuously stellate-hairy, soon becoming glabrous. *Stipules* 0.7-1.5 mm long, acute, minutely ciliate and minutely hairy along midvein. *Petioles* 0.2-0.4 mm long. *Leaf blades* oblong to elliptic or narrowly so, 1.2-2.2 x 0.4-0.6 mm, obtuse or with a minute mucro; lower surface densely hairy but largely concealed; upper surface densely minutely stellate-hairy to glabrous. *Floral bracts c.* 8, broadly ovate-elliptic or very broadly so, *c.* 1.5 mm long, minutely ciliate; outer surface densely stellate-hairy along the midvein, glabrous along the margins, somewhat lobed-toothed or with a short broad apical tooth but not prominently pointed. *Flowers* sometimes solitary, usually 2-8 per branchlet, in a loose spike-like cluster 7-11 mm wide, white. *Floral tube* 2-2.5 mm long (not seen in fruit),

minutely stellate-hairy; adnate portion of tube *c.* 0.5 mm long, densely hairy; free portion of tube 1.5-2 mm long, sparsely to moderately densely hairy towards base, becoming more densely hairy towards the top. *Sepals c.* 1.5 mm long, densely minutely stellate-hairy. *Petal claw c.* 0.3 mm long. *Disc* with hairs *c.* 0.2 mm long. *Ovary* about half inferior; summit with hairs *c.* 0.2 mm long. *Style* 2-2.5 mm long. *Schizocarp* unknown. (Figure 4J-M)

Other specimens examined. WESTERN AUSTRALIA: East Yuna Reserve, 5/6/1966, *A.C. Burns* 14; Kowald's property, off Arrinooka Rd, Canna,15/81990, *G.J. Keighery & J.J. Alford* 2048; Mullewa Common, 22/6/1994, *E. Leyland* 005; Mullewa Shire Common, 6/8/1994, *S. Patrick* 1935-1938.

Distribution. Extends from East Yuna Reserve south to Canna, southern Western Australia.

Habitat. Usually occurs on sandy soil overlying granite or granite conglomerate.

Flowering period. June-August.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 2. Known from several populations on two nature reserves and one from privately-owned land. The species has a range of *c.* 100 km and is locally common at populations sampled recently (1990-94).

Etymology. From the Latin *nola* - small bell, referring to the shape of the flowers.

Notes. Similar to *Cryptandra arbutiflora*, which differs in having simple hairs on the young stems and leaves (or glabrous leaves), longer petioles, glabrous flowers and shorter petal claws.

Cryptandra polyclada Diels in Diels & E. Pritzel, Bot. Jahrb. Syst. 35: 358-359 (1904). *Type:* Near Tammin, Western Australia, 21 May 1901, *L. Diels* 2877 (PERTH 01136232, 01136240)

Notes. Occurs near Tammin and extends from Boorabbin National Park south to east of Lake King. *C. polyclada* has recently been included on the Priority Flora List with a Priority 3 coding. Since then, several additional specimens have been identified as this species and the typical subspecies no longer appears to be at risk, but the new subspecies described below appears to need a higher priority. No attempt has been made to survey either subspecies.

Crytandra polyclada subsp. **aequabilis** Rye, subsp. nov.

A *Cryptandrae polycladae* subsp. *polycladae* folius magis manifeste mucronatis, floribus magis aequabiliter pilosis differt.

Typus: 50 miles/80 km E of Southern Cross, 10 October 1931, *W.E. Blackall* 940 (*holo:* PERTH 01514156; *iso:* CANB, MEL).

Shrub low and spreading, dense, 0.1-0.4 m high. *Leaf blades* 1.8-2.8 mm long; mucro prominent, fairly erect, *c.* 0.2 mm long. *Flowers* white, with a fairly uniform indumentum of minute stellate hairs and larger simple antrorse hairs, the largest hairs 0.2-0.3 mm long. *Floral tube c.* 1.0 mm long (not seen in fruit), densely stellate-hairy; adnate portion of tube *c.* 0.4 mm long; free portion of tube *c.* 0.6 mm long. *Sepals c.* 0.8 mm long, with a dense indumentum of minute stellate hairs and a few larger antrorse simple hairs. (Figure 6A-C)

Other specimens examined. WESTERN AUSTRALIA: 276 mile peg on Great Eastern Highway, 10/10/1974, *H. Demarz* 5266.

Distribution. Known only from in or near Boorabbin National Park.

Habitat. Recorded on sand.

Flowering period. October.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 2. Known from two collections probably less than 5 km apart, both apparently in a national park.

Etymology. From the Latin *aequabilis* - consistent, referring to the uniform indumentum on the outside of the flowers in comparison with the typical subspecies.

Notes. Subsp. *polyclada* differs in its less prominently mucronate leaves and in the longer indumentum on the outside of the flowers, with a marked contrast between the very densely hairy sepals and subglabrous upper floral tube. Subsp. *aequabilis* has a shorter and fairly uniform indumentum on the upper floral tube and sepals.

Cryptandra polyclada Diels subsp. **polyclada**

Shrub varying from a mat-like form *c.* 0.1 m high to a more erect form up to 0.7 m high. *Leaf blades* 2.1-4.1 mm long; mucro *c.* 0.1 mm long. *Flowers* white or cream, much more densely hairy on the sepals than on the free portion of the floral tube, the largest hairs 0.4-0.8 mm long. *Floral tube* 0.7-1.1 mm long (enlarging to 1.4 mm or more in fruit); adnate portion of tube 0.3-0.4 mm long, usually densely hairy with a mixture of minute stellate hairs and large antrorse simple, sometimes sparsely hairy with mainly simple hairs; free portion of tube 0.5-0.7 mm long, with a sparse indumentum of large antrorse simple hairs or glabrous. *Sepals* 0.6-1.1 mm long, very densely hairy, with a mixture of minute stellate hairs and large antrorse simple hairs. (Figure 6D-F; also illustrated in Diels & Pritzel 1905, Figure 45B-D)

Distribution. Occurs near Tammin and extends from east of Hyden south to east of Lake King.

Habitat. Recorded from sandplains.

Flowering period. January-May, also recorded August. Fruits recorded in May.

Conservation status. Known from seven collections, probably including a nature reserve near Tammin, its range *c.* 300 km. It appears to flower predominantly during summer and early autumn, which may account for the paucity of collections.

Notes. The Tammin specimens are the largest, with leaves *c.* 4 mm long and flower clusters 5-7 mm wide, compared with leaves 2.1-3.2 mm long and flower clusters 3-4.5 mm wide in the other specimens.

Cryptandra recurva Rye, sp. nov.

Cryptandrae nutans arcte affine sed caulibus foliisque minute stellatis (non pilis simplicibus), apice folium valde recurvo, bracteis magis pubescentibus differt.

Typus: 30 km W of 90 mile tank on Salmon Gums-Lake King road, Western Australia, 18 June 1974, *T.E.H. Aplin* 5920 (*holo:* PERTH 01516183; *iso:* CANB, MEL).

Shrub 0.2-0.7 m high. *Branchlets* not spinescent. *Young stems* densely minutely stellate-hairy. *Stipules* 0.5-1 mm long, acute or shortly acuminate, minutely stellate-hairy, often minutely ciliate. *Petioles* 0.2-0.3 mm long, usually densely hairy on both surfaces, rarely glabrous on upper surface. *Leaf blades* narrowly oblong-elliptic or narrowly obovate, 2-3.8 x 0.5-0-8 mm, obtuse, the apex distinctly recurved; lower surface very densely hairy, largely or completely concealed; upper surface usually densely minutely stellate-hairy, sometimes glabrous. *Floral bracts c.* 5 per flower, very broadly or broadly ovate, 1-1.5 mm long, acute or obtuse, ciliate, the cilia 0.1-0.25 mm long; outer surface stellate-hairy, usually densely so except on the margin. *Flowers* usually 3-15 per branchlet, in a spike-like or head-like cluster 5-8 mm wide, white or cream to distinctly off-white or occasionally pale pink. *Floral tube* 1.2-1.5 mm long (enlarging to 1.8-2.3 mm in fruit), minutely densely stellate-hairy, usually also with short simple hairs 0.2-0.3 mm long; adnate portion of tube 0.5-0.8 mm long,

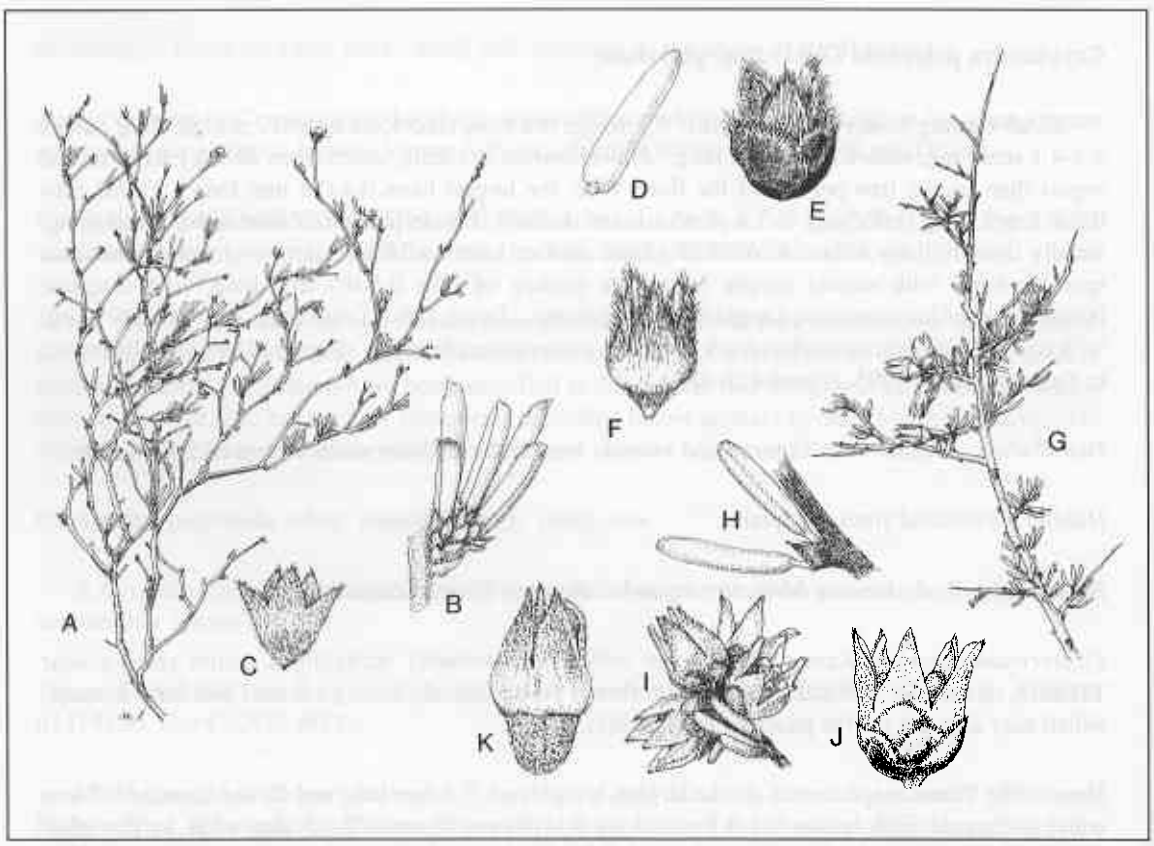

Figure 6. A-C - *Cryptandra polyclada* subsp. *aequabilis*. A - flowering branch (x1), B - leaf cluster (x6), C - flower (x7.5); D-F - *Cryptandra polyclada* subsp. *polyclada*. D - leaf (x6), E - flower with bracts (x7), F - flower (x7); G-K - *C. wilsonii*. G - fruiting branchlet (x1), H - leaf cluster (x6), I - flower cluster (x4), J - flower with bracts (x6), K - schizocarp (x6). Drawn from *W.E. Blackall* 940 (A-C), *C.A. Gardner* 31/1/1940 (D-F), *Spjut et al.* 7243 (G,K) and *G. Perry* 235 (H-J).

more densely hairy than free portion; free portion of tube 0.5-0.7 mm long. *Sepals* 0.8-1.3 mm long, densely minutely stellate-hairy, usually with simple hairs 0.2-0.3 mm long towards the apex. *Petal claw c.* 0.1 mm long. *Disc* with hairs 0.1-0.2 mm long. *Ovary summit* with hairs 0.1-0.3 mm long. *Style* 0.5-0.8(1) mm long. *Schizocarp* half or slightly less than half inferior, 2-2.5 x 1.5-2 mm; superior portion densely or very densely stellate-hairy, the apex reaching or protruding above the base of the sepals. *Seeds* 1.3-1.5 x 0.8-0.9 mm, orange-brown. (Figure 1O-S)

Selected specimens examined. WESTERN AUSTRALIA: Dunn Rock Nature Reserve, 15/4/1984, *D.J. Backshall* 160; 50 miles [80 km] E of Southern Cross, 10/10/1931, *W.E. Blackall* 940; Mt Holland road, 11/1931, *W.E. Blackall* 1247; 34 km due NNW of Clyde Hill, 7/8/1983, *M.A. Burgman* 1832 & *S. McNee*; 12 km E of Kings Rock, 5/10/1975, *M.L. Clark* 208; *c.* 21 miles [33.8 km] S of Cocklebiddy, 11/7/1974, *A.S. George* 11860; Kumarl, 8/1938, *L.A. Horbury* 104; Frank Hann National Park, 5/8/1978, *D. Monk* 213; 18 km NE of Scadden, 17/8/1982, *P. van der Moezel* 119; 9 km SW of Peak Charles, 2/11/1980, *K.R. Newbey* 7835; tributary of Young River, 28/9/1968, *P.G. Wilson* 8050; Fitzgerald River Reserve, 7/10/1970, *P.G. Wilson* 10210.

Distribution. Extends from between Southern Cross and Coolgardie southwards and from Fitzgerald River National Park east to Cocklebiddy, southern Western Australia.

Habitat. Occurs on sandy soils.

Flowering period. Mainly June-September. Fruits recorded August-November.

Conservation status. Widespread and apparently common.

Etymology. From the Latin *recurvus* - curved backwards, referring to the leaf apex.

Notes. Closely related to *Cryptandra nutans*, which differs in having longer simple hairs on the stems and often also on the leaves, a more erect apical point on the leaves and glabrous or less densely hairy bracts. The flowers of *C. recurva* have a whiter and often somewhat denser indumentum than those of *C. nutans*, and their long hairs are more curved and spreading. In areas where the two taxa overlap in range, *C. nutans* appears to have an earlier flowering time.

Two specimens of *C. recurva* from Fitzgerald River National Park (*A.S. George* 10025, *P.G. Wilson* 10210) are unusual in having distinctly papillose leaves, but otherwise have the typical features of the species. In *C. nutans* the leaves are often papillose.

Cryptandra scoparia var. **microcephala** Benth., Fl. Austral. 1: 439 (1863). *Type:* Murchison River, [Western Australia], *Oldfield* (MEL 227043).

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 3. Classed as a Priority 2 taxon on the 1991 Priority Flora List under the phrase name *Cryptandra* sp. *Kalbarri* (*A.S. George* 2364). It has now been collected from three sites in Kalbarri National Park, and from four other localities, including a nature reserve near Geraldton. A recent collection from Nerren Nerren Station has slightly extended its known range to *c.* 155 km. It may be favoured by infrequent fires as young plants were common at a site surveyed in 1994, where the bush was regenerating following a fire. (Figure 5K-N)

Notes. This shows only minor morphological differences from the type variety. *Cryptandra scoparia* Reissek var. *scoparia* occurs from near Mt Lesueur south to Perth and is distinguished mainly by its longer spinescent branchlets.

Cryptandra wilsonii Rye, sp. nov.

Cryptandrae polycladaee affine sed indumento cauli minus implicato, petiolis manifeste a vagino stipuli exserto colore foliorum fusciore differt.

Typus: N of Cape Riche Beach, Western Australia, 8 August 1974, *G. Perry* 235 (*holo:* PERTH 03118509; *iso:* CANB, MEL).

Shrub 0.15-0.9 m high. *Branchlets* sometimes spinescent. *Young stems* usually with fine indumentum of appressed to antrorse simple hairs 0.2-0.4 mm long, sometimes with minute stellate hairs instead or with a mixture of simple and stellate hairs. *Stipules* 0.8-1.4 mm long, acute or shortly acuminate; outer surface glabrous or with hairs along the midvein; inner surface glabrous on margins, with a dense indumentum within of simple hairs 0.3-0.4 mm long, the hairs sometimes protruding from the sides and resembling cilia. *Petioles* 0.3-0.5 mm long. *Leaf blades* oblong-elliptic or narrowly so, 1.8-3.2 x 0.5-0.7 mm, with an erect mucro; lower surface completely or largely concealed, densely hairy; upper surface usually glabrous and minutely tuberculate at least on the margins, sometimes more prominently tuberculate or with minute coarse patent hairs. *Floral bracts* 6 or 7 per flower, broadly ovate, 1.2-1.6 mm long, acute, with cilia *c.* 0.1-0.3 mm long; outer surface glabrous or rarely with few stellate hairs towards apex. *Flowers* solitary or 2-6 in a loose spike-like or head-like cluster 4-8 mm wide, white. *Floral tube* 1.4-1.9 mm long (enlarging to *c.* 3 mm in fruit); adnate portion of tube *c.* 0.5 mm long, densely minutely stellate-hairy; free portion of tube 0.9-1.4 mm long, sparsely to moderately densely minutely stellate-hairy. *Sepals* 1.2-1.6 mm long, densely minutely stellate-hairy, often also with simple hairs 0.2-0.3 mm long towards the apex. *Petal claw* 0.1-0.3 mm long. *Disc* with hairs 0.1-0.2 mm long. *Ovary summit* with hairs 0.2-0.3 mm long. Style 0.7-1.3 mm long. *Schizocarp* half or slightly less than half inferior, *c.* 3 x 2.2 mm; superior portion concealed within the free floral tube, densely stellate-hairy. *Seeds* not seen at maturity. (Figure 6G-K)

Other specimens examined. WESTERN AUSTRALIA: 15 miles [24.2 km] NE of Wialki, no date, *J.M. Arnold*; 20.75 km due SE of Mt Burdett, 3/8/1983, *M.A. Burgman* 1684 & *S. McNee*; South Stirlings road, 35 miles [56.4 km] E of Borden road, 27/5/1964, *A.S. George* 6250; *c.* 14 km SE of Kulin, 16/7/1977, *R. Hnatiuk* 770401; 13 km NNW of Chillinup Pool, 7/5/1974, *K.R. Newbey* 4131A; 7 km NNW of Point Charles, Fitzgerald River National Park, 16/7/1980, *K.R. Newbey* 6816; Fitzgerald River Reserve, 12/7/1970, *R.D. Royce* 8938; 2 km SW of Manmanning, 19 July 1978, *B. & M. Smith*; 3-5 km E of Merredin along Great Eastern Highway, 29/9/1981, *R. Spjut, G. White, R. Phillips & L. Lacy* 7243; Mt Madden 6/8/1968, *P.G. Wilson* 6776.

Distribution. Extends from north east of Wialki south to near Cape Riche and eastwards from there to east of Gibson, southern Western Australia.

Habitat. Recorded in sandy soils or in clay, with one record from gravel, sometimes in mallee scrub.

Flowering period. May-August. Fruits September-October.

Conservation status. Fairly widespread and apparently not at risk at present.

Etymology. Named in honour of Paul G. Wilson, a botanist prominent in studies of Australian plants. His collection of this *Cryptandra* species in 1968 was the earliest one with a date. An undated collection by J.M. Arnold may have preceded it.

Notes. Related to *Cryptandra polyclada*, which differs in its very fine matted indumentum on the stems, in having petioles concealed at first (and often remaining concealed) by the long stipule sheaths and in its paler green leaves. *C. polyclada* also tends to be a smaller plant with more intricate branching, is never spinescent and generally has longer cilia on the bracts and longer hairs on the flowers.

Specimens of *C. wilsonii* from the more inland areas usually have spinescent branchlets, while those occurring near the south coast usually lack spinescent branchlets.

Species included in the reinstated genus *Stenanthemum* Reissek

The genus is predominantly Western Australian but some species extend into other states and there are a few species restricted to other parts of Australia, such as *Stenanthemum leucophractum* (Schledl.) Reissek. A total of 21 Western Australian species are included in the genus at this stage and all are listed below except for *Stenanthemum humile* Benth. and *S. pomaderroides* (Reissek) Reissek.

Implicit characters for *Stenanthemum*

Indumentum white or clear. *Branchlets* not spinescent. *Stipules* persistent, brown, each pair free on lower (abaxial) side of the petiole and either connate at the base or free (but meeting) on the upper side of the petiole. *Leaves* conduplicate in bud, spreading but remaining partially folded or with an indented midvein at maturity, entire; lower surface pale green, hairy; upper surface green. *Flowers* sessile or subsessile, several to many aggregated into dense head-like clusters surrounded by brown bracts and leaves, each flower subtended by at least two floral bracts. *Floral tube* extended into a free tube above the ovary summit. *Disc* lining floral tube and scooped between the stamens or stamen traces, glabrous. *Ovary* 3-celled. *Style* glabrous (sometimes with a few stellate hairs at the base if ovary is hairy); stigmatic lobes 3. *Fruit* a schizocarp, inferior or largely inferior; fruitlets crustaceous, opening over the summit and down inner surface, with a basal hole where attached to the peduncle or receptacle. *Seeds* with a dark base seated on an aril; aril with three prominent acute lobes, one inner (adaxial) lobe and two lateral lobes.

Stenanthemum bilobum Rye, sp. nov.

Stenanthemo notiali simile sed stipulis libris, foliis marginem magis recurvis ad apice manifeste 2-lobatis differt.

Typus: 262 km from Mt Magnet on Geraldton road, Western Australia, 20 August 1963, *D.W. Goodall* 1840 (*holo:* PERTH 01539698).

Shrub small, height not recorded. *Young stems* densely stellate-hairy. *Stipules* free or very shortly united at base, pale brown or whitish; outer surface densely stellate-hairy. *Petioles c.* 0.5 mm long, very densely hairy. *Leaf blades* obcordate or narrowly obcordate, *c.* 5 x 3 mm, 2-lobed at apex, with the midvein indented, the margins recurved, pale green and densely hairy on both surfaces, apparently

with mainly stellate hairs but also some simple hairs; simple hairs mostly 0.3-0.4 mm long. *Bracts* narrowly triangular or subulate, *c.* 1 mm long, pale brown, ciliate; outer surface densely hairy, the hairs *c.* 0.3 mm long. *Flower clusters* 2-3 mm wide, their colour unknown but probably white or cream. *Floral tube c.* 0.7 mm long (enlarging to *c.* 1.7 mm in fruit), densely stellate-hairy and with simple antrorse hairs 0.2-0.3 mm long; free portion of tube *c.* 0.4 mm long. *Sepals c.* 0.5 mm long, very densely stellate-hairy and with simple antrorse to spreading hairs 0.2-0.3 mm long. *Disc* shallowly scooped between the stamens. *Ovary summit* stellate-hairy; hairs 0.1-0.2 mm long. *Style c.* 0.5 mm long. *Schizocarp* seen only when immature, *c.* 1.5 x 1 mm, densely stellate-hairy and also with antrorse simple hairs 0.4-0.5 mm long. (Figure 7A-E)

Specimens examined. None other than the type.

Distribution. Recorded from near Tenindewa, west of Mullewa, southern Western Australia.

Habitat. Unknown.

Flowering period. August.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 1. Apparently at risk as it is known from only one collection, probably from a road verge. This poorly known species urgently needs to be surveyed.

Etymology. From the Latin *bi* - two and *lobus* - lobe, referring to the prominently 2-lobed leaves.

Notes. The leaves of this species are very distinctive and immediately distinguish it from all other members of the genus. It could be confused with *Stenanthemum notiale*, which differs in having stipules connate for about a quarter to half their length, flat or less prominently recurved leaf margins and either an entire or acutely toothed leaf apex.

Stenanthemum complicatum (F. Muell.) Rye, nov. comb.

Spyridium complicatum F. Muell., Fragm. Phyt. Austral. 3: 78 (1862). *Type:* Murchison River, [Western Australia], *Oldfield* (*holo:* MEL 90946).

Conservation status. Not considered to be at risk at present.

Stenanthemum coronatum (Reissek) Reissek, Linnaea 29: 295 (1858) - *Cryptandra coronata* Reissek in Lehm., Pl. Preiss. 2: 288 (1848). *Type:* [Western Australia], *J. Drummond* 2nd coll. 722 (MEL 227036).

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 3. Included on the 1994 Priority Flora List with a priority 2 code but several additional populations have been reported since then. Known from eight localities with a range of *c.* 200 km, extending from Mokine Nature Reserve south to near Duranillan (south of Darkan). The species is apparently not common at any of these locations, but has some degree of protection as at least two populations are on nature reserves. (Figure 8A-C)

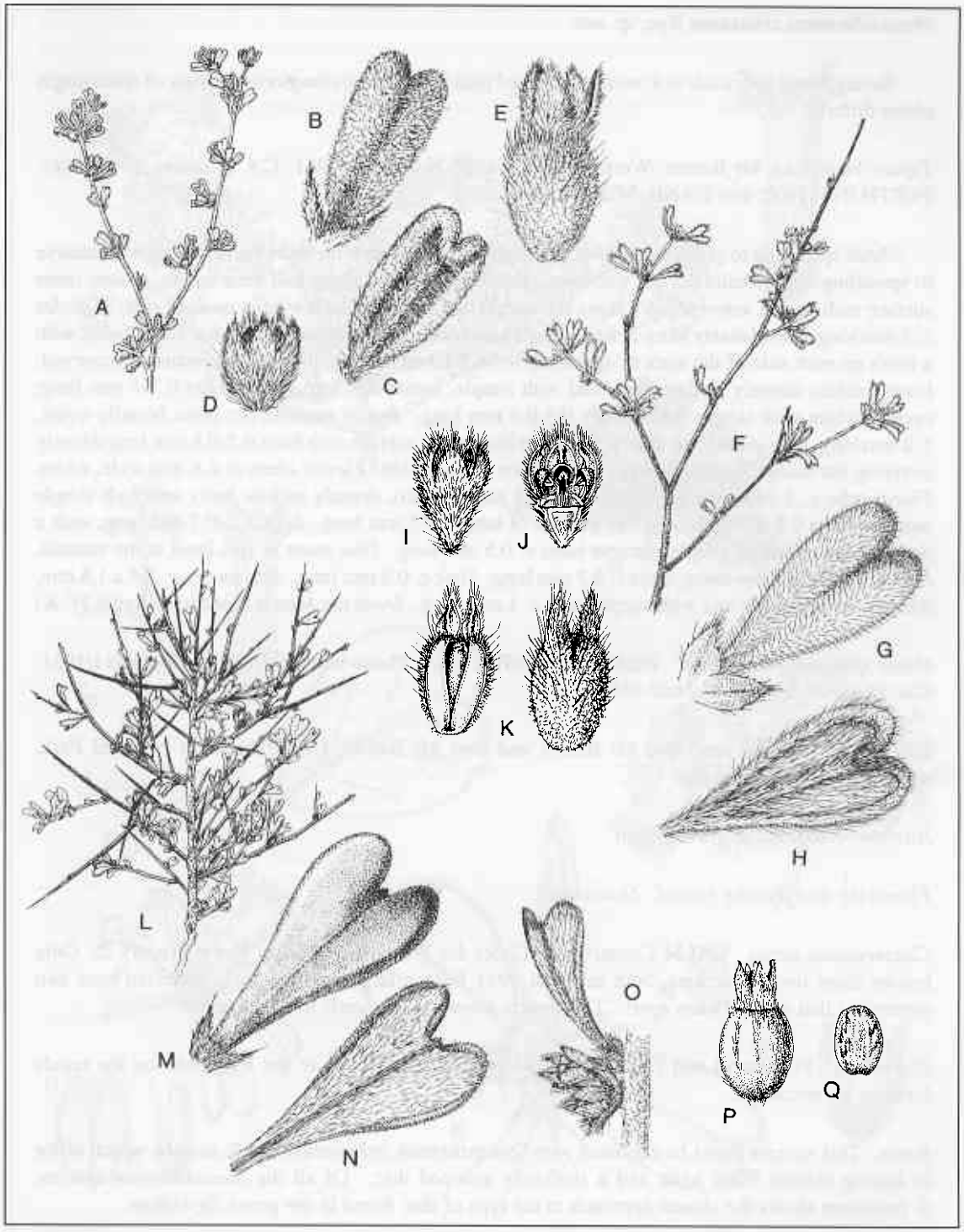

Figure 7. A-E - *Stenanthemum bilobum*. A - flowering branch (x1), B - stipules and upper surface of leaf (x6), C - lower surface of leaf (x6), D - flower (x12), E - schizocarp (x12); F-K - *S. cristatum*. F - flowering branch (x1), G - stipules and upper surface of leaf (x6), H - lower surface of leaf (x6), I - flower (x9), J - half flower (x9), K - inner and outer surfaces of a dehiscing fruitlet (x6); L-Q - *S. divaricatum*. L - flowering branch (x1), M - stipules and upper surface of leaf (x6), N - lower surface of leaf (x6), O - flower cluster and leaves (x6), P - schizocarp (x8), Q - seed (x8). Drawn from *D.W. Goodall* 1840 (A-E), *C.A. Gardner* 2947 (F-J), *C.A. Gardner 1406* & *W.E. Blackall* (K), *A.S. Weston* 10609 (L-O), *A.S. George* 11501 (P) and *A.S. George* 10154 (Q).

Stenanthemum cristatum Rye, sp. nov.

Stenanthemo imbricato et *S. notiali* simili sed pilis florum magis longioribus, disco ad apice magis plano differt.

Typus: Near East Mt Barren, Western Australia, 25 November 1931, *C.A. Gardner* 2947 (*holo:* PERTH 01541900; *iso:* CANB, MEL).

Shrub spreading to prostrate, 0.05-0.2 m high. *Young stems* with short stellate hairs and antrorse to spreading simple hairs 0.5-0.7 mm long. *Stipules* united for about half their length, ciliate; outer surface with simple antrorse hairs along the midrib and sometimes a few hairs on each side. *Petioles* *c.* 1 mm long, very densely hairy at first. *Leaf blades* obcordate or broadly so, 5-8 x 3.5-5.5 mm, with a tooth on each side of the apex or appearing to be 2-lobed at apex, the margins distinctly recurved; lower surface densely stellate-hairy and with simple, sometimes ferruginous hairs 0.7-1 mm long; upper surface with simple patent hairs 0.3-0.4 mm long. *Bracts* variable but often broadly ovate, 1-2 mm long, long-ciliate, the cilia 0.3-0.5 mm long; outer surface with hairs 0.5-0.8 mm long densely covering the midvein, sparsely hairy or glabrous on each side. *Flower clusters* 4-6 mm wide, white. *Floral tube* *c.* 1 mm long (enlarging to *c.* 2.5 mm in fruit), densely stellate-hairy and with simple antrorse hairs 0.8-1.2 mm long; free portion of tube *c.* 0.5 mm long. *Sepals* *c.* 0.7 mm long, with a dense indumentum of simple antrorse hairs *c.* 0.5 mm long. *Disc* more or less level at the summit. *Ovary summit* stellate-hairy; hairs *c.* 0.3 mm long. *Style* *c.* 0.6 mm long. *Schizocarp* *c.* 2.4 x 1.8 mm, densely stellate-hairy and with simple hairs *c.* 1 mm long. *Seeds* not seen at maturity. (Figure 7F-K)

Other specimens examined. WESTERN AUSTRALIA: Plains near Mid Mt Barren, 25/11/1931, *C.A. Gardner & W.E. Blackall* 1406.

Distribution. Occurs near Mid Mt Barren and East Mt Barren, Fitzgerald River National Park, southern Western Australia.

Habitat. Recorded in gravelly soil.

Flowering and fruiting period. November.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 2. Only known from two collections, both made in 1931 from a large national park, collected near two mountains that are *c.* 35 km apart. This poorly known taxon needs to be surveyed.

Etymology. From the Latin *cristatus* - tufted or crested, referring to the long hairs on the sepals forming an apical tuft.

Notes. This species could be confused with *Stenanthemum imbricatum* and *S. notiale*, which differ in having shorter floral hairs and a shallowly scooped disc. Of all the *Stenanthemum* species, *S. cristatum* shows the closest approach to the type of disc found in the genus *Spyridium.*

Stenanthemum divaricatum (Benth.) Rye, nov. comb.

Spyridium divaricatum Benth., Fl. Austral. 1: 427 (1863). *Type:* Dirk Hartog Island, [Western Australia], *Milne* (*n.v.*); Murchison River, [Western Australia], *Oldfield* (MEL 227041).

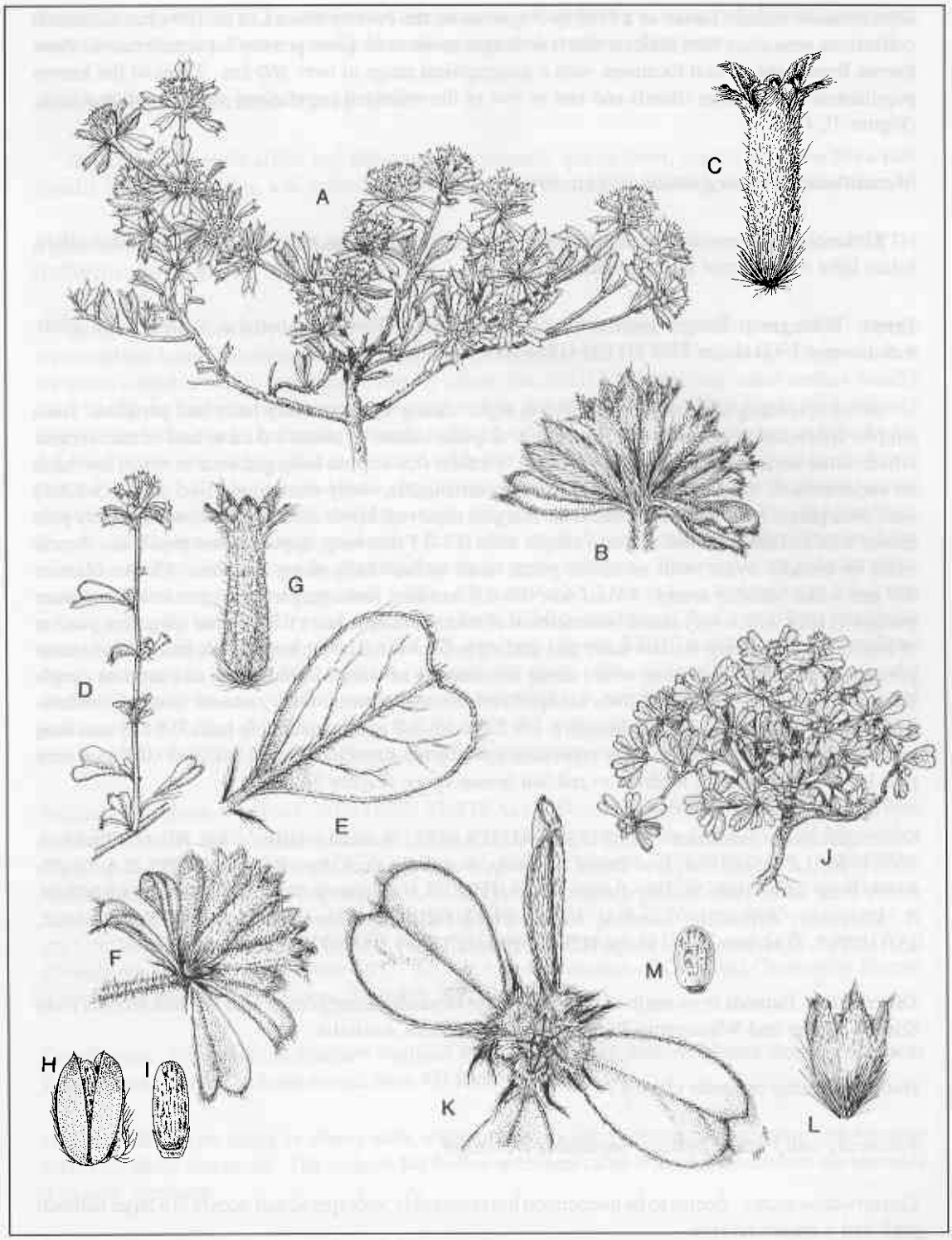

Figure 8. A-C - *Stenanthemum coronatum*. A - whole plant (x1), B - flower cluster (x3), C - flower (x6); D-I - *S. limitatum*. D - flowering branch (x1), E - stipules and lower surface of leaf (x4), F - flower cluster (x4); G - flower (x6), H - dehiscing fruitlet (x7), I - outer surface of seed and aril (x7); J-M - *S. nanum*. J - whole plant (x1), K - flower cluster (x6), L - flower (x10), M - seed (x7). Drawn from *G.J. Keighery & J.J. Alford* 448 (A-C), *A.S. George* 12893 (D-H), *C.A. Gardner* 8471 (I) and *A. Strid* 21106 (J-M).

Conservation status. Listed as a Priority 3 species on the Priority Flora List of 1994 but additional collections seen since then indicate that it no longer needs to be given priority for conservation. Now known from eight coastal locations, with a geographical range of over 360 km. Three of the known populations are on large islands and one or two of the mainland populations are in a national park. (Figure 7L-Q)

Stenanthemum emarginatum Rye sp. nov.

Stenanthemo divaricato arcte affine sed spinis destitutis, lobis apicalibus foliorum acutioribus, folius infra magis dense pilosis differt.

Typus: Whoogarup Range, south west of Ravensthorpe, Western Australia, 2 December 1960, *A.S. George* 1900 (*holo:* PERTH 01541838; *iso:* CANB).

Shrub spreading to prostrate, 0.05-0.1 m high. *Young stems* sparsely hairy and papillose; hairs simple, appressed to antrorse, *c.* 0.5 mm long. *Stipules* united for about a third to half of their length, ciliate; outer surface with hairs along midvein. *Petioles* 0.5-1.5 mm long, glabrous or with a few hairs on undersurface. *Leaf blades* usually narrowly obtriangular, rarely obtriangular, 4.5-11 x 1.5-3.5(5) mm, emarginate and 3-toothed at apex, the margins recurved; lower surface usually white, rarely pale green, with stellate hairs and antrorse simple hairs 0.4-0.7 mm long; upper surface papillose. *Bracts* ovate or broadly ovate, with an apical point; outer surface hairy along midvein. *Flower clusters* 3-5 mm wide, white or cream. *Floral tube* 0.6-0.9 mm long (enlarging to 2-2.5 mm in fruit); adnate portion of tube with a very dense indumentum of antrorse simple hairs 0.3-0.5 mm long; free portion of tube 0.3-0.5 mm long, stellate-hairy and tending to be covered by the long simple hairs of the adnate portion. *Sepals* 0.6-1 mm long, with a dense indumentum of minute stellate hairs and antrorse simple hairs *c.* 0.3 mm long. *Disc* shallowly scooped between the stamens. *Ovary summit* minutely stellate-hairy. *Style c.* 0.5 mm long. *Schizocarp* 1.8-2.2 x 1.5-1.7 mm, with simple hairs 0.5-0.8 mm long and usually also a few stellate hairs especially towards the summit. *Seeds* 0.9-1.2 x *c.* 0.7 mm, very pale brown, with distinct medium to reddish brown spots. (Figure 9A-F)

Other specimens examined. WESTERN AUSTRALIA: Bobakine Hills, 4 km NE of Clackline, 30/9/1986, *J.J. Alford* 968; E of Brand Highway, S of Wannamal West Rd, 16/12/1992, *E.A. Griffin* 8469; Near Moir Hill, Stirling Range, 15/11/1982, *G.J. Keighery* 5854; Kelmscott, 21/12/1899, *A. Morrison*; Armadale, Canning River, 21/12/1901, *A. Morrison*; Dryandra State Forest, 15/11/1987, *D.M. Rose* 504; Ridge Hill Rd, Helena Valley, 11/1977, *J. Seabrook* 621.

Distribution. Extends from north of Gingin south to Dryandra State Forest, with isolated records from Stirling Range and Whoogarup Range, southern Western Australia.

Habitat. In clay or sandy clay.

Flowering and fruiting period. September-December.

Conservation status. Seems to be uncommon but reasonably widespread and occurs in a large national park and a nature reserve.

Etymology. From the Latin *e* - out of and *margo -inis* - margin, referring to the notched (emarginate) apical margin of the leaf.

Notes. Closely related to *Stenanthemum divaricatum*, which differs in commonly having spinescent branchlets and in the obtuse apical lobes and sparser undersurface of its leaves.

Stenanthemum intricatum Rye, sp. nov.

Stenanthemo notiali affine sed foliis supra indumento sparso brevi, sepalis et parte libra tubi floralis magis aequabilus, a *S. tridentato* tubo florali inferi et fructo magis pubescentibus differt.

Typus: 6 km S of Kalbarri township, Western Australia, 7 May 1968, *P.G. Wilson* 6581 (*holo:* PERTH 01539701; *iso:* CANB).

Shrub dense, often wiry, erect to widely spreading, 0.1-0.7 m high, intricately branched. *Young stems* stellate-hairy, sometimes also with a few simple antrorse hairs 0.3-0.6 mm long. *Stipules* united for about a third to half of their length, usually ciliate, the cilia 0.1-0.3 mm long; outer surface usually hairy along the midvein, sometimes appearing almost glabrous. *Petioles* 0.3-0.8 mm long, densely hairy at first, sometimes becoming sparsely hairy. *Leaf blades* obovate to obcordate or broadly so, 2.5-8 x 2-8 mm, the margins flat or recurved, with 1 or 2 teeth on each side of the apical tooth; lower surface densely hairy at first, sometimes becoming sparsely hairy; upper surface with simple, patent to widely antrorse hairs 0.05-0.2 mm long, rarely also with a few antrorse simple hairs c. 0.3 mm long. *Bracts* ovate or broadly ovate, prominently ciliate, often toothed; outer surface usually with a few hairs along the midvein, sometimes moderately densely hairy on midvein. *Flower clusters* 3-5 mm wide, usually white to cream, rarely greenish white. *Floral tube* 0.8-1.0 mm long (enlarging to 2.3-3 mm in fruit), densely stellate-hairy and with simple hairs 0.2-0.5 mm long at first, sometimes becoming sparsely hairy; free portion of tube (0.4)0.5-0.6 mm long. *Sepals* 0.5-0.7 mm long, densely stellate-hairy, with simple hairs 0.1-0.3 mm long towards the apex. *Disc* shallowly scooped between the stamens. *Ovary summit* densely stellate-hairy; hairs 0.2-0.3 mm long. *Style* 0.5-0.8 mm long. *Schizocarp* 1.8-2.5 x 1.6-2 mm, densely stellate-hairy and with simple hairs usually 0.3-0.4 mm long. *Seeds c.* 1.4 x 0.8 mm, very pale brown, with dark red-brown markings. (Figure 9G-N)

Selected specimens examined. WESTERN AUSTRALIA: Durokoppin Nature Reserve, 12/11/1986, *L. Darlington* HLA76; Wongan Hills, 12/1924, *C.A. Gardner*; *c.* 5 miles [8.5 km] W of Mogumber Mission, 11/4/1964, *A.S. George* 6174; Masons Rd, NE of Watheroo, 27/10/1992, *E.A. Griffin* 7726; Kalbarri road, E of Kalbarri National Park, 7/8/1976, *R.J. Hnatiuk* 760555; Mokine Nature Reserve, 7/6/1985, *G.J. Keighery & J.J. Alford* 858; Mt Ridley, 9/3/1980, *K.R. Newbey* 6695; at entrance of track to Junga Dam, Kalbarri National Park, 2/6/1994, *S. Patrick* 1833; 17 miles [27.4 km] W of Dalwallinu, 4/5/1955, *R.D. Royce* 5037; 6.5 km S of intersection of Grey and Clotworthy streets, Kalbarri, on road to Eagle Gorge, 5/7/1991, *B.L. Rye* 91006.

Distribution. Extends from Kalbarri National Park south east to Mokine Nature Reserve and near Kellerberrin, with an isolated record from Mt Ridley.

Habitat. Occurs on sandy or clayey soils, sometimes associated with laterite, often in low-lying or relatively damp situations. The isolated Mt Ridley specimen came from clayey sand on the apron of a granite monolith.

Flowering and fruiting period. March-November.

Conservation status. Widespread and not considered to be at risk.

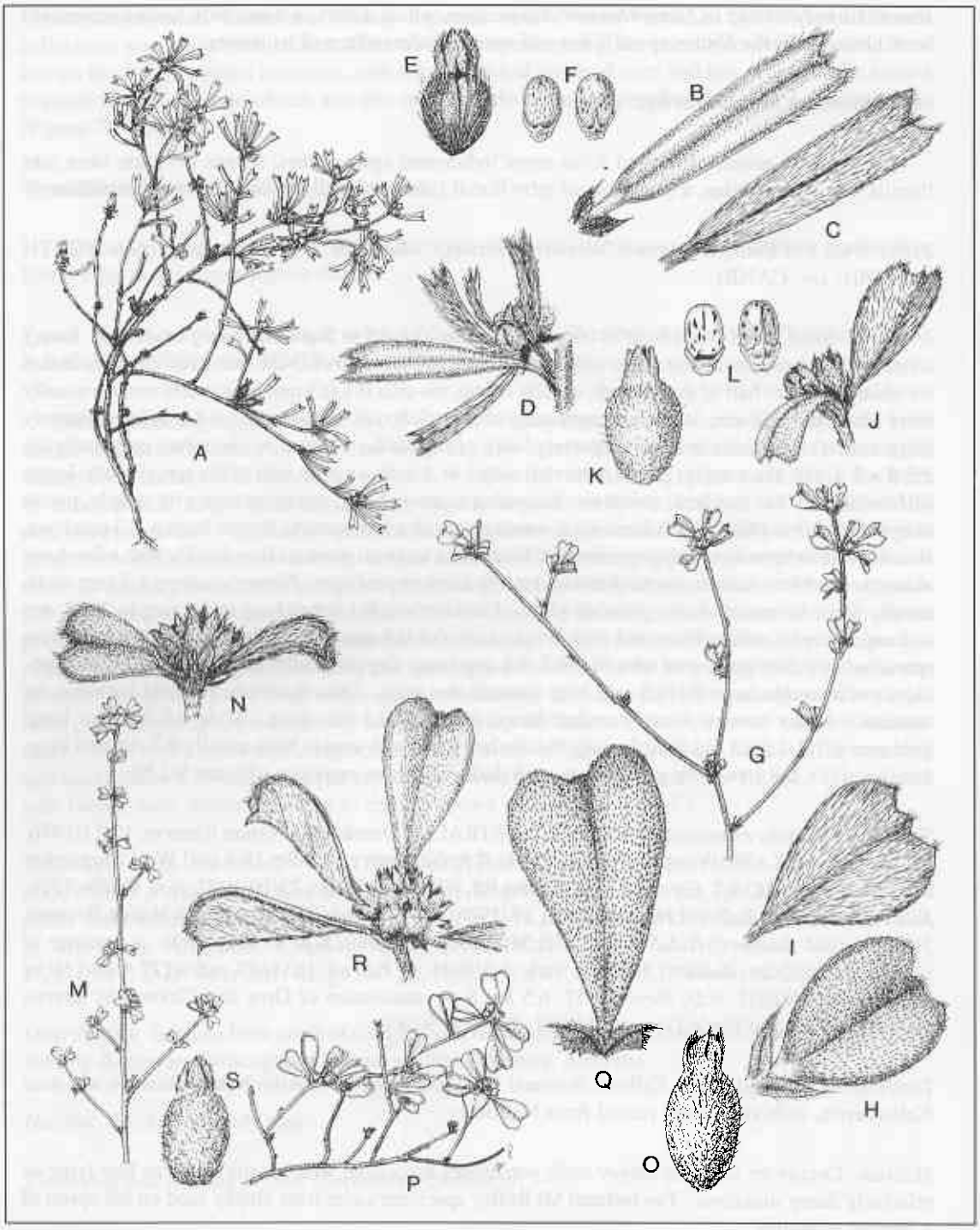

Figure 9. A-F - *Stenanthemum emarginatum*. A - whole plant (x1), B - stipules and upper surface of leaf (x7), C - lower surface of leaf (x7), D - flower cluster (x4), E - dehiscing schizocarp (x8), F - outer and inner surfaces of seed and aril (x9); G-L - typical *S. intricatum*. G - flowering branch (x1), H - stipules and upper surface of leaf (x6), I - lower surface of leaf (x6), J - flower cluster (x5), K - schizocarp (x6), L - outer and inner surfaces of seed and aril (x7); M,N - atypical *S. intricatum*. M - flowering branch (x1), N - flower cluster (x7); O - *S. notiale* subsp. *notiale* schizocarp (x6); P-S - *S. notiale* subsp. *chamelum*. P - flowering branch (x1), Q - stipules and upper surface of leaf (x5), R - flower cluster (x4), S - schizocarp (x7). Drawn from *A.S. George* 1900 (A-F), *R.J. Hnatiuk* 760555 (G-L), *Y. Chadwick* 1738 (M,N), *R. Pullen* 9786 (O-Q), *J. Dodd* 5/9/1978 (R) and *G.J. Keighery* 9673 (S).

Etymology. From the Latin *intricatus* - entangled, referring to the intricate branching pattern characteristic of this species.

Notes. The closest relative is *Stenanthemum notiale*, which tends to have longer petioles and larger leaves, with its upper leaf surface either tuberculate or more densely hairy, and sepals distinctly exceeding the free portion of the floral tube. The difference in the relative lengths of the sepals and free part of floral tube is usually more evident in fruit than in flower and is a less reliable character than the vegetative differences. In Western Australia, *S. notiale* also differs in its usually open branching pattern and commonly has more yellowish flowers.

Stenanthemum intricatum could also be confused with the three species in the *S. tridentatum* species group, which differ in their less hairy lower floral tube and fruit and their paler seed mottling.

Two atypical specimens (*Y. Chadwick* 1738 from east of Geraldton and *F.W. Went* 79 from south west of Yuna) have particularly small leaves with margins more recurved than usual. Whereas typical specimens have only short patent to antrorse hairs 0.05-0.2 mm long on the upper leaf surface, the atypical variant also has a few antrorse hairs *c.* 0.3 mm long. This variant is illustrated in Figure 9M,N.

Stenanthemum limitatum Rye sp. nov.

Stenanthemo coronato arcte affine sed planta grandiore, bracteis brevioribus, floribus minus dense pubescentibus differt.

Typus: Mt Lesueur, Western Australia, 16 October 1946, *C.A. Gardner* 8471 (*holo:* PERTH 01516957; *iso:* CANB).

Shrub, erect to decumbent, 0.15-1 m high. *Young stems* with large stellate and simple hairs; large simple hairs more or less patent, 0.4-0.7 mm long. *Stipules* connate for about a quarter of their length, persistent or shed about the same time as the leaves, attenuate or acuminate, with a few large cilia; outer surface usually with a few large hairs mainly on the midvein. *Petioles* 0.5-1 mm long, usually with a few large simple hairs on undersurface. *Leaf blades* usually broadly obovate to broadly obtriangular, sometimes obovate to obtriangular, 5.5-16 x 3-8 mm, with 1 or 2 (rarely more) teeth on each side of the apex, the margins recurved; lower surface with 1-3 lateral veins on each side of midrib, densely stellate-hairy and with large simple hairs at first, soon becoming sparsely hairy, with simple hairs *c.* 1 mm long persisting mainly on the midvein; upper surface sparsely hairy on the margins or glabrous, the marginal hairs 0.4-1 mm long. *Involucral bracts* subulate or narrowly triangular, 1.5-2 mm long, attenuate, prominently ciliate, the larger cilia usually *c.* 0.6 mm long; outer surface sparsely hairy or glabrous. *Floral bracts* apparently deciduous, similar to involucral bracts but smaller. *Flower clusters* 5-10 mm wide, white or cream. *Floral tube* 3-3.5 mm long (enlarging to 5-6 mm in fruit); adnate portion of tube densely hairy with a mixture of short stellate hairs and coarse antrorse simple hairs *c.* 0.7 mm long; free portion of tube 2.5-3 mm long, with a sparse to moderately dense indumentum of stellate and simple hairs. *Sepals* 1.1-1.5 mm long, rather sparsely stellate-hairy and with antrorse or spreading simple hairs *c.* 0.5 mm long. *Disc* deeply v-shaped between the stamen traces. *Ovary summit* minutely stellate-hairy. *Style* 3-4 mm long. *Schizocarp* 2.5-3.3 x 1.5-1.8 mm, with a mixture of minute stellate hairs and antrorse to almost patent simple hairs 0.4-0.8 mm long. *Seeds c.* 2 x 0.8 mm, very pale brown, with mid brown markings. (Figure 8D-I)

Other specimens examined. WESTERN AUSTRALIA: summit of Mt Lesueur, 13/10/1974, *A.S. George* 12893; western slope of Mt Lesueur, 17/7/1979, *E.A. Griffin* 1883; 2 km N of Mt Lesueur, 11/10/1979, *E.A. Griffin* 2354; 8 km NE of Mt Lesueur, 12/10/1979, *E.A. Griffin* 2533; Jurien Bay, 4/11/1962, *R.D. Royce* 7746.

Distribution. Occurs in the Mt Lesueur area, southern Western Australia.

Habitat. Recorded mainly on laterite, with one record from sandstone.

Flowering and fruiting period. October-November.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 2. Included on the 1991 Priority Flora List under the phrase name *Cryptandra* sp. *Lesueur* (*A.S. George* 12893). This species has been included in a survey of rare taxa in the Moora District. Known localities are restricted to an 8 km range and include a national park.

Etymology. From the Latin *limito -atus* enclose within limits, referring to the very restricted geographic range of the species.

Notes. Closely related to *Stenanthemum coronatum*, which differs in being a smaller, more prostrate plant with longer bracts and more densely hairy flowers. *S. coronatum* also tends to have smaller, more densely clustered leaves and less elongate fruits and also has a glabrous ovary summit.

Stenanthemum mediale Rye, sp. nov.

Folia late obovato-conduplicata, parva, integra; bracteae latae; flores in amplitudine medii; disci sinubus v-formatis; ovarium stellato-pubescens.

Typus: Yeelirrie Station, Western Australia, 3 May 1990, *H. Pringle* 2755 (*holo:* PERTH 02937778; *iso:* CANB, MEL).

Shrub erect, *c.* 0.35 m high. *Young stems* with a dense indumentum of minute stellate hairs and appressed simple hairs, the largest simple hairs 0.4 mm or more long. *Stipules* connate for about a third to half of their length, acute or acuminate; outer surface usually hairy on midvein. *Petioles* *c.* 1 mm long, densely hairy. *Leaf blades* obovate to very broadly obovate, 3.5-7 x 2.5-4.5 mm, entire, the apex recurved; lower surface with a very dense indumentum of long appressed hairs, usually with 3 or 4 lateral veins (sometimes scarcely visible) on each side of midrib; upper surface glabrous or minutely papillose. *Involucral bracts* ovate or broadly ovate, 3-4 mm long, usually acuminate; outer surface hairy on the margins and midvein, glabrous in between, prominently ciliate. *Floral bracts* very broad, often toothed, *c.* 1.5 mm long, hairy on midvein, long-ciliate. *Flower clusters* 5-8 mm wide, colour unknown. *Floral tube* 1.5-2.5 mm long (enlarging to 3-4 mm long in fruit), with a dense indumentum of minute stellate hairs and rather coarse simple hairs, the simple hairs antrorse and becoming smaller towards the summit of tube, the basal ones commonly *c.* 0.6 mm long; free portion of tube 1-2 mm long. *Sepals* 1.3-1.7 mm long, with an indumentum like that at summit of floral tube but with the simple hairs mostly *c.* 0.2 mm long. *Disc* v-shaped between the stamen traces, the base of each v being 0.5-0.8 mm above base of free tube. *Ovary summit* densely stellate-hairy. *Style* 1.5-2 mm long. *Schizocarp* 3-3.5 x *c.* 2.5 mm, densely hairy. *Seeds* not seen at maturity. (Figure 10A-E)

Other specimens examined. Black Hill Station, 31/7/1993, *D.A. Blood* 3751.

Distribution. Known from Yeelirrie Station and Black Hill Station, central Western Australia.

Habitat. Recorded from red clayey sand.

Flowering and fruiting period. April-August.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 1. First listed in 1994 under the phrase name *Stenanthemum* sp. *Yeelirrie* (*Pringle* 2755). Known from two specimens collected from pastoral stations.

Etymology. From the Latin *medialis*- in the middle, referring to the occurrence of the species in the middle of Western Australia.

Notes. This species has a disk similar to *Stenanthemum coronatum* and its allies, but those species differ in their leaves usually being toothed on each side of the apex and their flowers either shorter or longer, with a number of other differences which vary according to the species. *Stenanthemum petraeum* appears to overlap in range with *S. medialis* but has larger and more shiny leaves, finer and more spreading hairs on the floral tube, a shorter disc and a different habitat.

Stenanthemum nanum Rye, sp. nov.

Stenanthemo coronato arcte affine sed floribus parvioribus, bracteis latioribus, apice ovarium stellato-pubescenti differt.

Typus: 50.5 miles [88.5 km] SE of Perth on Brookton Highway, Western Australia, 25 November 1965, *A.S. George* 7368 (*holo:* PERTH 0154307; *iso:* CANB).

Shrub spreading, more or less prostrate to 0.05 m high. *Young stems* with stellate and simple hairs both common or with mainly simple hairs; larger simple hairs antrorse to almost patent, 0.4-0.7 mm long. *Stipules* connate for about a third of their length, attenuate, long-ciliate; outer surface with some long simple hairs mainly on the midvein. *Petioles* 0.8-2 mm long, hairy at first on undersurface, becoming sparsely hairy or subglabrous. *Leaf blades* broadly obovate or sometimes obovate, 5-8 x 3-5 mm, with a tooth on each side of the apex, the margins flat; lower surface with a dense indumentum of small stellate and antrorse simple hairs 0.5-0.7 mm long; upper surface often with a brown or reddish margin, papillose. *Bracts* ovate or broadly ovate, 2-3 mm long, prominently ciliate, the cilia 0.5-0.6 mm long; outer surface with long antrorse simple hairs along the midvein. *Flower clusters* 4-6 mm wide, white or cream. *Floral tube* 1.6-1.8 mm long (enlarging to 3-3.5 mm in fruit), with a very dense indumentum of minute stellate hairs and antrorse simple hairs *c.* 1 mm long; free portion of tube *c.* 0.9 mm long. *Sepals c.* 1 mm long, with a dense indumentum of minute stellate hairs and antrorse to spreading simple hairs *c.* 0.4 mm long. *Disc* v-shaped between the stamen traces. *Ovary* summit stellate-hairy; hairs 0.1-0.2 mm long. *Style c.* 0.7 mm long. *Schizocarp* 2.2-2.5 x *c.* 2 mm, densely stellate-hairy and with some simple hairs *c.* 1 mm long. *Seeds c.* 1.5 x 0.8 mm, very pale brown with distinct medium brown markings. (Figure 8J-M)

Other specimens examined. WESTERN AUSTRALIA: No collection data, 01543415; Worsley Mine Site, 10 km S of Boddington, 23/4/1982, *K.J. Atkins* 172; 73 km from Perth on Brookton Highway, near Christmas Tree Well, 27/10/1982, *A. Strid* 21106.

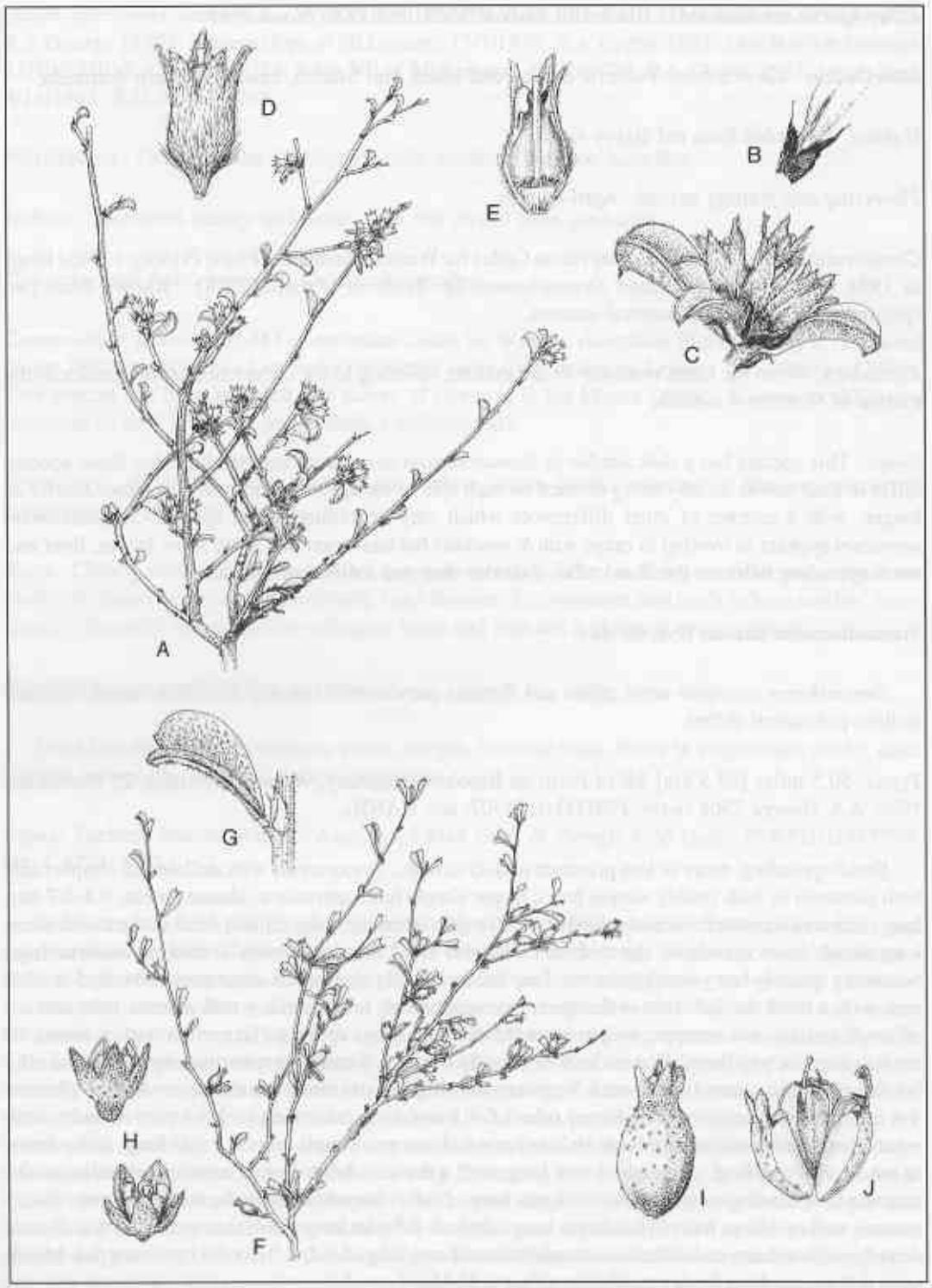

Figure 10. A-E. *Stenanthemum mediale.* A - flowering branch (x1), B - connate stipules (x6), C - flower cluster (x4), D - flower (x7), E - half flower showing disc (x7.5); F-J - *Stenanthemum tridentatum.* F - fruiting branch (x1), G - stipules and leaf (x7), H - two views of flower (x6), I - fruit (x7), J - dehisced fruit (x7). Drawn from *H. Pringle* 2755 (A-E), *P.G. Wilson* 6210 (F,G,I,J) and *A.S. George* 9899 (H).

Distribution. Occurs in the Darling Range from Brookton Highway south to near Boddington, southern Western Australia.

Habitat. Recorded from laterite and from gravelly clay on granite.

Flowering and fruiting period. October-November.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 1. Known from three localities with a range of *c.* 70 km, one from a mining lease and the others probably in state forest.

Etymology. From the Latin *nanus* - dwarf, referring to the size of the plants.

Notes. Closely related to *Stenanthemum coronatum*, which differs in its larger flowers, narrower bracts and glabrous ovary summit.

Stenanthemum newbeyi Rye, sp. nov.

Stenanthemo complicato arcte affine sed apice ovarii glabro, fructo minus pubescenti; *S. stipuloso* arcte affine sed foliis grandioribus multi-venisque supra pilis simplicibus, floribus grandioribus.

Typus: Bungalbin Hill, Western Australia, 2 January 1989, *D.J. Pearson* 559 (*holo:* PERTH 01679538).

Shrub, erect or spreading, 1-1.5 m high. *Young stems* with stellate and simple hairs; simple hairs appressed or antrorse, 0.4-0.6 mm long, sometimes ferruginous. *Stipules* free or very shortly connate at the base; outer surface hairy. *Petioles* 2-2.5 mm long, densely hairy. *Leaf blades* obovate or sometimes broadly obovate, 10-15 x 6-8 mm, entire, the margins flat or incurved; lower surface pale green or ferruginous, with 6-9 main lateral veins on each side of midvein; upper surface with long antrorse simple hairs at first, at maturity with minute patent simple hairs. *Involucral bracts* variable, commonly broadly ovate, *c.* 3 mm long, with an apical point, hairy inside along midvein; outer surface densely hairy, with a mixture of minute stellate hairs and appressed simple hairs *c.* 0.5 mm long, the indumentum sometimes ferruginous. *Flower clusters* 6-11 mm wide, pale yellow, each flower either subsessile or on a short hairy pedicel 0.3-1 mm long. *Floral tube c.* 1.5 mm long (enlarging to *c.* 3.8 mm in fruit), with a very dense indumentum of simple hairs 0.8-1 mm long; free portion of tube *c.* 1 mm long. *Sepals c.* 0.6 mm long, with a very dense indumentum of antrorse or spreading hairs 0.4-0.5 mm long. *Disc* apparently absent or shallowly scooped between the stamens. *Ovary summit* glabrous. *Style c.* 1.2 mm long. *Schizocarp c.* 3 x 2 mm, with simple hairs 0.7-1 mm long at first, apparently becoming glabrous with age. *Seeds* not seen at maturity. (Figure 11A-C)

Other specimens examined. WESTERN AUSTRALIA: 3 km N of Bungalbin Hill, 6/9/1989, *R.J. Cranfield & P.J. Spencer* 7773; 10 km N of Bungalbin Hill, 15/9/1979, *K.R. Newbey* 5922.

Distribution. Known only from Bungalbin Hill and nearby hills, southern Western Australia.

Habitat. On rocky slopes of ironstone or lateritic hills.

Flowering and fruiting period. August-September, December-January.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 1. Known from three localities, with a range of only 10 km, in a mining area.

Etymology. After Ken R. Newbey, a prominent collector of Western Australian plants and the first person to collect this taxon.

Notes. Closely related to *Stenanthemum complicatum* and *S. stipulosum*, the former with a densely hairy ovary summit and more hairy fruits, the latter having smaller, few-veined leaves with a dense indumentum of minute stellate hairs on the upper surface and also smaller flowers.

Stenanthemum notiale Rye, sp. nov.

Stenanthemo intricato arcte affine sed sepalis parte libra tubi floralis manifeste longioribus, insuper uno subspecierum ramificationis ordinatione magis aperto, alter subspecierum folio supra magis pubescenti differt.

Typus: c. 17 km NNW of Young River crossing on Ravensthorpe-Esperance road, Western Australia, 27/9/1968, *E.N.S. Jackson* 1296 (*holo:* PERTH 01541315; *iso:* AD, CANB).

Shrub subprostrate to erect, up to 0.5 m high. *Stipules* united for about a quarter to half of their length, usually ciliate, the cilia 0.1-0.3 mm long; outer surface usually hairy along the midvein. *Petioles* 0.5-2.0 mm long. *Leaf blades* narrowly to broadly obovate to obcordate, 2.5-15 x 2.5-9 mm: lower surface densely hairy with small stellate hairs and simple appressed to antrorse hairs 0.3-1.0 mm long. *Bracts* narrowly to broadly ovate, prominently ciliate, often toothed. *Flowers clusters* 4-7.5 mm wide. *Floral tube* 0.6-1 mm long (enlarging to 2-2.8 mm in fruit), densely stellate-hairy and with simple hairs 0.2-0.5 mm long; free portion of tube 0.3-0.4(0.5) mm long. *Sepals* 0.6-0.9 mm long, densely minutely stellate-hairy and with simple hairs 0.05-0.3 mm long. *Disc* shallowly scooped between the stamens. *Ovary summit* densely stellate-hairy; hairs 0.1-0.3 mm long. *Style* 0.5-0.8 mm long. *Schizocarp* 1.8-2.4 x 1.5-1.8 mm, densely stellate-hairy and with simple hairs 0.3-0.7 mm long.

Distribution. Widely distributed in the south-west of Western Australia between Kalbarri National Park and Cocklebiddy and occurring also in South Australia and Victoria.

Etymology. From the Latin *notialis* - southern, referring to the southern distribution of the species in mainland Australia, with representation in each of the three southern states.

Notes. Closely related to *Stenanthemum intricatum*, which differs in having sepals and the free portion of the floral tube similar in length. In comparison with most Western Australian specimens of *S. notiale*, *S. intricatum* also tends to differ in habit, being a denser, more intricately branched shrub. It usually has shorter petioles and leaf blades, which have a sparse indumentum of short hairs on the upper surface.

Stenanthemum notiale subsp. **chamelum** Rye, nom. et stat. nov.

Cryptandra tridentata var. *tomentosa* Reissek in Lehm., Pl. Preiss. 2: 288 (1848). *Type:* Mt Eliza, Perth, [Western Australia], 25 September 1839, *L. Preiss* 1216 (LD).

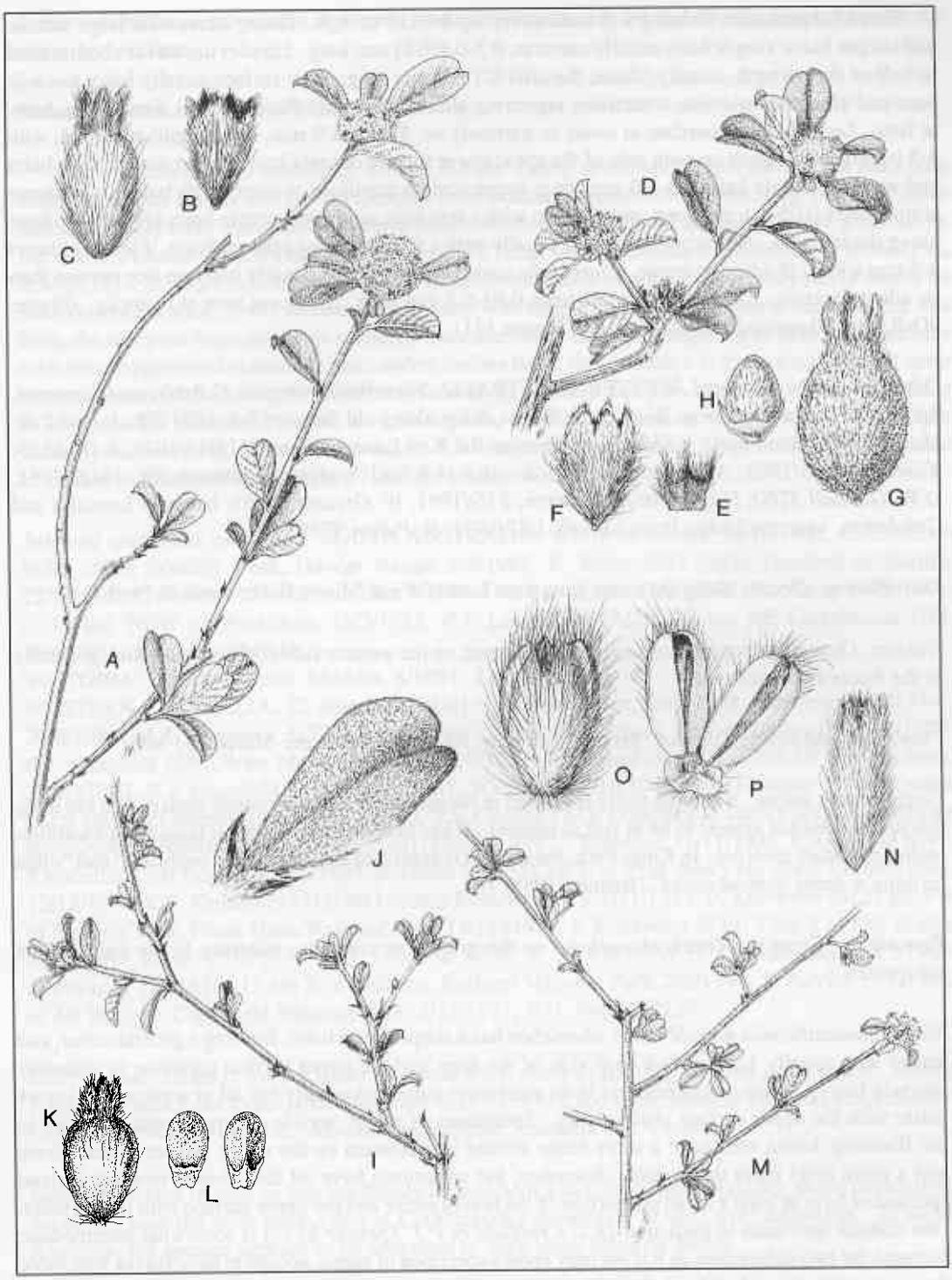

Figure 11. A-C - *Stenanthemum newbeyi*. A - flowering branch (x1), B - flower (x8), C - schizocarp (x6); D-H - *S. petraeum*. D - flowering branch (x1), E - floral bract (x8), F - flower (x8), G - schizocarp (x7), H - outer surface of seed and aril (x6); I-L - *S. stipulosum*. I - flowering branch (x1), J - stipules and upper surface of leaf (x6), K - schizocarp (x7), L - outer and inner surfaces of seed and aril (x7); M-P - *Stenanthemum* sp. *Mt Clifford* (*R. Cumming* 1267). M - flowering branch (x1), N - flower (x7), O - dehiscing schizocarp (x7), P - two fruitlets dehiscing (x6). Drawn from *D.J. Pearson* 559 (A-C), *A.S. George* 8323 (D), *P.K. Latz* 2337 (E,F), *R. Bates* (G,H), *C.A. Gardner* 13868 (I,J), *R.J. Cranfield* 2457 (K,L) and *R. Cumming* 1267 (M-P).

Shrub subprostrate, forming a ground cover, up to 0.15 m high. *Young stems* with large stellate and simple hairs; simple hairs usually antrorse, 0.3-0.4(0.8) mm long. *Stipules* united for about a third to half of their length, usually ciliate, the cilia 0.1-0.2 mm long; outer surface usually hairy towards base and along the midvein, sometimes appearing almost glabrous. *Petioles* 0.8-1.5 mm long, hairy at first. *Leaf blades* obcordate to ovate or narrowly so, 5-15 x 3-9 mm, the margins recurved, with 1-3 (rarely more) teeth on each side of the apex; lower surface densely hairy at first with stellate hairs and antrorse simple hairs 0.3-1.0 mm long; upper surface papillose or rarely with patent to antrorse simple hairs 0.05-0.1 mm long, usually also with a few long appressed simple hairs towards the base along the midvein. *Bracts*: outer surface usually with a few hairs along the midvein. *Flower clusters* 4-5 mm wide, off-white or cream. *Floral tube* sometimes much less densely hairy on free portion than on adnate portion. *Sepals* with simple hairs 0.05-0.2 mm long. *Seeds* not seen at maturity. (Figure 9O-R; also illustrated in Bennett 1988, Figure 131).

Other specimens examined. WESTERN AUSTRALIA: No collection details, *C. Andrews*; Claremont, 3/1902, *C. Andrews*; Moore River State Forest, 5 km along old Bennies Rd, 5/9/1978, *J. Dodd* 18; Moore River State Forest, 6.5 km along Bennies Rd, E of Lancelin turnoff, 18/11/1979, *J. Dodd* 59; Yanchep, 21/5/1963, *A.S. George* 4379; 3 miles [4.8 km] S along Wanneroo Rd, 18/10/1961, *D.W. Goodall* 3760; Nilgen Nature Reserve, 27/9/1991, *W. Greuter* 22261; between Lancelin and Guilderton, near the Ledge Point turnoff, 1/12/1974, *R. Pullen* 9786.

Distribution. Occurs along the coast from near Lancelin and Moore River south to Perth.

Habitat. Occurs in deep sand or sand over limestone, on the western side of the coastal plain, generally in the Spearwood soil type.

Flowering and fruiting period. Probably all year, recorded September-March and May.

Conservation status. Although fairly restricted in range, occurring on a coastal strip *c.* 110 km long, this taxon does not appear to be at risk at present. It has been recorded from at least eight localities, including nature reserves. In Kings Park, the species is described as "common in bushland" and "often forming a dense ground cover" (Bennett 1988: 70).

Etymology. From the Greek *chamelos* - on the ground or creeping, referring to the habit of the subspecies.

Notes. Stenanthemum notiale subsp. *chamelum* has a subprostrate habit, forming a ground cover, and leaves with usually 1-3 teeth on each side of the apex and the upper surface papillose or minutely sparsely hairy. Subsp. *notiale* differs in its more erect habit and usually has all or some of the leaves entire with the upper surface always hairy. Specimens of subsp. *notiale* occurring near the coast in the Illawong-Jurien area have a short dense stellate indumentum on the upper surface of the leaves and a more erect habit than subsp. *chamelum*, but sometimes have all their leaves toothed. Inland specimens have at least a small proportion of the leaves entire and the upper surface with longer hairs. One coastal specimen in particular (*R.J. Cranfield & P.J. Spencer* 8252) is somewhat intermediate between the two subspecies, as it is the only known specimen of subsp. *notiale* to have leaves with more than one tooth on each side of the apex.

Like the typical subspecies, subsp. *chamelum* has a more densely hairy floral tube and fruit than *S. tridentatum*, in which it was previously included as var. *tomentosum*. Its closer relative,

S. intricatum, has a more erect and more intricately branched habit and usually longer hairs on the upper leaf surface.

Stenanthemum notiale Rye subsp. **notiale**

Shrub usually erect or spreading, 0.1-0.5 m high. *Young stems* with simple and stellate hairs both common or with mainly stellate hairs; simple hairs usually antrorse, 0.3-0.8 mm long. *Stipules*: outer surface densely hairy along the midvein at least towards the base, more sparsely hairy or glabrous on the sides. *Petioles* 0.5-2.0 mm long, densely hairy. *Leaf blades* obovate to obcordate or broadly so, 2.5-10(13) x 2.5-6(7) mm, the margins flat or recurved, entire or with 1 tooth (very rarely more) on each side of the apex; lower surface densely hairy with simple appressed to antrorse hairs 0.3-0.5 mm long, the marginal hairs and often scattered hairs elsewhere usually ferruginous at first; upper surface with simple appressed to antrorse hairs and/or stellate hairs; simple hairs *c.* 0.5 mm long. *Bracts*: outer surface densely hairy along the midvein, sometimes sparsely hairy on the sides. *Flower clusters* 4-7.5 mm wide, commonly yellow or yellow-green, sometimes cream or white. *Sepals* with simple hairs 0.1-0.3 mm long. *Seeds* 1.1-1.4 x 0.65-0.8 mm, with dark markings. (Figure 9S; also illustrated in Barker & Dashorst 1988, Figure 1 as *Spyridium tridentatum*)

Selected specimens examined. SOUTH AUSTRALIA: WNW of Kimba, 10/10/1981, C.*R. Alcock* 9086 (AD); Scrubby Peak, Gawler Range, 9/9/1983, *R. Bates* 3353 (AD); Hundred of Parilla, 22/7/1968, *B. Copley* 1952 (AD); *c.* 2 km WNW of Mt Bosanquet, 27/10/1987, *P.J. Lang* 8675 (AD); *c.* 12 km WSW of Waddikee, 18/7/1985, *P.J. Lang* 8834 (AD); 5-7 km NE Corrobinnie Hill, 5/10/1981, *M. Lewis* 91 (AD).
VICTORIA: Hattah and near Mildura, 8/1951, *J.H. Willis* (AD).
WESTERN AUSTRALIA: 22 miles [35.4 km] N of Lake Grace, 26/7/1968, *anonymous*; Mt Ney, 30/8/1984, *M.A. Burgman* 3172 & *C. Layman*; Jurien Bay turnoff, Brand Highway, 21/12/1978, *R.J. Cranfield* 1208; West Moresby Range, 22/8/1983, *R.J. Cranfield* 2804; 8 km SE of Mt Adams, 25/10/1993, *R.J. Cranfield* & *D. Kabay* 8951; Wicherina, 9/10/1945, *C.A. Gardner* 7733; 8 miles [12.9 km] N of Bremer River, 28/11/1960, *A.S. George* 1743; Dandaragan survey area [near Moore River North], 30/9/1988, *E.A. Griffin* 5341; Reserve 42477, Illawong, 11/11/1991, *E.A. Griffin* 6697; Kamballup Golf Course, 25/10/1985, *N. Hoyle* 1293; 11 km E of York then 5 km along Tammin road, 12/12/1974, *K.F. Kenneally* 2418; Mt Lesueur Reserve 15018, 1/11/1973, *D. Kitchener* 89; 21 km SW of 90 Mile Tank, Frank Hann National Park, 13/11//1979, *K.R. Newbey* 6514; 7 km S of Pell Bridge over Irwin River, 27/9/1971, *A.E. Orchard* 4209; *c.* 23 km SSW of Cocklebiddy, 1/12/1967, *R. Parsons* 155 (AD); 15 km E of Kalbarri, Kalbarri National Park, 2/6/1994, *S. Patrick* 1832; foot of Mt Ragged, Cape Arid National Park, 5/12/1971, *R.D. Royce* 10129.

Distribution. Extends from Kalbarri National Park south to Badgingarra and south east to Stirling Range and near Lake Grace, extending east from there to Cape Arid National Park and Cocklebiddy, southern Western Australia. Also occurs in South Australia and Victoria.

Habitat. Occurs in sand or less commonly in soils with a mixture of sand and clay, those populations occurring near the west coast (also at Cocklebiddy) sometimes in sand over limestone. In South Australia, the species appears to be restricted to deep sand, often on dunes.

Flowering and fruiting period. Apparently all year, most collections made in July-December but also some in January-June.

Conservation status. A common and widespread subspecies.

Notes. Most specimens have all leaves entire or a mixture of entire and 3-toothed leaves, but a few specimens have most or all of the leaves toothed. In the northern specimens flower colour is usually given as yellow or yellow-green, while there are only three specimens mentioning colour in the southern part of the species range, one from north of Bremer Bay with cream flowers, one from near Young River with yellow flowers and one from Mt Ragged with white flowers. None of the South Australian and Victorian specimen labels indicates flower colour, nor is flower colour mentioned in the detailed description of the South Australian material provided by Barker & Dashorst (1988).

A very variable subspecies. In most of its Western Australian range, it is a subprostrate to erect shrub, up to 0.5 m high, usually with a very open branching habit, with petioles 0.7-2.0 mm long and leaf blades (4)5-10(13) x 3-6(7) mm. In South Australia, Victoria and Cocklebiddy, Western Australia, it is apparently usually a spreading decumbent shrub, with erect branches commonly 0.1-0.2 m high, more intricately branched than in the typical variant, with petioles 0.5-1.5 mm long and leaf blades 2.5-6 x 2.5-4 mm. Some Western Australian specimens occurring in the Fitzgerald River-Cape Arid area are also like the eastern variant or intermediate between the eastern and western variants of the taxon.

Stenanthemum petraeum Rye, sp. nov.

Stenanthemo complicato arcte affine sed stipulis magis glabris, foliis magis argenteo-griseis tuberculatis, sepalis indumento magis appresso differt.

Typus: 189 km N of Neale Junction, Western Australia, 18 July 1974, *A.S. George* 12000 (*holo:* PERTH 01515411; *iso:* CANB, MEL).

Shrub erect or spreading, 0.4-1 m high. *Young stems* densely hairy at first, sometimes soon becoming glabrous; hairs appressed or antrorse, sometimes ferruginous. *Stipules* free or very shortly connate at the base; outer surface usually sparsely hairy. *Petioles* 1-2 mm long, densely hairy. *Leaf blades* usually broadly obovate to circular, sometimes elliptic, rarely obovate, 5-18 x 5-12 mm, entire, margins flat or incurved; lower surface silvery pale green, with 4-7 main lateral veins on each side of midvein, very densely covered by long appressed hairs; upper surface papillose and sometimes also with a few long appressed simple hairs. *Involucral bracts* broadly oblong or ovate, 1-2 mm long, with an apical point and often some lateral teeth on each side of the apex, long-ciliate; outer surface densely hairy along the midvein, the hairs *c.* 0.5 mm long. *Floral bracts* 1 or 2 per flower, narrower and paler than the involucral bracts. *Flower clusters* 5-11 mm wide, cream. *Floral tube* 1.5-2.3 mm long (enlarging to 3-3.8 mm in fruit), densely minutely stellate-hairy and with simple hairs usually 0.8-1 mm long; free portion of tube 1.3-2 mm long. *Sepals* 1-1.8 mm long, densely hairy; hairs appressed or antrorse, 0.2-0.3 mm long. *Disc* shallowly scooped between the stamens. *Ovary summit* with stellate hairs 0.2-0.3 mm long. *Style* 1.5-3 mm long. *Schizocarp c.* 2.6 x 2.4 mm, with minute stellate hairs and simple hairs 0.7-1 mm long. *Seeds c.* 1.8 x 1.4 mm, orange-brown, with dark brown spots but these not prominent. (Figure 11D-H)

Selected specimens examined. NORTHERN TERRITORY: Shaw River, East Petermann Range, 4/1967, *W.H. Butler* 5; Glen Edith, 24/6/1959, *G. Chippendale* 6247; 23 miles [37 km] NE of Docker River Settlement, 29/10/1970, *C. Dunlop* 1989.
WESTERN AUSTRALIA: Summit of Mt Augustus, 1/8/1984, *R. Bates* 3936; 3.2 km NNE of Miralga Bore, Yoothapina Station, 14/8/1986, *R.J. Cranfield* 5678; 53 miles [85.3 km] SW of Warburton

Mission, 30/8/1961, *A.S. George* 2966; Miss Gibson Hill, 26/8/1962, *A.S. George* 4074; Near Ediths Marble Bath, Rawlinson Range, 3/10/1966, *A.S. George* 8271; *c.* 6.5 km N of Giles, Rawlinson Range, 7/7/1958, *R. Hill & T.R.N. Lothian* 842; Sir Frederick Range, 8/4/1972, *P.K. Latz* 2337; Mt Augustus, 26/8/1987, *K.R. Newbey* 11709; Rawlinson South, 30/7/1972, *A. Robinson;* Mt Ella, Hamersley Range, 19/5/1995, *M.E. Trudgen* 12738.

Distribution. Occurs in central Western Australia, extending from Mt Augustus and Yoothapinna Station (near Meekatharra) eastwards *via* the Warburton area into Northern Territory.

Habitat. Occurs in rocky or gravelly sites on hills or rock outcrops.

Flowering and fruiting period. April-October.

Conservation status. Not considered to be at risk at present.

Etymology. From the Greek *petraeus* - among rocks, referring to the occurrence of the species in rocky habitats.

Notes. Closely related to *Stenanthemum complicatum*, which differs in its more hairy stipules, greener leaves with minute patent hairs on the upper surface and spreading hairs on the sepals. The two taxa also differ in habitat.

Stenanthemum poicilum Rye sp. nov.

Stenanthemo pomaderroides simile sed stipulis basi connatis, foliis brevioribus venis minus numerosis differt.

Typus: 12 km E of Jasper Hill, Western Australia, 22 November 1992, *R.J. Cranfield* 8605 (*holo:* PERTH 03048551; *iso:* CANB).

Shrub erect to decumbent, 0.15-0.5 m high. *Young stems* with a dense indumentum of simple and stellate hairs; simple hairs appressed to antrorse, mostly less than 0.5 mm long, a few 0.5-0.8 mm long, sometimes ferruginous. *Stipules* connate at the base for about a quarter of their length, long-acuminate; outer surface hairy. *Petioles* 0.5-1 mm long, densely hairy. *Leaf blades* broadly obovate, 2.5-7 x 2.5-6 mm, entire, the margins more or less flat; lower surface with 2-4 main lateral veins on each side of midvein, minutely stellate-hairy and with antrorse simple hairs *c.* 0.5 mm long; upper surface minutely stellate-hairy. *Involucral bracts* ovate or broadly ovate, 2.5-3.5 mm long, acuminate, ciliate, the cilia commonly 0.3-0.5 mm long; outer surface hairy. *Floral bracts* ovate, *c.* 3 mm long, acuminate, hairy. *Flower clusters* 5-12 mm wide, white. *Floral tube* 2.5-3.7 mm long (enlarging to 4-5.5 mm in fruit), with a dense indumentum of small stellate hairs and antrorse to appressed simple hairs 0.4-0.6 mm long; free portion of tube 2-3 mm long. *Sepals* 1.3-1.6 mm long, with a dense indumentum of small stellate hairs and appressed simple hairs 0.3-0.5 mm long. *Disc* apparently absent. *Ovary summit* glabrous. *Style* 2.5-3.5 mm long. *Schizocarp* 2-2.5 x *c.* 1.5 mm, with antrorse to appressed simple hairs, the longest hairs 0.5-0.6 mm long. *Seeds* 1.3 x 0.8 mm, pale yellow-brown, with prominent dark (almost black) markings. (Figure 12A-F)

Other specimens examined. WESTERN AUSTRALIA: Canna, 29/10/1974, *J.S. Beard* 7204; between Mullewa and Morawa, 24/9/1932, *W.E. Blackall* 2804; Maggie Hays Hill, Bremer Range,

8/5/1978, *G.J. Keighery* 1687; Wilroy Reserve, 5/6/1977, *B.G. Muir* 358.

Distribution. Occurs in the Wilroy-Canna and Warriedar Station areas, with an isolated record from Bremer Range, southern Western Australia.

Habitat. Recorded in clay or sandy clay, sometimes or often over ironstone.

Flowering and fruiting period. May-June, September-November.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 2. Included on the 1991 Priority Flora List under the phrase name *Cryptandra* sp. *Canna* (*J.S. Beard* 7204). Since then, an additional population of the species has been located. The species has been collected from three or four northern localities, extending *c.* 145 km, and from an isolated south-eastern locality *c.* 440 km from the remainder of its range. One of these localities is a nature reserve. *C. poicilum* is probably poorly collected rather than rare but this needs confirmation before the species can be removed from the priority list.

Etymology. From the Greek *poikilos* - mottled, referring to the conspicuously mottled seeds.

Notes. Closely related to *Stenanthemum pomaderroides*, which has free stipules and larger leaves with 5-8 prominent lateral veins on each side of the midvein. *S. pomaderroides* also has a more open branching pattern and different indumentum on the flowers, with the stellate hairs whiter and more predominant.

Stenanthemum pumilum (F.Muell.) Diels in Diels & E. Pritzel, Bot. Jahrb. Syst. 35: 356 (1904). - *Spyridium pumilum* F.Muell., Fragm. Phyt. Austral. 9: 137 (1875). - *Cryptandra pumila* (F. Muell.) F. Muell., Syst. Census Aust. Pl. 61 (1882-1883). *Type:* Stirling Range, [Western Australia], *F. Mueller* (n.v.).

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 3. First included on the 1994 Priority Flora List. It is known from an area *c.* 25 km long in Stirling Range National Park, with a very isolated record in Darling Range *c.* 280 km north-west of the Stirling Range localities. (Figure 12G-K)

Stenanthemum reissekii Rye sp. nov.

Stenanthemo pomaderroides simile sed stipulis connatis, foliis margine recurvis, disco florum manifesto.

Typus: N of Badgingarra, Western Australia, 29 October 1966, *A.S. George* 8631 (*holo:* PERTH 01517406; *iso:* CANB, MEL).

Shrub erect to decumbent, 0.1-0.5 m high. *Young stems* usually densely hairy at first, soon becoming glabrous with a flaky surface; hairs simple and stellate, appressed or antrorse, sometimes ferruginous. *Stipules* connate for about half or more of their length, acuminate; outer surface hairy on the almost black midvein. *Petioles* 0.5-1.5 mm long, hairy on undersurface at first, becoming glabrous. *Leaf blades* narrowly obovate, 12-24 x 4-7 mm, entire, the margins recurved; lower surface with a dense indumentum of long antrorse ferruginous hairs, with 3-6 lateral veins on each side of

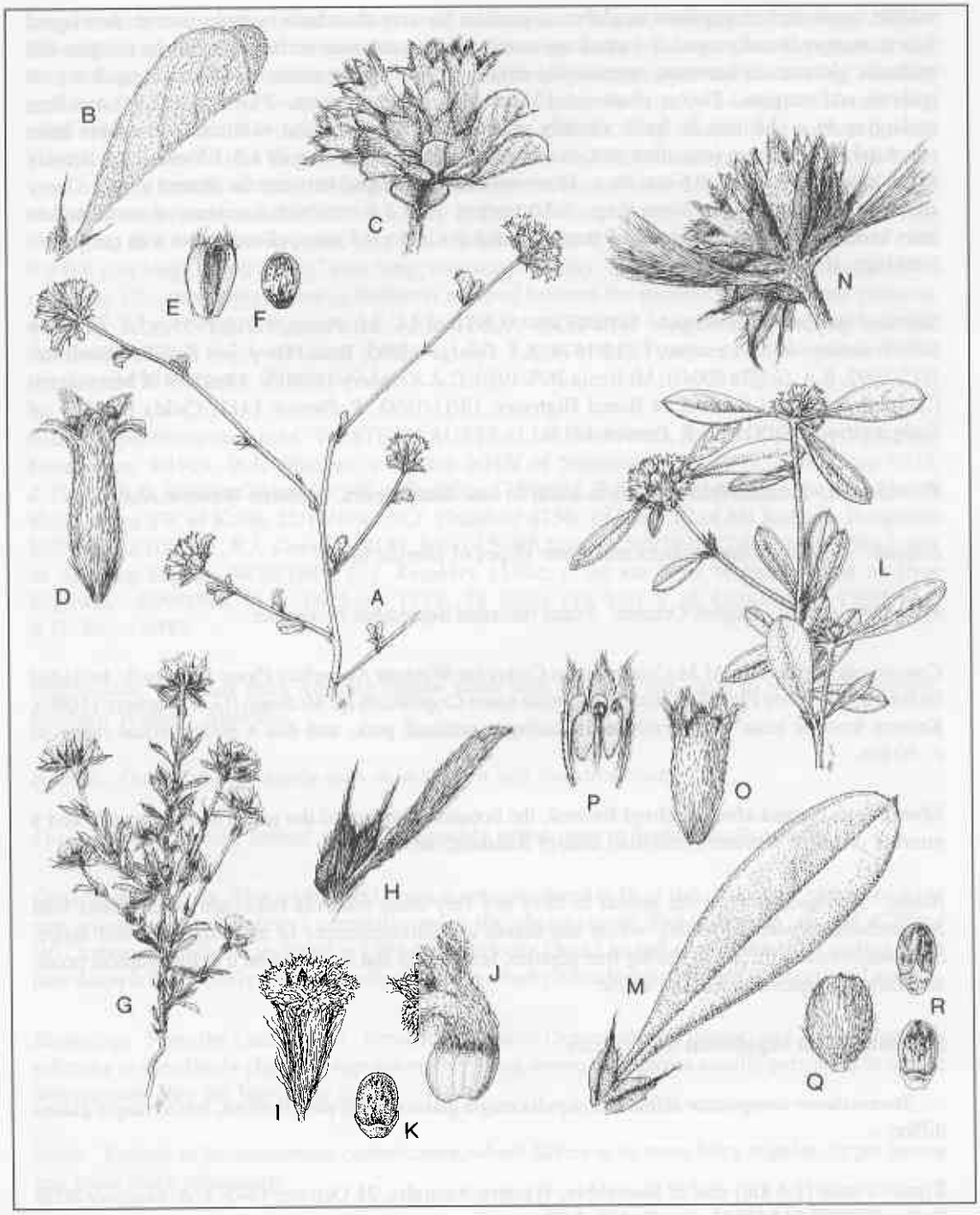

Figure 12. A-F - *Stenanthemum poicilum*. A - flowering branch (x1), B - stipules and leaf (x7), C - flower cluster (x4), D - flower (x7), E - fruitlet (x7), F - seed (x7); G-K - S. *pumilum*. G - whole plant (x1), H - stipules and leaf (x7), I - flower (x6), J - schizocarp (x6), K - outer surface of seed and aril (x7); L-R - *S. reissekii*. L - flowering and fruiting branch (x1), M - stipules and upper surface of leaf (x4), N - flower cluster (x4), O - flower (x6), P - inside of flower showing disc (x7), Q - schizocarp (x7), R - outer and inner surfaces of seed and aril (x7). Drawn from *R.J. Cranfield* 8605 (A-D), *W.E. Blackall* 2804 (E,F), *A.S. George* 10918 (G,H), *R.J. Cranfield* 1971 (I-K) and *A.S. George* 8631 (L-R).

midrib; upper surface papillose or glabrous; papillae (or very short hairs) simple, patent. *Involucral bracts* ovate or broadly ovate, 3-4 mm long, usually acuminate; outer surface hairy on the margins and midvein, glabrous in between, prominently ciliate. *Floral bracts* ovate, *c.* 2.5 mm long, hairy on midvein and margins. *Flower clusters* 6-13 mm wide, white or cream. *Floral tube* 2.5-3 mm long (enlarging to *c.* 3.6 mm in fruit), densely minutely stellate-hairy and with antrorse simple hairs commonly 0.4-0.6 mm long; free portion of tube 1.7-2 mm long. *Sepals* 1.3-1.5 mm long, densely hairy; hairs appressed, *c.* 0.6 mm long. *Disc* very deeply v-shaped between the stamen traces. *Ovary summit* glabrous. *Style c.* 2 mm long. *Schizocarp c.* 2.4 x 1.6 mm, with a mixture of small stellate hairs and antrorse simple hairs *c.* 0.6 mm long. *Seeds c.* 1.4 x 0.7 mm, yellow-brown with red-brown markings. (Figure 12L-R)

Selected specimens examined. WESTERN AUSTRALIA: Mt Peron, 11/10/1957, *C.A. Gardner* 10568; summit of Mt Lesueur, 13/10/1974, *A.S. George* 12895; Brand Hwy, just S of Tootbardi Rd, 1/12/1992, *E.A. Griffin* 8004B; Mt Benia 26/8/1989, *G.J. Keighery* 11080; *c.* 1 km NW of Marchagee-Coomalloo Rd at 1.2 km E of Brand Highway, 18/11/1992, *S. Patrick* 1411; Cadda Rd, NW of Badgingarra, 20/10/1992, *S. Patrick* 1314.

Distribution. Extends from Mt Peron south to near Badgingarra, southern Western Australia.

Habitat. Occurs on the summits and upper slopes of lateritic hills.

Flowering period. August-October. Fruits recorded September-November.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 3. Included on the 1991 Priority Flora List under the phrase name *Cryptandra* sp. *Mt Benia* (*G.J. Keighery* 11080). Known from at least five localities, including a national park, and has a geographical range of *c.* 40 km.

Etymology. Named after Siegfried Reissek, the botanist who named the genus *Stenanthemum* and a number of other Western Australian taxa of Rhamnaceae.

Notes. This species does not appear to have any very close relatives but could be confused with *Stenanthemum pomaderroides*, which has leaves and inflorescences of a similar size and shape. *S. pomaderroides* differs in having free stipules, leaves with flat margins and a definite apical point, and flowers apparently lacking a disc.

Stenanthemum stipulosum Rye, sp. nov.

Stenanthemo complicato affine sed stipulis magis glabris, foliis pusillioribus, fructo magis glabro differt.

Typus: 1 mile [1.6 km] east of Boorabbin, Western Australia, 21 October 1945, *C.A. Gardner* 8039 (*holo:* PERTH 01542931; *iso:* CANB, MEL).

Shrub erect to decumbent, (0.05)0.1-1 m high (possibly sometimes taller). *Young stems* with a dense tangled indumentum of simple and stellate hairs; simple hairs 0.3-0.5 mm long, sometimes ferruginous. *Stipules* free or very shortly connate at the base; outer surface hairy. *Petioles* 0.5-2 mm

long, densely hairy. *Leaf blades* obovate to obcordate or broadly so, usually obovate, 3-8.5 x 2.5-4.5(5.5) mm, entire, the margins flat or incurved; lower surface pale green or ferruginous, with 3 or 4 main lateral veins on each side of midvein, densely hairy; upper surface densely minutely stellate-hairy. *Involucral bracts* variable, often broadly linear or broadly 2-lobed, 1.7-3 mm long, often toothed across the broad apex, hairy inside along midvein, long-ciliate; outer surface densely hairy, the hairs *c.* 0.5 mm long. *Floral bracts c.* 2 per flower, 1.3-2 mm long, with hairs 0.5-1.3 mm long, ovate or broadly ovate, sometimes toothed across the apex. *Flower clusters* 4-8 mm wide, white or cream, each flower subsessile or on a hairy pedicel 0.3-1 mm long. *Floral tube* 0.8-1.2 mm long (enlarging to 2.5-3.5 mm in fruit), very densely hairy, hairs 0.7-1.3 mm long; free portion of tube 0.4-0.8 mm long. *Sepals* 0.5-0.7 mm long, very densely hairy; hairs antrorse, or spreading; 0.3-0.5 mm long. *Disc* apparently absent or shallowly scooped between the stamens. *Ovary summit* glabrous. *Style* 0.7-1.3 mm long. *Schizocarp* 1.8-2.3 x 1.5-1.8 mm, sparsely hairy or glabrous; hairs simple, deciduous, usually 0.7-1 mm long. *Seeds c.* 1.4 x 1 mm, orange-brown, with pale yellow-brown patches and black spots. (Figure 11I-L)

Selected specimens examined. WESTERN AUSTRALIA: Bruce Rock district, *E. Bailey* V13; Near Narembeen, 9/1929, *W.E. Blackall*; *c.* 65 km WNW of Norseman, 19/9/1979, *M.D. Crisp* 5938, *J. Taylor & R. Jackson*; 26 km due SW of Bodallin, 17/9/1982, *R.J. Cranfield* 2457; 6 km NE of South Kulin, 2 km SW of Kulin, 25/10/1983, *R.J. Cranfield* 4756; 19.5 km SE of Mt Jackson, Bungalbin Hill track, 2/10/1991, *R.J. Cranfield* 8134; base of North Ironcap, 5/5/1978, *G.J. Keighery* 1647; SW of Adelong Station, 24/10/1989, *G.J. Keighery* 11392; *c.* 34 km N of Widgiemooltha on Eyre Highway, 30/9/1968, *A.E. Orchard* 1259; 23 miles [37 km] S of Coolgardie, 17/2/1961, *R.D. Royce* 6443.

Distribution. Extends from Adelong Station south west to Kulin and south to west of Norseman, southern Western Australia.

Habitat. Occurs in deep sandy soils or in shallow soil over ironstone.

Flowering and fruiting period. All year, possibly with a peak in September-November.

Conservation status. This widespread taxon is not considered to be at risk, but a new variant of it (or new closely related species) currently under the phrase name *Stenanthemum* sp. *Mt Clifford* (*R. Cumming* 1267) was included in 1994 on the Priority Flora List and given a Priority 1 coding. The new taxon is known only from one collection from a rocky hillside near Mt Clifford, north of Leonora.

Etymology. From the Latin *stipula* - diminutive of stipes (botanical term stipule) and *-osus* - plentiful, referring to the closely clustered stipules on the young stems, the stipules usually persisting in a tight arrangement after the leaves are shed.

Notes. Related to *Stenanthemum complicatum*, which differs in its more hairy stipules, larger leaves and more hairy schizocarp.

Stenanthemum sp. *Mt Clifford* appears to be either a new species or a new subspecies of *S. stipulosum*. It differs from typical *Stenanthemum stipulosum* in its larger flowers and fruits, the floral tube initially 2.5-3 mm long and enlarging to 5.5-6 mm long in fruit, the free tube 2-2.5 mm long and the schizocarps *c.* 3.5 mm long. More material is needed to assess its taxonomic status and determine how rare it is. It occurs north of the known range of *S. stipulosum* and is illustrated in Figure 11M-P.

Stenanthemum tridentatum (Steud.) Reissek, Linnaea 29: 295 (1958) - *Cryptandra tridentata* Steud. in Lehm., Pl. Preiss. 1: 186 (1845) - *Spyridium tridentatum* (Steud.) Benth., Fl. Austral. 1: 427 (1863); *C. tridentata* var. *pubescens* Reissek *nom. illeg.* in Lehm, Pl. Preiss. 2: 288 (1848). *Type: L. Preiss* 2421 (LD).

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority 3. Known from five scattered localities from Gunyidi to West River, a distance of *c.* 500 km, including one nature reserve. (Figure 10F-J)

Notes. Many other species were previously misidentified as, or believed to belong within, this species, which has generally been treated since Bentham's (1863) treatment as *Spyridium tridentatum*. The two closest species are *S. divaricatum* and *S. emarginatum*, which differ from the other related taxa (e.g. *S. intricatum* and *S. notiale*) in having the lower part of the floral tube only sparsely hairy, although this is often difficult to detect until it matures to a fruit. They also tend to have young stems more papillose (i.e. with fewer stellate hairs or long antrorse simple hairs), shorter ovary hairs and paler markings on the seeds.

Discussion

There are presently 21% of the typical Western Australian *Cryptandra* species and 55% of the typical *Stenanthemum* species on the Priority Flora List, but none has been included on the Gazetted Rare Flora List. There are also three infraspecific taxa listed for the genus *Cryptandra*. Many of the listed taxa are small and relatively inconspicuous plants, particularly those in the taxa previously lumped under the name *'Spyridium' tridentatum*, so are likely to be poorly collected rather than genuinely rare. Most of the priority taxa have been partially surveyed or are presently the subject of field surveys in the Albany, Esperance, Manjimup, Moora and other Wildlife Districts as well as the Midwest Region. With further study, some of these taxa will probably be removed from the priority list.

Further collections are needed of a few unnamed taxa, such as *Stenanthemum* sp. *Mt Clifford*, so that their taxonomic status can be better assessed. Fruiting material with mature seeds is also needed for a number of taxa to complete the descriptions given here.

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