New species of *Hibbertia* (Dilleniaceae) from the northern wheatbelt area of Western Australia

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Abstract

Wheeler, J.R. New species of *Hibbertia* (Dilleniaceae) from the northern wheatbelt area of Western Australia. Nuytsia 9 (3): 427-439 (1994). *H. lividula, H. glabriuscula, H. graniticola* and *H. arcuata* from the northern wheatbelt area of Western Australia are described and illustrated. The placement of *H. lividula* in section *Hibbertia* subsection *Bracteatae* and *H. glabriuscula* in section *Hibbertia* subsection *Ochrolasiae* is discussed. The relationship between *H. graniticola* and *H. arcuata* is also examined.

Introduction

The genus *Hibbertia* Andr. contains several as yet undescribed species in Western Australia. In 1983 and 1984, Phil Roberts, who was then CALM District Wildlife Officer for Wongan Hills, brought *H. lividula* to my attention with his collections of this species from Dalgouring, Beacon and Wialki in the northern wheatbelt area of Western Australia. Further studies confirmed that this was a new species related to *H. commutata* Steudel. Shortly afterwards a further new species from the Carrabin area, *H. glabriuscula,* which is clearly related to *H. drummondii* and also two other new species, *H. graniticola* and *H. arcuata,* came to my attention. The latter three are also taxa of the northern wheatbelt area of Western Australia.

Descriptions

1. Hibbertia lividula J.R. Wheeler, sp. nov. (Figure 1)

Frutex plerumque multi-caulis foliis lividis. Stamina 30-40, libra, ovaria aequaliter circumdantia, post deum in fasciculis quinque aequalibus carpellis alternantibus disposita. Carpella quinque, glabra.

Typus: 8 km east of Beacon, Western Australia, 19 July 1989, *J.R. Wheeler* 2624 (holo: PERTH 03453626; iso: AD, CANB, K, MEL, NSW).

Erect or sprawling *shrub* to 0.6 m high, usually multi-stemmed, with an indumentum of curled or twisted hairs and usually also some straight hairs. Young *branchlets* thinly hairy. *Leaves* alternate, subsessile, bluish grey, narrowly elliptic to narrowly oblong or narrowly obovate, (5)7-15 x 1.5-3.5 mm, sparsely hairy above and below, gradually tapered to the base, margins slightly to distinctly recurved, apex obtuse. *Flowers* solitary, terminal and terminating short branchlets, sessile, 12-25 mm in diameter. *Bracts* imbricate, dark brown and scarious, 1.5-3 mm long; outermost bracts with short appressed hairs at least in the upper half, acuminate or less often terminating in a small leaf-like projection; innermost bracts sparsely hairy, obtuse to obtusely acuminate. *Sepals* 5, more or less equal in length, connate only at the extreme base, 5-9 x 3-5 mm, the hairs somewhat appressed; outer sepals ovate-elliptic, moderately to densely hairy, apex obtuse to subacute; inner sepals elliptic, sparsely to moderately hairy except for a glabrous submarginal band, margin ciliolate, apex obtuse. *Petals* 5, free, golden yellow, obovate to obcordate, 6-15 x 4-9 mm, emarginate. *Stamens* 30-40, free, evenly distributed but the filament apices and anthers falling into 5 groups between the carpels; filaments slender, 1.5-2.5 mm long; anthers obovate and truncate apically, 0.7-1.2 mm long, opening by subterminal oblique pores; staminodes absent, although occasional unusually small stamens may be present. *Carpels* 5, glabrous; ovules usually 2, rarely 3; style 1.5-3 mm long, arising from the adaxial side of the carpel and radiating outwards; stigma minutely 2-lobed. *Fruit* not seen.

Other specimens examined (all PERTH). WESTERN AUSTRALIA: North of Watheroo and east of Bryant Park, 23 July 1965, *J.C. Anway* 159; 8 miles north of Wialki, 16 July 1967, *J.S. Beard* 4727; Seymour Rd, east of Miling, 12 August 1972, *S. Paust* 1108A; East Beacon, 11 May 1984, *P. Roberts s.n.*; Dalgouring Townsite reserve, 31 May 1983, *P. Roberts s.n.*; Wialki West, 19 July 1984, *P. Roberts s.n.*; Dalgouring, 30° 30'S, 118° 13'E, 8 June 1984, *B.H. Smith* 366; 0.6 miles east of Dalgouring, 8 June 1984, *B.H. Smith* 367; 11 km east of Beacon, 19 July 1989, *J.R. Wheeler* 2625; 11 km east of Beacon, 19 July 1989, *J.R. Wheeler* 2626; 3 km north of Beacon-Wialki Rd along Dalgouring Rd, 19 July 1989, *J.R. Wheeler* 2627; 3.5 km north of Beacon-Wialki Rd along Dalgouring Rd, 19 July 1989, *J.R. Wheeler* 2628; 10 km south east of Beacon (31 km north of Mandiga Rd, along Mandiga-Marindo Rd), 20 July 1989, *J.R. Wheeler* 2630; 15 km west of Mollerin on Burakin-Wialki Rd, 20 July 1989, *J.R. Wheeler* 2633; 5 km west of Kulja on Burakin-Wialki Rd, 20 July 1989, *J.R. Wheeler* 2635.

Distribution. South-west Australia, Avon District between Watheroo and Wialki.

Habitat. Occurs on sand, loam or lateritic sand, in *Eucalyptus wandoo* woodland, mallee woodland with *Acacia* and *Allocasuarina* species or *Acacia* shrubland.

Flowering period. Flowers May to September.

Affinities. *Hibbertia lividula* with its free stamens arranged around glabrous carpels clearly belongs to the section *Hibbertia*, subsection *Bracteatae* (Bentham 1863). Members of subsection *Bracteatae* typically have broad dark brown scarious bracts, free stamens which although evenly distributed around glabrous carpels fall into groups alternating with the carpels. *H. lividula* is related to and has many attributes in common with *H. commutata* Steudel and *H. serrata* Hotchk. (Wheeler 1984). However it differs from all known species of this subsection in having 5 rather than 3 carpels.

Conservation status. The populations have not been fully surveyed but this species does not appear to be under threat.

Etymology. The specific epithet refers to the bluish grey colour of the foliage.

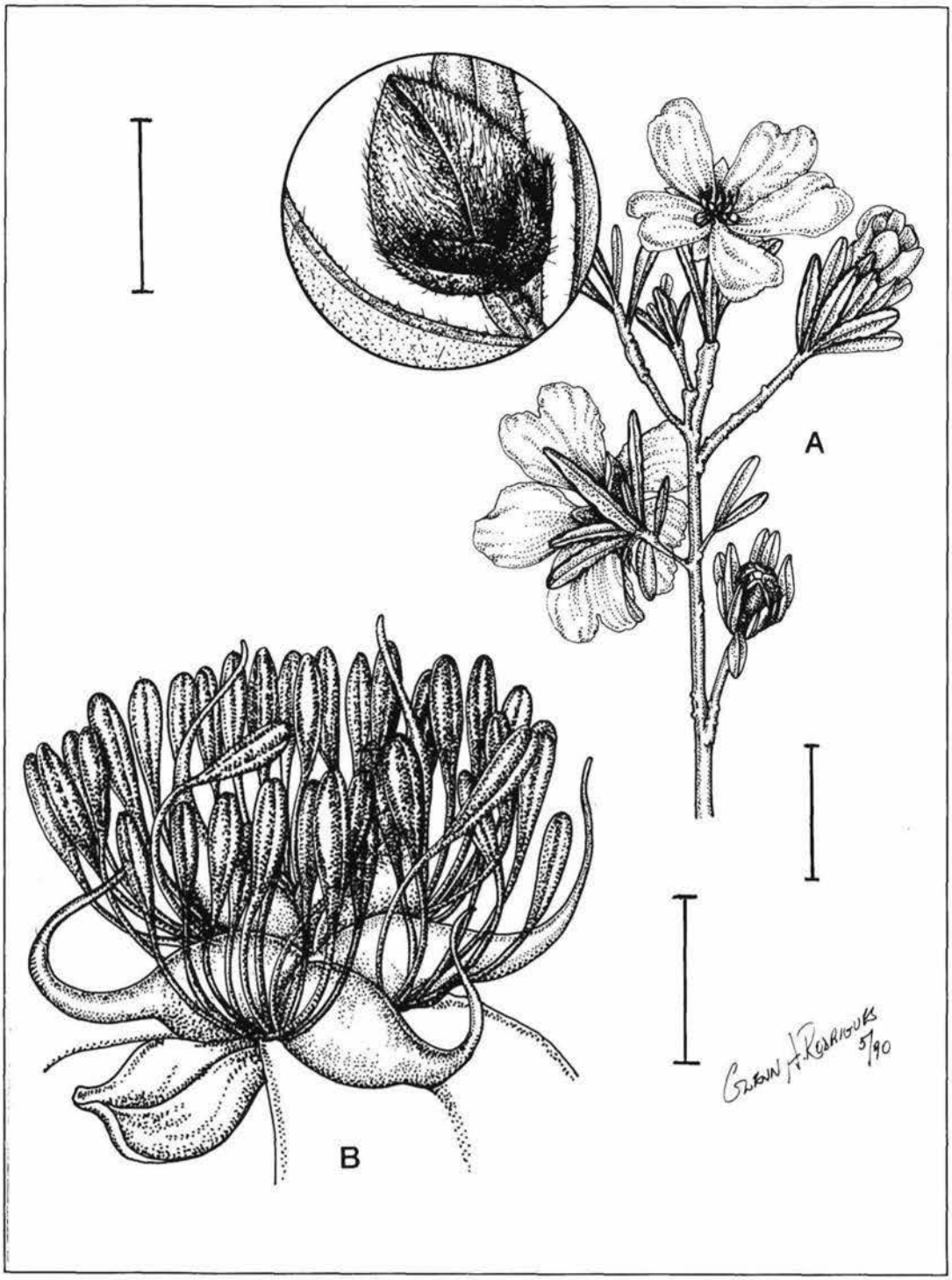

Figure 1. *Hibbertia lividula* A - flowering branch (scale bar = 10 mm), with enlargement of bud and bracts (scale bar = 5 mm), B - stamens and carpels (scale bar = 1 mm).

2. Hibbertia glabriuscula J.R. Wheeler, sp. nov. (Figure 2)

Ex affinitate *H. drummondii* sed sepalis et bracteis sine pilis villosis aureo-fuscis.

Typus: c. 24 km south of Carrabin, Hackling Rd, 14 km east of junction with Burracoppin South Rd, Western Australia, 26 September 1989, *J.R. Wheeler* 2638 (holo: PERTH 03453588; iso: AD, CANB, K, MEL).

Small erect *shrub* to 0.5 m high. Young *branchlets* glabrous. *Leaves* alternate, subsessile or with a very short hairy petiole to 0.3 mm long, oblong to oblong-elliptic and thick, 2-5.5 x 1-1.3 mm, glabrous or sparsely scabrous with simple forward-projecting hairs arising from slight protuberances, margin recurved and connate to the thick broad midrib completely hiding the lower surface, apex obtuse. *Flowers* solitary, terminal, 10-20 mm in diameter; peduncle 1-3 mm long, with short simple hairs; bracts several on the peduncle, narrowly elliptic, 1-3.5 mm long, sepal-like in texture and indumentum. *Sepals* 5, connate only basally, elliptic to broadly elliptic, 4-7 x 2-5 mm, more or less equal in size although the outermost sometimes slightly narrower and more acute, glabrous to thinly hairy with simple hairs outside, appressed hairy at least apically inside, margin ciliolate, apex obtuse or subacute. *Petals* 5, obovate, 6-10 x 4-7 mm, emarginate. *Stamens* 6-12, free, arranged all around the carpels; filaments slender, 1-1.7 mm long; anthers oblong, 1-1.7 mm long, opening by longitudinal slits; staminodes absent. *Carpels* 2, ellipsoid, 1.2-1.5 x c. 1 mm, glabrous; ovules 4 or 6; style at length radiating outwards, 2.5-3.5 mm long. *Fruit* not seen.

Other specimens examined (all PERTH). WESTERN AUSTRALIA: no locality given, no date given *J.S. Beard* 6213; 24 km SSE Carrabin, flora and fauna reserve on land survey blocks nos. 969 and 975, 15-17 September 1982, *A. Strid* 20307; c. 24 km south of Carrabin, Hackling Rd, 14 km east of junction with Burracoppin South Rd, 26 September 1989, *J.R. Wheeler* 2639; c. 24 km south of Carrabin, Hackling Rd, 14 km east of junction with Burracoppin South Rd, 26 September 1989, *J.R. Wheeler* 2640; c. 24 km south of Carrabin, Hackling Rd, 14 km east of junction with Burracoppin South Rd, 26 September 1989, *J.R. Wheeler* 2641; c. 24 km south of Carrabin, Hackling Rd, 14 km east of junction with Burracoppin South Rd, 26 September 1989, *J.R. Wheeler* 2642; c. 25 km south of Carrabin, Pink Rd, c. 1 km south of junction with Hackling Rd, 26 September 1989, *J.R. Wheeler* 2645; c. 25 km south of Carrabin, Pink Rd, c. 1 km south of junction with Hackling Rd, 26 September 1989, *J.R. Wheeler* 2646; c. 23 km south of Carrabin, Hackling Rd, 8 km east of junction with Burracoppin South Rd, 26 September 1989, *J.R. Wheeler* 2647; c. 20 km SSE of Carrabin, Della Rd, c. 1 km north of junction with Hackling Rd, 26 September 1989, *J.R. Wheeler* 2649.

Distribution. South west Australia, Avon District, recorded only from south of Carrabin.

Habitat. Occurs on yellow sand in heath or shrubland.

Flowering period. Flowers recorded for September.

Affinities. *Hibbertia glabriuscula* seems most closely related to *H. drummondii* and clearly belongs with that species in section *Hibbertia*, subsection *Ochrolasiae*. *H. glabriuscula* differs markedly from *H. drummondii* in the absence of the conspicuous long golden brown hairs which characteristically clothe the sepals and bracts of the latter species. The sepals and bracts of *H. glabriuscula* are glabrous to thinly hairy outside and with appressed hairs towards the apex of the inner surface. *H. drummondii* also differs in its usually glabrous and smooth leaves, slightly larger flowers with more numerous (15-18) stamens and larger carpels each with 6-8 ovules.

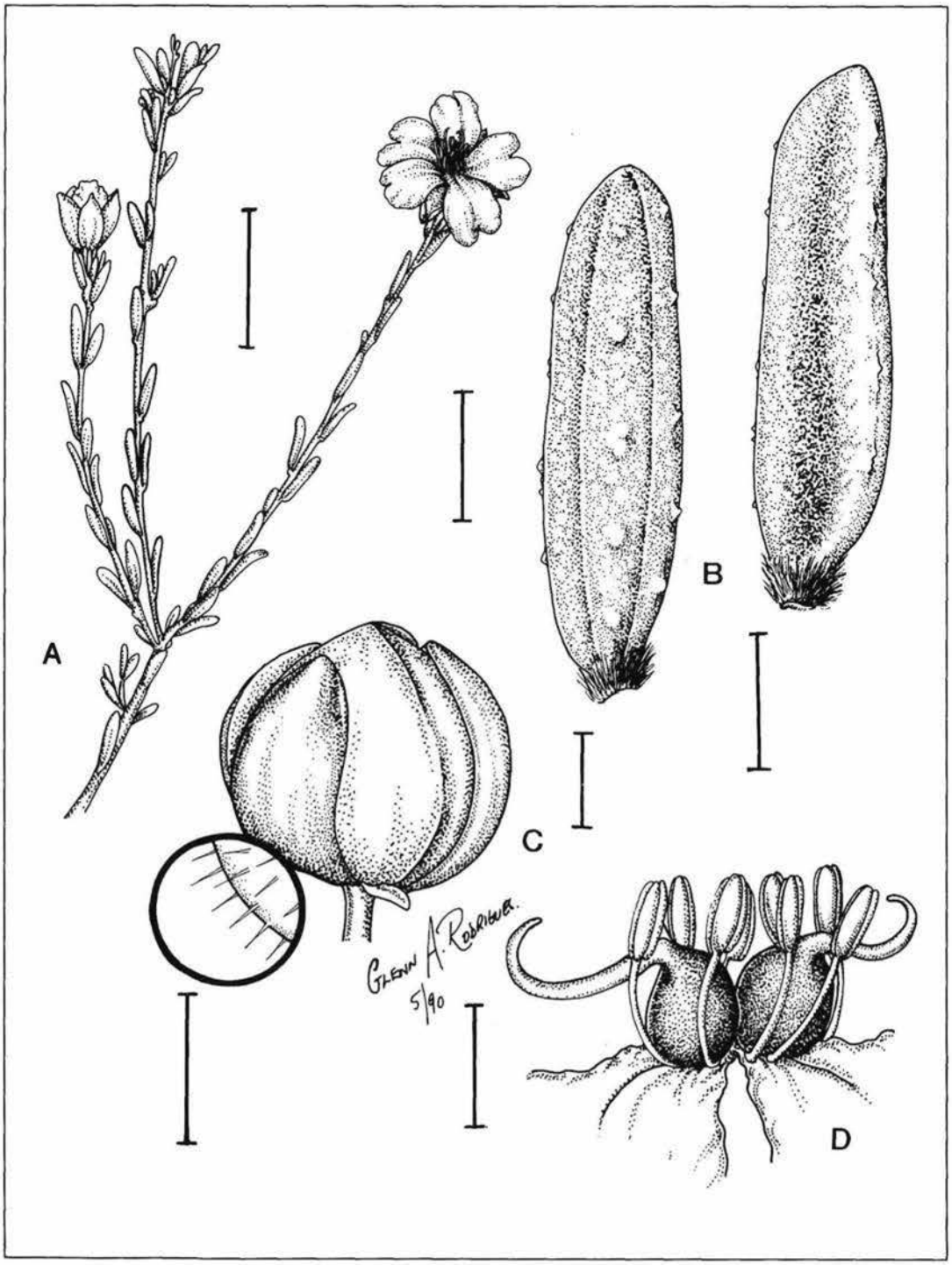

Figure 2. *Hibbertia glabriuscula* A - flowering branch (scale bar = 10 mm), B - leaf, abaxial and adaxial views (scale bar = 1 mm), C - bud (scale bar = 2 mm), with enlargement to show minute hairs sometimes present on sepals (scale bar = 1 mm), D - stamens and carpels (scale bar = 1 mm).

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority Two - Poorly Known Taxa. Survey work is necessary to search for further populations before a complete statement can be made on its conservation status.

Etymology. The specific epithet refers to the absence of long conspicuous hairs on the sepals and bracts; these hairs are present on the sepals and bracts of its closest relative, *Hibbertia drummondii*. Although there are frequently minute hairs present in *H. glabriuscula* it is, in comparison to *H. drummondii*, almost glabrous.

3. Hibbertia graniticola J.R. Wheeler, sp. nov. (Figure 3)

Frutex; pili indumenti breviter stellati. Folia recta, pungentia. Stamina 17-30 carpella circumdantia, versus basim irregulariter connata. Carpella (2)3, dense stellato-pilosa; ovula (8)10 in unoquoque carpello posita.

Typus: Rock NW of Warralakin, 3.5 km along English Rd from junction with Echo Valley Rd, Western Australia, 21 September 1988, *J.R. Wheeler* 2599 (holo: PERTH 03453618; iso: AD, CANB, K, MEL).

Shrub to 1.5 m high, with a minute but dense indumentum on young branchlets, petioles, bracts and sepals of short stellate hairs in which the centre of the hair is slightly fused. *Leaves* spirally arranged and crowded especially towards the tips of the branchlets; petiole 1-1.5 mm long; blade straight, linear but thick with the true margins recurved and fused to the midrib, 10-20 x 1.2-1.5 mm; upper surface flat or slightly concave, glabrous; lower surface convex with a prominently raised midrib, glabrous; edges coarsely scabrous with forward pointing simple hairs; apex a long pungent mucro 1-1.5 mm long. *Flowers* solitary, terminating short branchlets, sessile, 20-35 mm in diameter. *Bracts* inconspicuous, leaf-like, 9-12 mm long. *Sepals* 5, connate basally, densely and shortly stellate-hairy, the margin ciliolate with somewhat curled hairs, apex pungent with a mucro 0.5-2 mm long; outermost sepals elliptic, 12-16 x 4-8 mm; innermost sepals broadly elliptic, 12-16 x 7-11 mm and with a minutely hairy to glabrous submarginal band. *Petals* 5, golden yellow, obovate, 14-20 x 4-8 mm, emarginate. *Stamens* 17-30, arranged all around the carpels, irregularly connate towards the base for the basal 0.5-1 mm; filaments slender, 4-6 mm long; anthers very slender, narrowly elliptic, 3-4 mm long, opening by longitudinal slits; staminodes usually absent. *Carpels* usually 3 but sometimes 2, ovoid, densely stellate-hairy; ovules (8)10 per carpel, placentation marginal; style slender, 4-5 mm long, arising from the abaxial side of the carpel. *Fruits* dry, splitting apically and adaxially to release the seeds. *Seeds* orange-brown, shiny, transversely ellipsoid, 2.5-3 x 1.5-2.5 mm, with a white waxy aril.

Other specimens examined (all PERTH). WESTERN AUSTRALIA: Chutawalakin Hill, (southern edge) 3 September 1989, *R. Cranfield & P. Spencer* 7694A; 1.5 km W of southern boundary of Chiddarcooping Nature Reserve, 11 September 1989, *R. Cranfield & P. Spencer* 7801; NW section Chiddarcooping Nature Reserve, September 1989, *R. Cranfield & P. Spencer* 7820; Chiddarcooping Nature Reserve, 2.55 km WNW of Chiddarcooping Hill, 7 November 1990, *F.H. & M.P. Mollemans* 3784; Warralakin Rock, 14 August 1970, *E. Parkin s.n.*, Chiddarcooping Nature Reserve, site 38, 1 October 1984, *A.S. Weston* 14162; Chiddarcooping Nature Reserve, 5 November 1984, *A.S. Weston* 14493; Rock NW of Warralakin, 3.5 km along English Rd from junction with Echo Valley Rd, 21 September 1988, *J.R. Wheeler 2598*.

Distribution. South-west Australia, Avon District, in the northern wheatbelt near Warralakin.

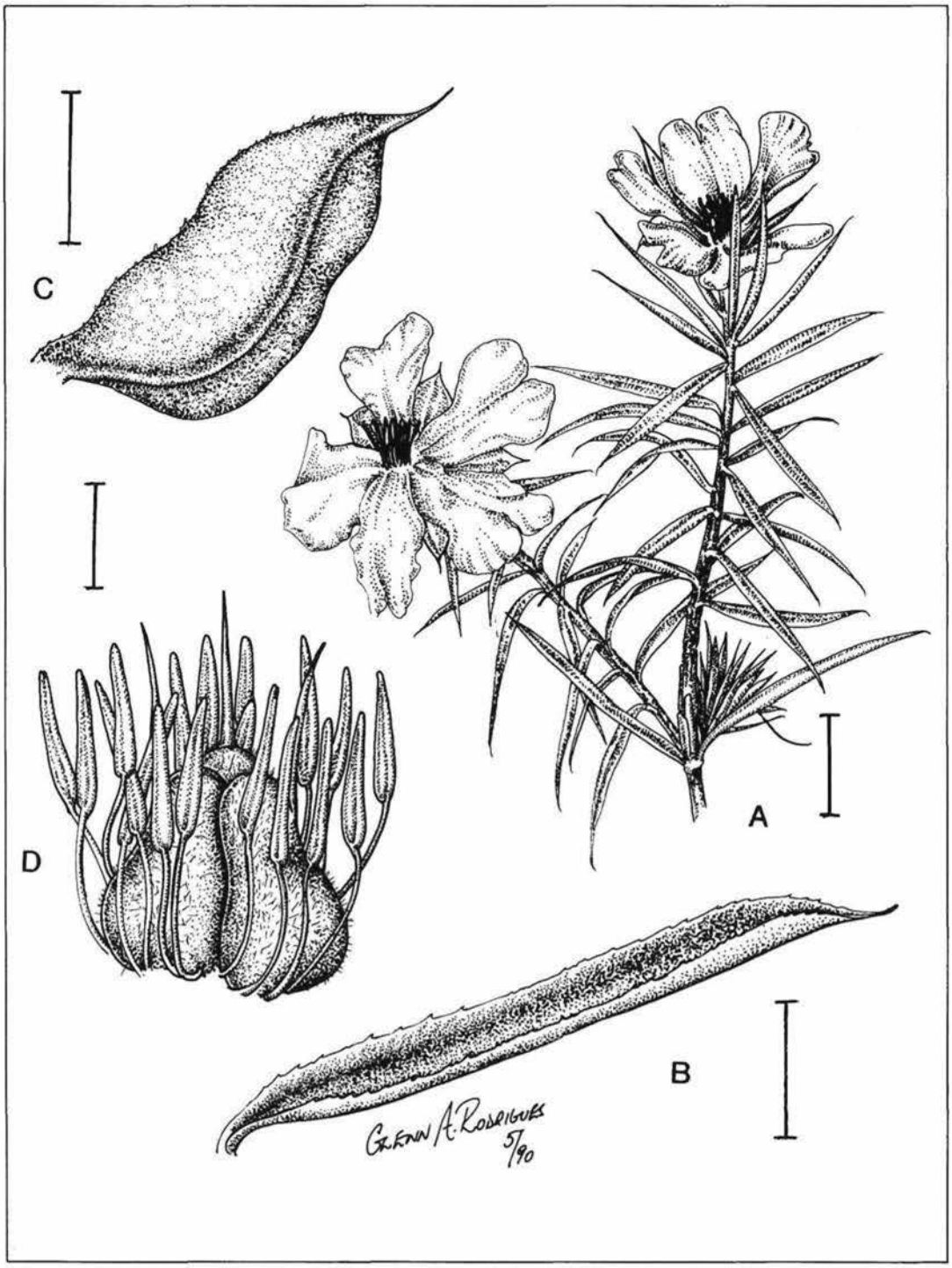

Figure 3. *Hibbertia graniticola* A - flowering branch (scale bar = 10 mm), B - leaf, C - sepal (B & C scale bars = 5 mm), D - stamens and carpels (scale bar = 2.5 mm).

Habitat. Restricted to sand pockets on granitic outcrops or surrounding the base of granite outcrops, usually in shrubland.

Flowering period. Flowers August to September. Fruits recorded for November.

Affinities. *Hibbertia graniticola* is closely related to *H. arcuata* differing primarily in its longer straight leaves, larger flowers and (2)3 carpels with (8)10 ovules per carpel. See under *H. arcuata*.

Conservation status. This is a taxon known from one or a few (generally less than 5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered) and designated as a Priority Two taxon of CALM. This taxon has previously been referred to as *Hibbertia* sp. *Chiddarcooping* (*R.J. Cranfield* 7820).

Etymology. The specific epithet refers to the fact that the species is apparently restricted to granite rocks.

4. Hibbertia arcuata J.R. Wheeler, sp. nov. (Figure 4)

Frutex; pili indumenti breviter stellati. Folia recurva, pungentia. Stamina 15-28 carpella circumdantia, omnio vel fere libera. Carpella 2, dense stellato-pilosa; ovula 6-8 in unoquoque carpello posita.

Typus: 13.4 km E of Kalannie on Kulja road, Western Australia, 19 September 1988, *J.R. Wheeler* 2579 (holo: PERTH 03453596; iso: AD, CANB, K, MEL).

Shrub to 1.3 m high, with a minute indumentum on young branchlets, petioles, bracts and sepals of short stellate hairs in which the centre of the hair is slightly fused and scale-like. *Leaves* spirally arranged, not usually crowded; petiole 0.3-0.8 mm long; blade distinctly to slightly recurved, narrowly oblong-elliptic to narrowly ovate-elliptic, thick with the true margins recurved and fused to the midrib, 4-8 x 1-1.5 mm, upper surface minutely scabrous with forward pointing simple hairs, lower surface glabrous with a prominently raised midrib, apex a long pungent mucro 1-1.5 mm long. *Flowers* solitary, terminating short branchlets, sessile, 12-20 mm in diameter. *Bracts* inconspicuous, leaf-like, 4-6 mm long. *Sepals* 5, connate basally, stellate-hairy, margin ciliolate with somewhat curled hairs; outermost sepals elliptic to broadly elliptic, 5-8 x 3-4 mm including a mucro 1-1.3 mm long; innermost sepals broadly elliptic, 6-9 x 4-6 mm including a mucro 0.5-1 mm long, with a glabrous or very sparsely hairy submarginal band. *Petals* 5, golden yellow, obovate, 5-11 x 5-9 mm, emarginate. *Stamens* 15-28, arranged all around the carpels, free or connate only basally; filaments 1-2.5 mm long; anthers elliptic to ovate-elliptic, 1.5-2.5 mm long, opening by longitudinal slits; staminodes absent or sometimes a few stamens reduced in size and perhaps non-functional. *Carpels* 2, ovoid, densely stellate-hairy; ovules 6 or 8 per carpel, placentation marginal; style slender, 3-4.5 mm long, arising from the abaxial side of the carpel. *Fruits* dry, splitting apically and adaxially to release the seeds. Immature seeds orange-brown, shiny, transversely ellipsoid, with a white waxy aril.

Other specimens examined (all PERTH). WESTERN AUSTRALIA: Halfway between Paynes Find and Perenjori, 31 August 1975, *A.M. Ashby* 5221; Emu fence N of Cleary, 16 July 1967, *J.S. Beard* 4714; Pindar, E of Mullewa, 16 September 1931, *W.E. Blackall* 667; Between Mt Churchman and Beacon, 13 October 1937, *W.E. Blackall* 3453; Dromedaries, near Mt Churchman, October 1937, *W.E. Blackall s.n.*, Between Mullewa and Morowa, August 1959, *A.M. Baird s.n.*, 216 km from Mt Magnet on Geraldton Rd, 22 August 1963, *Y. Chadwick* 1671; 73 miles from Paynes Find to Wubin,

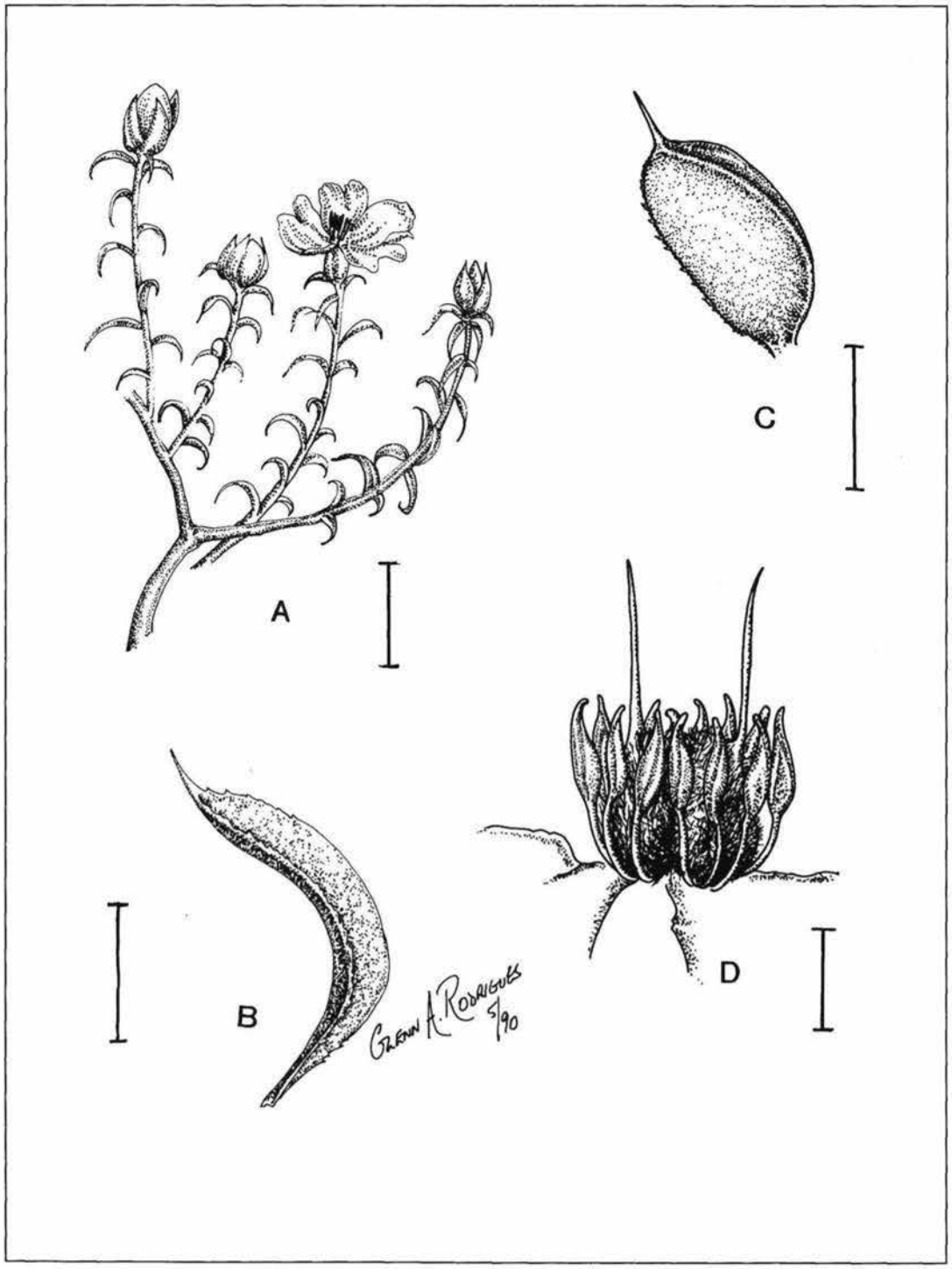

Figure 4. *Hibbertia arcuata* A - flowering branch (scale bar = 10 mm), B - leaf, C - sepal (B & C scale bars = 5 mm), D - stamens and carpels (scale bar = 2.5 mm).

October 1965, *J.R. Knox* 651038; 52.4 km from Wubin towards Mt Magnet, 28 July 1974, *B.R. Maslin* 3538; Wilroy Reserve 29196, 16 km SSE of Mullewa, 4 June 1977, *B.G. Muir* 544; ?Wyalkatchem area, 17 September 1965, *S.B. Rosier* 336; 13.4 km E of Kalannie on Kulja road, 19 September 1988, *J.R. Wheeler* 2579; North west of Beacon, 21.6 km north along Bimbijy Rd towards Mt Churchman, 20 September 1988, *J.R. Wheeler* 2589; South east of Beacon, Gillet road 6 km south from junction with Faulkner road, 19 July 1989, *J.R. Wheeler* 2622.

Distribution. South-west Australia, Avon District, in the northern wheatbelt from Mullewa and Pindar east towards Paynes Find and south to near Beacon, and possibly the Wyalkatchem area.

Habitat. Acacia shrubland, *Allocasuarina* shrubland or *Eucalyptus* woodland, on yellow to brown sand or loam.

Flowering period. Flowers July to October. Fruits recorded for October.

Affinities. Hibbertia arcuata is closely related to *H. graniticola*, differing primarily in its shorter recurved leaves, smaller flowers and presence of only 2 carpels each with 6 or 8 ovules. However *H. graniticola* and *H. arcuata* clearly have many features in common. Their leaves are similar in form and both have long pungent apices. The flowers are solitary terminating short shoots and subtended by inconspicuous leaf-like bracts which grade into the leaves. The sepals are similar in shape with similar indumentum and similar pungent apices. The stamens are similar in shape and type, are arranged all around the carpels and have the same form of dehiscence. Staminodes are usually absent, although occasionally some smaller and possibly non-functional stamens may be found. The carpels are similar in shape and indumentum. Ovules although usually different in number are similar in placentation.

The morphological differences between the closely related *H. graniticola* and *H. arcuata* are summarised in the table below.

	Hibbertia graniticola	**Hibbertia arcuata**
Leaves	Straight, 10-20 mm long	Recurved, 4-8 mm long
Flower size	20-35 mm in diameter	12-20 mm in diameter
Sepal length	12-16 mm long	5-9 mm long
Sepal apex	Mucro not or scarcely longer in outer sepals	Mucro of outer sepals distinctly longer than that of inner sepals
Petals	13-20 mm long	5-11 mm long
Stamens	Irregularly fused for basal 0.5-1 mm	Free or almost so
Staminal filaments	4-6 mm long	1-2.5 mm long
Anthers	Narrowly elliptic and 3-4 mm long	Elliptic to ovate-elliptic and 1.5-2.5 mm long
Carpel number	3, less often 2	2
Ovule number	10, more rarely 8 per carpel	6 or 8 per carpel

As well as being morphologically different, the two species differ markedly in their habitat preferences, with *H. graniticola* being restricted to granite outcrops and *H. arcuata* being more widespread on sandy or loamy soils.

It seems that these two species should be placed in section *Hibbertia,* in which the stamens are characteristically arranged all around the carpels (Bentham 1863 and Gilg & Werdermann 1925). The two are clearly closely related, but do not appear to have any other close relatives. It is therefore not clear in which subsection of section *Hibbertia* they belong. Initially they seem to belong to a subsection of their own, however instead of creating a new subsection for *H. graniticola* and *H. arcuata* it seems sensible to leave this until the whole of the genus is studied Australia-wide for a forthcoming volume of "Flora of Australia".

Conservation status. The populations have not been fully surveyed, but the species is not considered to be under threat.

Etymology. The specific epithet refers to the recurved bow-like nature of the leaves.

Acknowledgements

I should like to thank Phil Roberts for first bringing *H. lividula* to my attention and also Ray Cranfield and Phil Spencer for providing material of *H. graniticola* and surveying populations prior to its inclusion on the Priority Flora List. I thank also Glen Rodrigues for preparing the illustrations of all species, Neville Marchant for his comments on an earlier draft and Paul Wilson for preparing the brief Latin descriptions.

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