

NOVELTIES AND TAXONOMIC NOTES RELATING TO *HAKEA* SECT. *HAKEA* (PROTEACEAE), MAINLY OF EASTERN AUSTRALIA

W.R. Barker

State Herbarium of South Australia, Botanic Gardens of Adelaide,
North Terrace, Adelaide, South Australia 5000

Abstract

Keys to the species of the informal "*H. sericea*" and "*H. nodosa*" species groups of Sect. *Hakea* are provided. In the former group new taxa described are: a new subspecies *ssp. sericipes* of the eastern and western perimeter of the widespread semi-arid Australian species *H. leucoptera* R. Br.; *H. actites* of coastal regions of southern Queensland and northern New South Wales and *H. macrorrhyncha* of a localised granite area on the Queensland - New South Wales border, both previously confused with *H. propinqua* Cunn.; *H. ochroptera*, a northern New South Wales counterpart of *H. macraeana* F. Muell. from the Dorrigo area; two new subspecies of *H. decurrens* R. Br., previously confused with *H. sericea* Schrad. & J. Wendl., *ssp. physocarpa* from western and central Victoria, the plant naturalised in South Australia, and *ssp. platytaenia* of coastal regions of eastern Victoria and south-eastern New South Wales. Of overseas introductions till now all considered to be *H. sericea*, substantial material has been seen only from South Africa, which is all true *H. sericea*; the few specimens from other countries indicate that *H. sericea* occurs in New Zealand and Norfolk Island and *H. decurrens ssp. physocarpa* in Portugal. In the "*H. nodosa*" group *H. propinqua* is shown to comprise two distinctive species, true *H. propinqua* a tall shrub confined to the Sydney region and lower Blue Mountains and *H. pachyphylla* Sieber ex Spreng., a small shrub of the higher Blue Mountains and possibly the Budawang Ranges. Accepted names and synonyms are typified where needed.

The species of *Hakea* which have terete or, less commonly, flat, usually rigid leaves, inflorescences in axillary umbelliform clusters on short rachises, small, white to yellow flowers or larger, red or pink flowers with an oblique-conical or lateral pollen-presenter, and woody fruits with a pair of conspicuous or inconspicuous horns form the section *Hakea*. Those species with white to cream, smallish flowers, which constitute the majority in the group in south-eastern Australia, are often known collectively as needlewoods.

This paper presents the changes resulting from a revised taxonomy of the terete-leaved species of *Hakea* Sect. *Hakea* with white to yellow flowers in south-eastern Australia, aimed at providing new names for use in the *Flora of Victoria* (R.M. Barker, W.R. Barker and Haegi, in press) and the *Flora of Australia* (R.M. Barker, W.R. Barker and L. Haegi, in preparation). Descriptions are provided for those taxa for which the circumscription has been reconstituted. Previous papers have clarified the taxonomy of other parts of the section (W.R. Barker 1985, 1986, 1989; R.M. Barker 1990, 1991). Some reference to the conclusions made in this paper was given in my notes appended to accounts of the relevant species in the *Flora of New South Wales* treatment of the genus (Harden 1991).

An account of the genus has been prepared for the *Flora of Australia*, but with descriptions being restricted in this publication, full descriptive data are left to other hard-copy and electronic publications in preparation. A cladistic analysis encompassing all taxa within the genus and taking into account the rest of the tribe Grevilleae is also being undertaken. Formal presentation of a revised infrageneric framework awaits its completion.

For consistency, infraspecific taxa are treated at the one level subspecies in our work in *Hakea*.

A conservation status rating is proposed for those taxa which are considered rare, following the criteria of Leigh, Briggs & Hartley (1981).

Dimensions are measured from dried material. Perianth length is measured from the base of the torus to the apex of the limb or the most distal part of it if it is recurved. Pistil length

is measured straightened. The term *tomentose* indicates that the arms of the hairs are ascending or suberect ("raised"), in contrast with *appressed-pubescent* and *appressed-sericeous* conditions. The longitudinal groove on the underside of the leaves of some needlewood species may not be apparent on all leaves of a plant. The fruit opens into two woody valves, each with the inner face bearing a seed borne in the *seed cavity*. The orientation of the seed with respect to the axis of the fruit (taken from the stalk to the persistent base of the style, the *apiculum*) is of diagnostic use. On either side of the seed cavity are two contrasting layers of wood, a *pale wood* zone, itself of two or more layers, and a *red-brown wood* zone. These vary between taxa in width and relative width. The *beak* is the attenuated region distal of the main swollen *body* of the fruit, well demarcated in most species of *Hakea* and marking the point where one or more layers of pale wood reach their distal limit; it is often decurrent down one or both sides of the fruit body. The extent of the beak has been defined as tiny where less than 0.05 the area of the fruit, small where up to 0.2, and moderately large where up to 0.5. The *horns* are a pair of hard points which project obliquely forwards from just behind the fruit apex, and are prone to breakage and wear.

Key to the needlewoods (the "*H. sericea* group"), mainly of eastern Australia

1. Branchlets and leaves densely villous. Fruits with seed borne at right angles to direction of stalk.
..... *H. gibbosa* (p. 207; Fig. 2, J-L; Map 2)
1. Branchlets and leaves often pubescent when young, usually glabrescent, but not villous. Fruits with seed borne in same direction as stalk or directed obliquely forward from it.
 2. Perianth hairy.
 3. Leaves not grooved below.
 4. Fruit coarsely rugose or tuberculate. [Perianth 3.5–6 mm long; pistil 8–10.5 mm long; pedicel 3.5–5.5 mm long; rachis 1–2 mm long, white-tomentose; fruit 2.3–2.7 mm long.]
..... *H. lissosperma* (Fig. 1, O-Q; Map 2)
 4. Fruit smooth, sometimes slightly pustulate.
 5. Perianth 2.5–3 mm long. Pistil 7–7.5 mm long. Pedicel sparsely appressed pubescent. [Rachis 1.2–5 mm long, densely brown-pubescent, sometimes covered by sparse white hairs; leaf mucro uncinat; fruit obscurely horned; seed wing grey-yellow.]
..... *H. kippistiana* (p. 180; Map 1)
 5. Perianth 3–6 mm long. Pistil 7–10 mm long. Pedicel densely appressed or raised pubescent.
 6. Rachis 1–3 mm long, brown-pubescent. Leaf mucro strongly uncinat. Fruits usually clearly horned; seed wing grey-yellow to blackish.
..... *H. tephrosperma* (p. 180; Fig. 1, A-H; Map 1)
 6. Rachis 6–14 mm long, white-tomentose or with an appressed layer of white and brown hairs. Leaf mucro porrect or uncinat. Fruits often obscurely horned; seed wing cream to brown-white, sometimes darker at the base. *H. leucoptera* (p. 180)
 3. Leaves grooved below.
 7. Branchlets tomentose, persistent to flowering. Fruit body rugose-reticulate; beak long; horns obscure, less than 1 mm long. Perianth moderately to densely tomentose.
..... *H. macrorrhyncha* (p. 184)
 7. Branchlets appressed-pubescent, persistent to flowering or glabrescent. Fruit body pustulate; beak short; horns prominent, 1–3 mm long. Perianth sparsely appressed sericeous.
..... *H. macraeana* (p. 206; Fig. 1, K-N; Map 2)
2. Perianth glabrous.
 8. Rachis 6–14 mm long. *H. leucoptera* (p. 180)
 8. Rachis 0.6–4 mm long.
 9. Fruit 4.3–5.5 cm long, 3–3.5 cm wide. Flowers 6–12. [Pistil 8–12 mm long.]
..... *H. constablei* (p. 187; Fig. 1, R-T)
 9. Fruit 1.8–4.0 cm long, 1.0–3.0 cm wide. Flowers 1–6 (to 8 in *H. lissosperma*).
 10. Pistil over 9 mm long.
 11. Horns on fruit 1–5 mm long; seed wing decurrent fully down both sides of the seed body, more narrowly on one side. *H. decurrens* (p. 189)
 11. Horns on fruit obscure; seed wing decurrent partly down one side of the seed body, fully down the other.

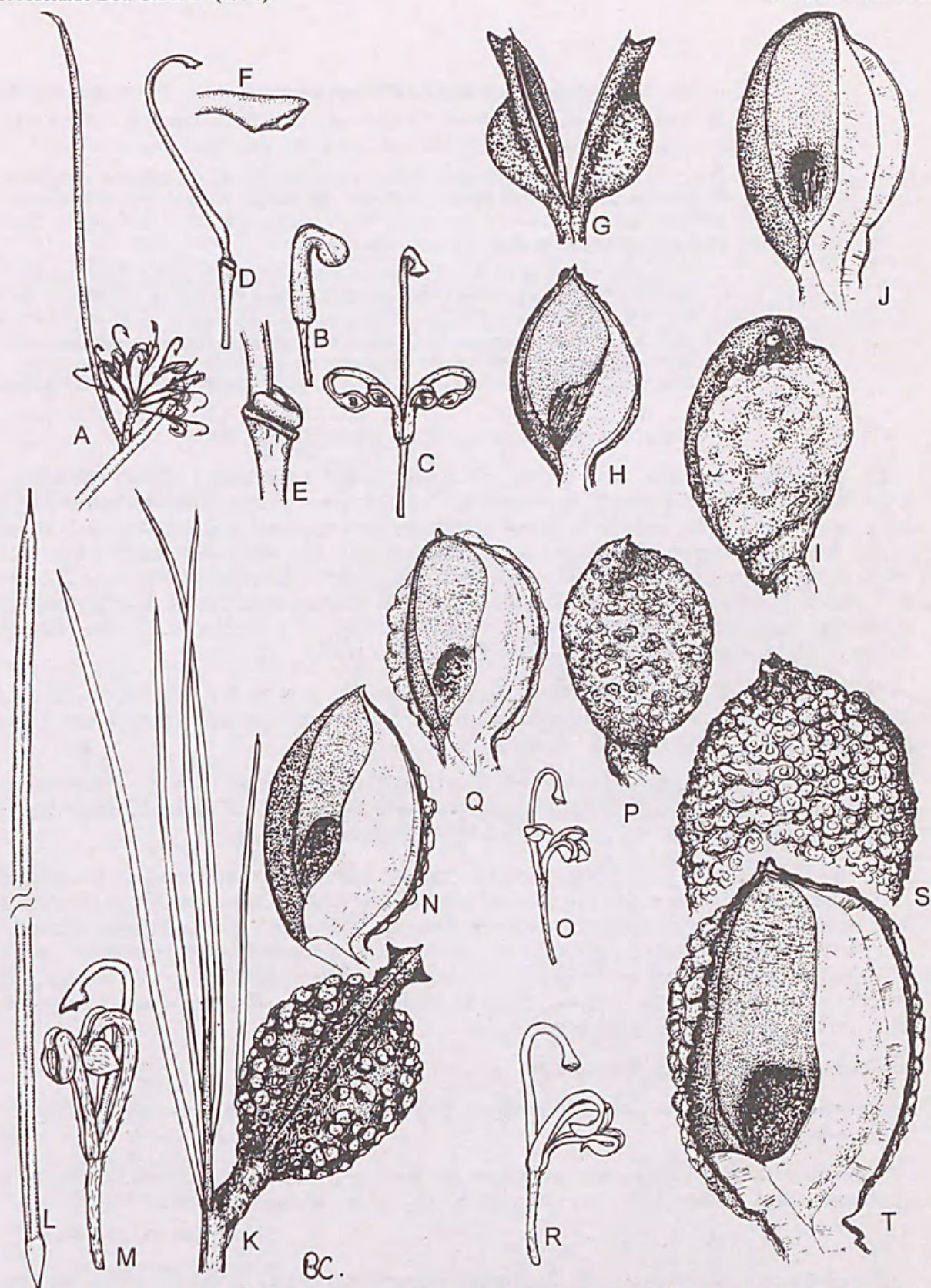


Fig. 1. *Hakea* Sect. *Hakea*, The "*H. sericea* group", 1. A-H, *H. sericea* (A, inflorescence $\times 1$; B, bud $\times 3$; C, flower $\times 2$; D, flower, tepals removed, $\times 2$; E, pistil base and gland $\times 7$; F, pollen-presenter, lateral view $\times 9$; G, fruit $\times 1$; H, valve, inner face $\times 1$). I-J, *H. actites* (I, fruit, lateral view $\times 1$; J, valve, inner face $\times 1$). K-N, *H. macraeana* (K, fruiting branchlet $\times 1$; L, leaf, abaxial side $\times 3$; M, flower $\times 4.5$; N, fruit, inner face $\times 1$). O-Q, *H. lissosperma* (O, flower $\times 2$; P, fruit $\times 1$; Q, valve, inner face $\times 1$). R-T, *H. constablei* (R, flowers $\times 2$; S, fruit $\times 1$; valve, inner face $\times 1$). (A-H, Purdie 5840; G-H, Ising AD966090454; I-J, Johnson NSW 5402...; K-L, N, Parris NSW190768; M, Constable NSW25757; O, Long 941; P-Q, Long 360; R-T, Foster NSW54031). (Del. B. Chandler).

- 12. Seed wing light brown (young?) to off-white. Flowers 1–6..... *H. ochroptera* (p. 187)
- 12. Seed wing black to dark brown. Flowers 6–8. *H. lissosperma* (Fig. 1, O–Q; Map 2)
- 10. Pistil less than 9 mm long.
 - 13. Pedicels villous or hirsute. Horns on fruit 1–3 mm long. Seed wing decurrent sometimes fully down one side of seed body only, on the other side not at all or more narrowly and partly to fully..... *H. sericea* (p. 196)
 - 13. Pedicels appressed-sericeous. Horns on fruit obscure.
 - 14. Fruit body smooth or coarsely pustulate; beak obliquely decurrent down one side, smooth. Seed wing decurrent fully down both sides of the seed body. Pedicels 1.8–3.0 mm long. Pistil 6.7–8 mm long. *H. actites* (p. 180)
 - 14. Fruit body coarsely rugose or tuberculate; beak transverse, its surface like the body. Seed wing decurrent partly, down one side of the seed body. Pedicels 3.5–5.5 mm long. Pistil 8.0–10.5 mm long. *H. lissosperma* (Fig. 1, O–Q; Map 2)

Intraspecific variation in *H. leucoptera* R. Br.

H. leucoptera belongs to a group of closely allied taxa which shows variation in branchlet, pedicel and perianth indumentum, fruit size and shape, conspicuousness of the horns and colour of the seed. It is spread widely across temperate arid and semi-arid regions of the Australian continent, though more sporadically in Western Australia. The distinction of *H. tephrosperma* R. Br. from *H. leucoptera*, the misapplication of *H. vittata* R. Br. (now in a different infrageneric group: R.M. Barker, W.R. Barker & L. Haegi, in preparation) to the former, and the misapplication of *H. kippistiana* Kippist & Meisn. to glabrous-flowered forms of *H. leucoptera* were clarified in W.R. Barker (1985, 1986).

H. kippistiana is a species confined to south-west Western Australia between Cunderdin and Madura (Map 1) and is distinguished from *H. leucoptera* and *H. tephrosperma* by its smaller flowers (perianth 2–3.5 mm long).

The few specimens from the Gibson Desert region of central Western Australia have robust leaves of *H. leucoptera* but smallish fruits similar to those of *H. kippistiana* (Map 1). Flowering material is required to establish their taxonomic affinity.

H. leucoptera is the most widespread of the three species. It comprises two geographical races classified as subspecies. For the major part of its range across central temperate semi-arid to arid Australia its rachis is woolly pubescent. This race varies within populations in its glabrous or pubescent perianth. A second race with appressed pubescent rachises occupies the eastern semi-arid regions of the species range. Collections with similar rachis indumentum occur on the western margins of the continent. Further work is required to confirm that they belong to the same taxon.

H. leucoptera R. Br. ssp. *leucoptera*

Indumentum on rachis raised-tomentose to woolly tomentose. Perianth glabrous or pubescent.

Distribution (Map 1): Widespread across the arid and semi-arid regions of central and eastern Australia, occurring in all mainland states except Western Australia.

Notes

Small fruited collections of *H. leucoptera* occur sporadically in the peninsula regions of South Australia. While their small fruits are similar to those seen in *H. kippistiana*, they otherwise match the attributes of *H. leucoptera*.

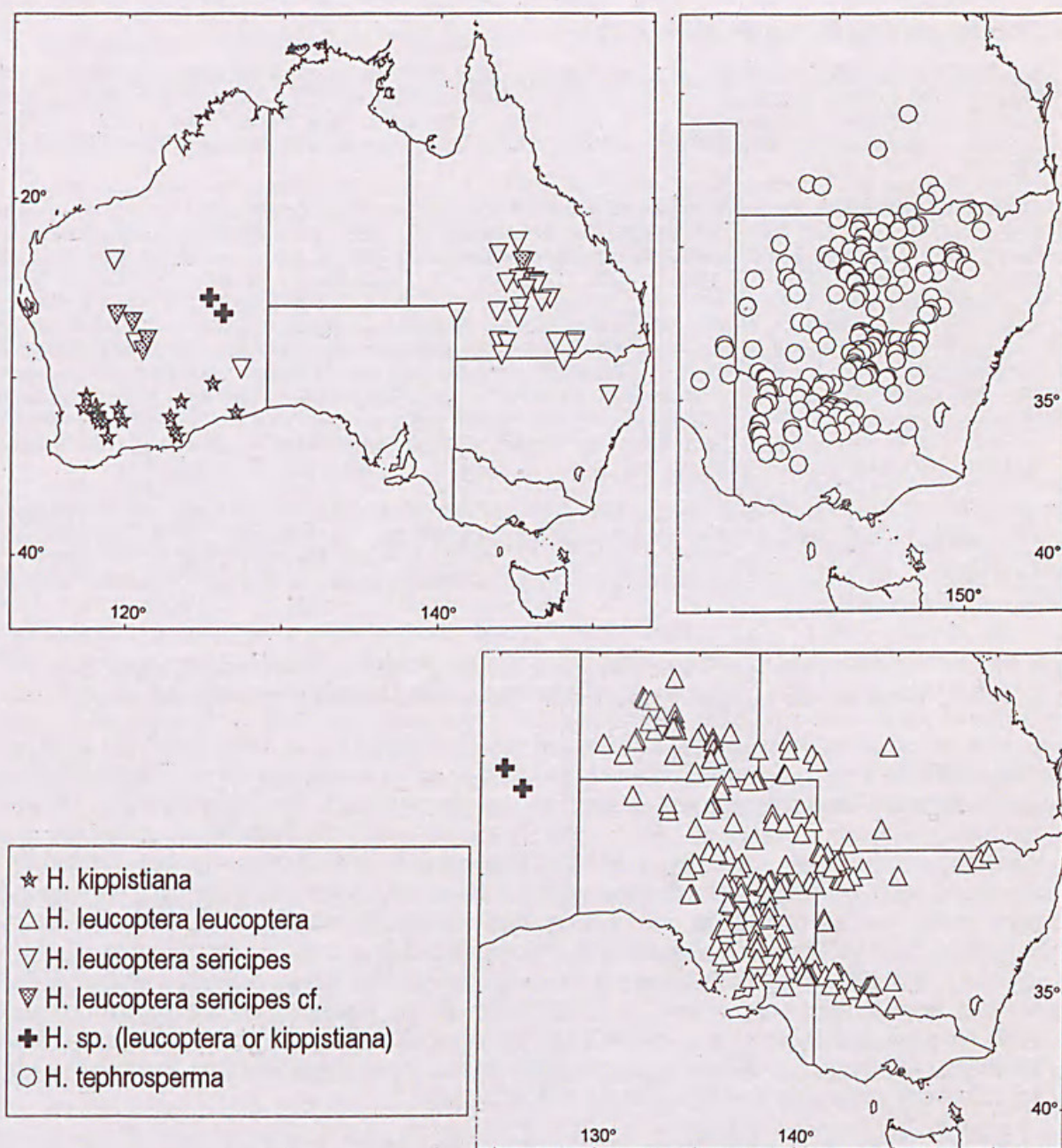
Specimens examined (501 seen): See a selection listed in W.R. Barker 1985.

H. leucoptera R. Br. ssp. **sericipes** W.R. Barker, ssp. nov.

A ssp. *leucoptera* rachidi pilis appressis tecta differt.

Holotypus: W.R. Barker 5587, 26.viii.1988, Queensland, Warrego District, c. 16 km by road NE of Hungerford on road to Eulo; localised (flowering) stand of c. 20 plants; *Acacia aneura* tall semi-open woodland with scattered emergent *Eucalyptus populnea* over *Hakea leucoptera* - *Eremophila longifolia* over *Eremophila* sp. low shrubs; deep red sand hardpan; shrubs with several thick main branches from base, ascending; old bark rough, but distally for most part smooth; young shoots rust brown on midgreen; leaves blue-grey ?through appressed tomentum, dark green on older parts; rachis appressed rust brown; pedicel, limb in bud, ovary and distal half of style mid green; corolla tube, style cream-white; all fruits old and open, even when distal to insertion on branch is a flowering branch; single specimen per plant collected; flowers with foul (rubbish bin) odour attracting many flies even towards dusk, AD. **Isotypi:** several for distribution.

Indumentum on rachis appressed-pubescent.



Map 1. Distribution of the "*H. sericea* group", 1. *H. leucoptera* ssp. *leucoptera*, *H. leucoptera* ssp. *sericipes*, *H. tephrosperma* and *H. kippistiana*.

Distribution (Map 1):

Occurring on the western slopes of the Great Dividing Range and adjacent plains in northern New South Wales and central and south Queensland and in western Western Australia.

Notes

1. A number of fruiting specimens of *H. leucoptera* from Western Australia resemble ssp. *sericipes* but lack inflorescences or adequate rachis remnants to be sure of their identity (Map 1, as ssp. cf. *sericipes*).
2. The subspecific epithet is a substantive and derives from the Latin *sericus*, silken, and *-pes*, foot, alluding to the appressed shiny indumentum on the pedicels.

Selected specimens examined (41 seen):

WESTERN AUSTRALIA. *Pilbara*: A.A. Mitchell 326, 30.iv.1977, 10 km N of the Prairie Downs H.S. on the Rhodes Ridge R track; Fortesque District, PERTH. – Austin: H. Demarz 7251, 21.xi.1978, 3 km S of Agnew, PERTH. – *Nullarbor*: Serventy D.L. 4511, 17.viii.1960, 4 m NE of "The Station", just before ... sandhills, PERTH. – *Questionable*: Menzies: J. Staer s.n., ii.1911, Middleton Beach, [Albany], NSW 190718, NSW 190717.

QUEENSLAND. *Mitchell*: G.R. Beeston 1184C, vii.1975, Warlus Area C Site No. 108 15 km NNE of Tambo, BRI. – S.T. Blake 10378, 6.xii.1935, Geera, E of Barcaldine, BRI. – W. Cullen per R.H. Cambage 5, vii.1914, Geera, NSW. – D. Davidson 228, vii.1952, 50 m NW of Longreach, BRI. – S.L. Everist 1890, x.1939, Blackall, BRI. – W.T. Jones 1894, 15.iv.1961, Tambo, CANB. – N.F. Pembroke s.n., 23.ix.1965, "Bowen Downs"-"Corinda" stock route, BRI 81868. – C.T. White 12413, 12.xi.1943, Enniskillen, BRI (2 sheets). – *Gregory South*: S.T. Blake 5444, 22.iv.1934, Earlstoun, between Quilpie and Windorah, BRI. – D.E. Boyland 3126, 8.vii.1971, 212.8 km WNW of Eromanga, BRI. – *Warrego*: L.H. Cockburn 31, 4.ix.1963, Near Dynevor Lake, Thargomindah, BRI. – J.K. Cull s.n., 11.xii.1961, T. Arden's property "Akaray", BRI. – C. Sandercoe 159, 1.v.1979, Ambathala Range area, 50 km E of Adavale; 3.5 km N of Telephone line on Stockmans Bore road, BRI. – J.P. Stanton s.n., 19.ix.1971, Between Lakes Wyara and Numalla, c. 48 km NW of Hungerford, BRI 141258. – R.M. Woolcock s.n., 18.iii.1960, "Lanherne", Cheepie, BRI 24335. – *Maranoa*: G.H. Allen s.n., 5.xi.1941, 19 km (12 m) E of St George, NE 2506. – K. Roach 9, xii.1981, 5 km S of Bollon, BRI.

NEW SOUTH WALES. *North-Western Plains*: S.W. Jackson s.n., xi.1911, 40-50 m[iles] NW of Collarenebri, NSW 190685, NSW 190733, NSW 190734. – M.B.E. Sampson s.n., xii.1909, Moor Creek, Tamworth, NSW 190740, NSW 190741, AD 98720338, AD 98720339, PERTH. – *North-Western Slopes*: J.T. Waterhouse s.n., 30.xi.1956, Clylie, Merrywinebore, NSW 190684. – *South-Western Slopes*: R. Roe s.n., 26.x.1940, 46 m North Morven, CANB 3173.

**Two new species previously confused with *H. propinqua* Cunn.
from north-eastern New South Wales and south-eastern Queensland**

The name *H. propinqua*, a species allied to *H. nodosa* (see p. 199), has been misapplied previously to two quite unrelated unnamed species of north-east New South Wales and south-eastern Queensland, one common to near-coastal heath ("wallum"), the other restricted to a small region of granite near Torrington on the border between the two states. The existence of the unrecognised species *H. pachyphylla* Sieber ex Spreng. related to but confused with *H. propinqua* in the Sydney - Blue Mountains area (see p. 199) no doubt contributed to the confusion, at least in New South Wales: its fruit is similar to these northern species. Queensland botanists tended to confound the more common of the two species, that occurring in wallum, with *H. gibbosa* (Sm.) Cav., which is endemic to the Sydney region; their confusion also of the isolated most northerly occurrences of *H. sericea* with *H. gibbosa* (Ross 1986) would have compounded the problems. It has only been in more recent times that the rarer second species has been discovered in their state (Mr W. MacDonald, pers. comm. 1987; MacDonald et al. 1995).

Nevertheless, it is clear from the literature that some botanists have for some time considered the relationships of the two existing species to be problematic. Annotations on herbarium specimens indicated that the Torrington or Wallangarra species has long been

suspected to be distinct, starting with Boorman, who annotated a Torrington collection (NSW182514) as being "less branched than the Port Jackson forms" of *H. propinqua*. From specimen annotations dated 1955 Dr L. Johnson debated a concept of species similar to that adopted here, noting on a sheet of fruiting material that the Wallangarra species was a "form ... conspecific with the type form [of *H. propinqua*] though it differs from the related 'wallum' sp[ecies]", but later corrected himself, stating, "Either they are all conspecific or this is put as close to the Wallum sp. as to *H. propinqua* s.str."; later again he added, "... but Wallum sp. has larger fl[owers] than *H. propinqua*". Ross (1986) recognised the distinctness of the "wallum species".

***H. actites* W.R. Barker, sp. nov.**

H. gibbosa auct. non (Sm.)Cav.: F.M. Bailey, Qld Fl. 4 (1901) 1349; F.M. Bailey, Comp. Cat. Qld Pl. (1913) 454.

H. sp. aff. propinqua: Beadle, Stud. Fl. North Eastern N. S. Wales (1972) 247, p.p. (as to Coast plants).

H. sp. A: S.W.L. Jacobs & Pickard, Pl. N. S. Wales (1981) 180, p.p. (as to North Coast, NSW, and some Qld occurrences).

Hakea sp. 2: E.M. Ross in T.D. Stanley & E.M. Ross, Fl. S. E. Qld, 2 (1986) 22.

In fruticeta oraria orientalia incolens, speciebus Sectionis *Hakeae* floribus albis, foliis teretibus, perianthiis glabris, rachidibus brevibus pistillis brevibus affinis; *H. sericea* pedicellis appresso-sericeis, cornibus brevioribus, formaque differente fructuum differt, *H. lissosperma* tomento ferrugineo in ramulis juvenibus, pistillis brevioribus, rostris conspicuis magis obliquioribusque, et aliis seminum longe decurrentibus.

Holotypus: W.R. Barker 5626 & I.R. Telford, E.M. Ballingall & D. Catling, 9.ix.1988, New South Wales, North Coast region, Northern boundary of Angourie, c. 1 km N of town centre by main road. Common; low sclerophyllous heath dominated by *Hakea sp.* (W.R. Barker 5626), *Banksia paludosa*, *Casuarina sp.*, with emergent *Melaleuca quinquenervia* and *Banksia integrifolia*; shallow sand on clay on sandstone. Shrubs to 1 m, to c. 1½ m diam. in sheltered deeper sandy sites; base of stem swollen, one horizontal lignotuber seen; flowers cream-white, style-end pink from initial white; fruits remaining closed except on the many dying branches; single specimen per plant collected. AD99604180. *Isotypi*: 4 to be distributed.

Shrub, rarely small tree, 0.3–5 m tall, lignotuberos; branchlets densely pale lenticellate from an early age, multiribbed through a single rib long-decurrent from each leaf, but at length lacking ribs, covered by dense woolly tomentose to appressed sericeous indumentum glabrescent by or persisting after flowering, not glaucous. *Leaves* narrowly divergent from branchlets, directed obliquely upwards, (3.5)5.5–10.5(13.5) cm long, 0.8–1.3 mm broad, flexible to almost rigid, on most plants, though sporadically, with a single groove below at the very base, moderately to densely appressed-pubescent to appressed-sericeous, quickly glabrescent, not glaucous, porrect, with mucro (0.8)0.9–1.4(2.2) mm long, with a marginal vein along each side. *Inflorescences* axillary umbels; inflorescence-subtending bracts 0.6–2.0 mm long forming an involucre 1.1–2.6 mm long, dark brown, pale yellow distally, moderately to densely tomentose, confined to distal third on outer bracts, more extensive within, ciliate to ciliolate, not glaucous; rachis with vegetative shoots at base and (Pedley 444) distal of the flowering region; *flowers* 1–6, not subtended by minute bracts, on knob-like to elongated rachis developing immediately from the leaf axis, persistent, becoming woody but hardly enlarging, simple, 0.6–1.5 mm long, 0.4–0.5 mm diameter, persistently densely woolly tomentose with rust-brown hairs, with a single vegetative bud at base to halfway along; *pedicels* 1.8–3.0 mm long, sparsely to densely appressed-sericeous with hair arms slightly raised, with white and rust-brown hairs; *torus* oblique; *perianth* 3.1–4.3 mm long to summit of limb, white, ± cylindrical, recurved behind limb, glabrous, sometimes glaucous, splitting fully into tepals which are displaced to gland side of flower, the limb in bud ovoid or broadly so and (Barker 5602) green; *anthers* 0.4–0.55 mm long; *gland* hidden by basally erect tepals, a small V shaped flat to slightly curved flap with hollowed apex, 0.2–0.4 mm high, 0.1–0.25 mm long laterally; *pistil* vertically inserted, 6.7–8 mm long straightened, the ovary vertically inserted on obscure gynophore, with prominent horns, the style many times longer than the obscure gynophore, vertically inserted on ovary, recurved (often looped or tortuous), white turning pink-red (Barker 5602, 5626) the pollen presenter

oblique, 0.6–0.8 mm long medianally, surmounted by a central or displaced cone 0.2–0.5 mm high, topped by an apiculum 0.1–0.3 mm long. *Fruits* 1(2) borne on branchlets substantially thicker than other branchlets of same age, terminal on a short stalk, rarely (*Epps 41* with 2 fruits) derived on a very short peduncle; stalk separated by an articulation and narrowly divergent from the rachis, straight, derived from the pedicel and gynophore; *body* 2.2–3.4 cm long (those less than 2.5 cm long probably immature, but opening after collection), not to slightly compressed medianally, smooth and minutely lenticellate to moderately to coarsely pustulate, sometimes with crests of pustules rupturing, in median view transversely elliptic to broadly ovate to obovate, abruptly attenuate, apically obtuse; beak transverse to oblique, long-decurrent down more than half of one side of body, obliquely, very narrowly obovate, moderately large, with surface smooth, minutely lenticellate, with horns present but obscure, 0.5–1.5 mm long, well below apex of beak, with apiculum present but obscure; *valves* ovate to obliquely obovate or obliquely ovate, sometimes with a slightly curved to displaced apex, with a long attenuate base when mature, 1.6–2.5 cm wide, 2–2.5 times width of the pale wood zone; seed cavity ± porrect, close to the valve margin through the narrowness of the red-brown wood zone (1.5)2–5 mm wide by the base of the seed cavity; pale wood zone on the other side of the seed 0.4–0.5 times the width of the valve, 2-layered. *Seed* oblique, ovate to obovate, 1.6–2.5 cm long, (0.8)0.9–1.1 cm wide; *body* elliptic to obovate, 6.0–9.0 mm long, finely rugose to coarsely tuberculate; distal ridge absent; *wing* extending fully down both sides of body, more broadly on one side, black, dark blackish-brown, sometimes with small to large, pale to mid yellow patches. *Local name*: Mulloway needle bush (Arrawarra: *Foreman 964*). (Fig. 1, I–J).

Distribution (Map 2) and *ecology*: In near coastal regions of south-east Queensland and northern New South Wales. It is recorded as common to rare, on sandy soil or sand on clay, on swampy low-lying or higher ground, in “wallum” scrub or open heath, *Melaleuca* swamp forest, sedge swamp, *Eucalyptus* forest, or *Eucalyptus planchoniana* woodland.

Notes

1. The species has very distinctive smooth walled fruits with a smooth long decurrent beak with horns displaced well down from the fruit apex. It is allied to the cream-flowered terete-leaved species of Sect. *Hakea* with glabrous perianths, short rachises and short pistils (less than 9 mm long); from *H. sericea* it differs by its appressed-sericeous pedicels, its shorter horns, and its different fruit shape, from *H. lissosperma* by its ferruginous tomentum on the young branchlets, its shorter pedicels, its shorter pistil, its more prominent and oblique beak, and the long decurrent seed wing.
2. The epithet is a substantive, from the Greek *aktites*, coast-dweller, alluding to the coastal regions occupied by the species.

Additional selected specimens examined (85 seen):

QUEENSLAND. *Moreton*: D. Anderson s.n., 14.vii.1964, 4 m N of Caloundra, BRI 57128. – W.R. Barker 5602, 3.ix.1988, Summit of Mt Coolum on seaward upper slopes, AD. – R. Coveny 6708 & P. Hind s.n., 26.viii.1975, King John Creek on Bruce H/way, c. 12 km S of Beerburrum, BRI, NSW. – L. Durrington 212, 27.iii.1973, Moreton Island, BRI. – L. Pedley 444, 19.viii.1959, Near Southport, on roadside in *Melaleuca quinquenervia* forest, BRI. – L.S. Smith & D.J. McGillivray 3072, 16.v.1968, 1 m N of Beerwah, NSW, AD. – J.E. Young s.n., ix.1920, Bribie Is., BRI 281388. – *Wide Bay*: S.T. Blake 22063A, 9.viii.1963, Near Cherwell River between Childers and Howard, BRI. – F.C. Epps 41, 13329, x.1921, Fraser Island, Wide Bay, BRI, AD. – D.A. Goy & L.S. Smith 563A, 28.xii.1938, Near Elliott River, near Bundaberg, BRI. – I.R. Telford 4303, 25.vii.1976, Upper Noosa River, 19 km N of Tewantin, CBG, AD. – D. & V. Webb s.n., 20.x.1962, Gympie-Tin Can Bay Rd, between Kangaroo Creek to P.O. Tin Can Creek, NSW 58164. – K. Williams s.n., 4.ix.1970, Cooloola on the roadside from Mt Bilewilan to Eight Mile Rocks, Rainbow Beach, BRI 103208.

NEW SOUTH WALES. *North Coast*: D.B. Foreman 964, 24.viii.1985, Arrawarra, c. 6 km N of Woolgoolga, MEL, AD. – D.J. McGillivray 2219, 2.vii.1966, 1 m NW of Broomes Head, on the coast SE of Maclean, NSW, AD. – J.B. Williams s.n., 6.viii.1967, Near Halfway Creek, S of Grafton, NE 25575.

H. macrorrhyncha W.R. Barker, *sp. nov.*

H. sp. aff. propinqua Cunn.: Beadle, Stud. Fl. North Eastern N. S. Wales (1972) 247, p.p. (as to Tablelands plants); W.J.F. MacDonald et al., Fl. Girraween & Bald Rock Nat. Parks (1995) 22.

H. sp. A (aff. propinqua): S.W.L. Jacobs & Pickard, Pl. N. S. Wales (1981) 180, p.p. (as to N. Tableland, NSW, and some Qld occurrences).

Foliis infra sulcatis, perianthiis tomentosis cremeis inter species Sect. *Hakeae* *H. macreanae*, *H. constablei* et *H. gibbosae* affiniore, omnibus rostrato multo longiore differt, etiam *H. macreana* mucronibus foliorum brevioribus, pedicello perianthioque tomentoso, et cornibus obsoletioribus, *H. constablei* floribus paucioribus in rachidi brevioribus, pedicello perianthioque tomentoso, pistillo brevioribus, et fructibus minoribus, et *H. gibbosa* in ramulis foliisque indumento brevioribus, foliis cito glabrescentibus et mucrone brevioribus, rachidi brevioribus, perianthio pistilloque brevioribus albo, et semine in fructu plus minusve stricto.

Holotypus: W.R. Barker 5611 & I.R. Telford, 7.ix.1988, Queensland, Darling Downs region: Girraween National Park, c. 3 km E of Ranger Station at Castle Rock camping area, SW of Dr Roberts Waterhole; locally abundant; granite hill with *Eucalyptus andrewsii*, *E. bancroftii*, *Callitris endlicheri* low closed woodland over *Exocarpos cupressiformis*, *Phebalium rotundifolium*, *Acacia adunca*, *Bossiaea* spp.; in rock crevices with deepish soil or in shallow gullies on sides of granite; erect tree to 6 m high, with single stem forked usually close to base; bark smooth, lenticellate, grey with ashwhite horizontal bands; branches ascending, young axes and leaf bases deep pink-red; pedicels deep pink with white hairs; tepals creamy white; style end pink-red even in mature bud; style reddening after anthesis; fruits remaining closed on plant for many years, opened on dead plants or branches; single specimen per plant collected, AD. *Isotypi*: CBG and many other duplicates to be distributed.

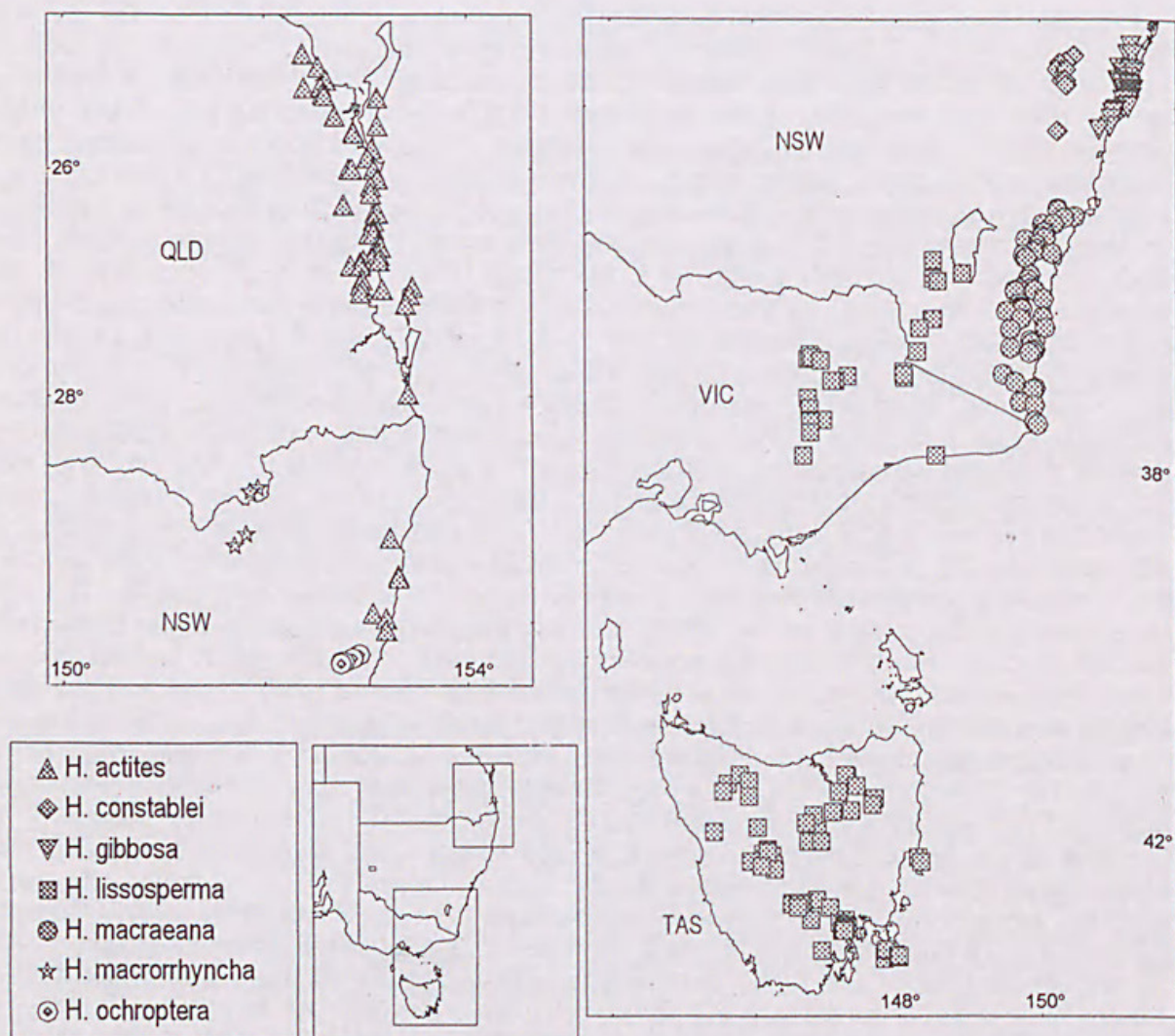
Erect shrub or small tree 1.8–6 m high, single-stemmed, though forked usually close to base (*Barker 5611*), lignotuber presence unknown; bark (*Barker 5611*) smooth, lenticellate, grey with ash-white horizontal bands; branches ascending; branchlets with rib decurrent shortly from each leaf base, otherwise smooth, deep pink-red becoming grey, when young densely white tomentose, the tomentum persisting over many nodes to flowering ones, becoming grey. *Leaves* simple, terete, narrowly angled to branchlets, (3)4.5–9 cm long, 0.9–1.5 mm wide, often with shallow longitudinal groove below from base for part or much of length, initially white tomentose, quickly glabrescent to expose smooth surface; base deep pink-red (*Barker 5611*), with no sharp flange like *H. propinqua*; apex porrect, the mucro 0.8–1.5 mm long. *Inflorescences* axillary umbels; inflorescence-subtending bracts caducous, white-woolly-pubescent all over; rachis knob-like, 0.5–0.7 mm long, simple, for most part knob-like (where bracts borne), white-woolly-pubescent; flowers c. 3–5; *pedicels* 4–5.5 mm long, deep pink, moderately densely white-raised-pubescent; *torus* oblique; *perianth* 3–3.8 mm long to the recurved apex, cream-white, externally moderately to densely white-raised-pubescent, splitting fully into 4 tepals; *anthers* 0.4 mm long with mid yellow pollen; *gland* a small U-shaped flap, 0.2 mm high, 0.15–0.2 mm wide laterally, with upper margin with a few teeth; *pistil* recurved, 6.5–8 mm long, the style white, reddening after anthesis, the pollen-presenter pink-red even in mature bud, obliquely conico-discoid, 0.15–0.3 mm high, 0.4–0.7 mm wide laterally, (topped by a) slender apiculum 0.1–0.2 mm long (bearing the stigma at the apex). *Fruit* long persisting closed; body medianally circular, laterally broad ovate, rugose-reticulate, the beak long, triangular, smooth but for dense small round blisters, decurrent down the red-brown wood side for much of the body length, very shortly so on the other; stalk with 3 parts, 10–12 mm long, smooth but for round blisters similar to beak on distal part; apiculum absent up to 0.1 mm long; horns obscure (by wear?), up to 0.05 mm long, forming a truncate apex in median view; *valve* ovate, 3.5–4.5 cm long excluding stalk, 2.1–2.5(3.0) cm wide, acuminate by concavity on (white wood) side; seed cavity \pm porrect; the red-brown wood zone dilated from halfway down length of seed, 3–4 mm wide, 0.35–0.5 times width of pale wood zone; pale wood zone 8–10 mm wide, 3-layered, the inner two layers \pm equal, sometimes poorly distinct, together 4.5–18 times the width of the narrow outermost layer which is terminated $\pm \frac{1}{2}$ – $\frac{2}{3}$ -way to the apex of the valve. *Seed* elliptic-oblong, concave at apex of seed body, 3.0–3.4 cm long, 0.9–1.3 cm wide, black throughout; *body* obovate, 10–14 mm long, 6–9 mm wide, densely longitudinally rugose to rugose-reticulate, the ridges low, only slightly broken up, to partially muricate; distal ridge absent; *wing* decurrent down one side of body only for $\frac{3}{4}$ of distance.

Distribution (Map 2) and ecology: Restricted to the Torrington area of the Northern Tablelands of New South Wales and nearby to the Girraween National Park and environs in south-eastern Queensland. It is very localised, in hilly granitic areas of layered open forest or low closed woodland, associated with granite rock outcrops. Flowers (2 records): August–September.

Proposed conservation status: 2RC. McDonald et al. (1995) gave the species a status of 3RC, but the it is more restricted in distribution falling within an area less than 50×25 km.

Notes

1. By its leaves grooved below and tomentose cream perianths apparently most closely allied amongst the species of *Hakea* Sect. *Hakea* to *H. macraeana*, *H. constablei*, and *H. gibbosa*, it differs from all by its much longer beak; also from *H. macraeana* by its shorter leaf mucros, its tomentose pedicel and perianth, and its more obscure horns, from *H. constablei* by its fewer flowers on a shorter rachis, its tomentose pedicel and perianth, its shorter pistil, and its smaller fruits, and from *H. gibbosa* by the shorter indumentum on the branchlets and leaves, leaves quickly glabrescent and with usually shorter mucro, shorter rachis, shorter white perianth and pistil, and its seed more or less straight in the fruit.



Map 2. Distribution of the "*H. sericea* group", 2. *H. lissosperma*, *H. actites*, *H. macrorrhyncha*, *H. constablei*, *H. macraeana*, *H. ochroptera*, and *H. gibbosa* in Australia.

2. The epithet is adjectival, derived from the Greek *macros*, long, and *rhynchos*, nose, referring to the long-beaked fruit of the species.

Additional specimens examined:

NEW SOUTH WALES. *Northern Tablelands*: J.L. Boorman s.n., i.1916, Torrington, SYD, NSW 182514, BRI 259676. –H.J. Wissmann s.n., 5.xi.1969, Blatherarm Creek, 6 miles NE of Torrington, NE 029878.

QUEENSLAND. *Darling Downs*: J. James s.n., vi.[19]72, Girraween National Park, "Girraween" 1593. –W.J.F. McDonald 278, 27.viii.1974, Northern side of Girraween N[ational] P[ark], BRI 223799. –K.N. Shea S120, 22.x.1962, On property of W. McDonagh, Lyra, BRI 035163

A new location of *H. constablei* L. Johnson

A new location of *H. constablei* over 80 km south of its previously known range in the Mt Wilson - Mt Banks area has been discovered recently (Map 2; Moore 1993: Kennedy 446). The population stretches over about 3 km of sandstone escarpment in a similar habitat to that previously known. Dr L. Johnson (pers. comm. 1994) considers that there are intervening unsearched rugged tracts of sandstone country which should be searched for further occurrences of this species.

Selected specimens examined (35 seen):

NEW SOUTH WALES. *Central Tablelands*: W.R. Barker 5669, 19.ix.1988, Du Faur's Rocks, Blue Mtns Nat. Park, AD. – W.R. Barker 5674, 19.ix.1988, C. 3.5 km by road S of Mount Wilson Fire Station on the main road to Bell, AD. – C. Burgess s.n., 26.x.1962, King's Tableland (Blue Mountains), CBG 11573. – E.F. Constable s.n., 6.x.1950, Bowen's Creek, Bilpin-Mt Irvine road, NSW 16415, MEL 108114, PERTH, K. – E.C. Chisholm s.n., i.1923, Katoomba, NSW 54035. – L. Johnson s.n., 10.viii.1953, Du Faur's Rocks, Mt Wilson, NSW 54034 AD 98714087. – L. Johnson & T. Clifford s.n., 24.viii.1952, 1.5 m S of Bell (old mineshaft c. 200 yds. W of road), NSW 20279, AD 98714085, MEL 1537523. – L.A.S. Johnson 8625 & D.H. Benson, 8.x.1982, Kings Tableland near Mt Kedumba, 9 km S of Wentworth Falls, NSW. – L.A.S. Johnson 7235 & A.N. Rodd, 20.vii.1971, Mt Banks, Blue Mountains, NSW. – M. Kennedy 446, A. Fairley, P. Moore & B. Michie, 6.x.1992, C. 4 km N of "Ben Hur" property, Wanganderry Road, off Wombeyan Caves Road, walking towards Bonnum Pic, Nattai Nat. Pk, NSW. – H.S. McKee, 2, 20.ix.1952, Near Bell, SYD. – P. Harper s.n., 4.x.1964, Blackheath, SYD. – J.H. Maiden s.n., x.1899, Mt Wilson, NSW 54032, AD 98714084, BM, B.

A new northern New South Wales species allied to *H. macraeana*

H. macraeana of the mountains of south-eastern New South Wales has a new counterpart in a group of ranges east of Dorrigo, in north-eastern New South Wales.

***H. ochroptera* W.R. Barker, sp. nov.**

H. macraeana auct. non F. Muell.: G.J. Harden, Fl. N. S. Wales 2 (1991) 61 (note by W.R. Barker discerning northern and southern NSW populations).

Inter species Sect. *Hakeae* foliis longis flexilibus, a ramulis anguste divergentibus, infra per longitudinem maximam caniculatis, mucronibus longis, et fructu pustulis dispersis in corpus cetera laeve rostroque parvo transverso *H. macraeanae* affinis, sed ramulis juvenibus tomentosis, perianthio glabro, fructu cornibus obsoletis, semineque pallidiore differt.

Holotypus: W.R. Barker 5636 & I.R. Telford, 10.ix.1988, C. 1.2 km by road from and c. 250 m direct N of the summit of Mt Moombil, North Coast region, New South Wales. Scattered; tall closed forest on metamorphics. Tree c. 12 m high, with single stem c. 20 cm diameter at breast height and mid brown rough bark with vertical fissures; no lignotuber apparent. Branches ascending to spreading; when young mid brown, shiny. Leaves flexile, ascending. All flower parts pure white except mid green limb in bud; pollen light yellow-brown. Fruits remaining closed, opened only occasionally. AD99603477. *Isotypi*: several to be distributed.

Small tree or large shrub to 12 m high, lignotuber apparently absent (Barker 5636); branchlets with 1 rib decurrent from each leaf base, when young densely tomentose with some hairs appressed, persistent at least until flowering, not glaucous. Leaves simple, terete, narrowly divergent from branchlets, 5–13.5 cm long, 0.75–1.1 mm wide, flexible, with a shallow longitudinal groove below for most of length, initially moderately appressed-pubescent or sericeous, quickly glabrescent, not glaucous; apex straight, the mucro (1.1)1.5–2.0(2.2) mm long. Inflorescences an axillary umbel; inflorescence-subtending

bracts caducous, moderately to densely appressed-pubescent or -sericeous, all over on outer ones, ciliolate; rachis obscure, 0.5–1.2 mm long, densely, very shortly woolly, rust-brown tomentose; flowers 1–6; *pedicels* 4.5–7.5 mm long, sparsely appressed-sericeous with white hairs, not glaucous; *torus* oblique with gland on lower side; *perianth* c. 4.2–5.0 mm long to the recurved apex, white, glabrous, not glaucous, in bud with limb mid green, splitting into 4 free tepals; *anthers* c. 0.5 mm long with light yellow-brown pollen; *gland* a small flat to slightly curved broadly shallowly emarginate flap, c. 0.25–0.3 mm high; *pistil* sigmoid to straight at base and recurved, c. 9.5 mm long (straightened), white, the pollen-presenter an oblique cone or disc raised centrally, 0.9 mm long, 0.2–0.4 mm high, laterally, sometimes topped by a filiform apiculum to 0.2 mm long. *Fruit* long closed; body medianally obliquely elliptic, 3.2–4 cm long excluding stalk, coarsely black- or white-pustulate on blackish to grey bark; beak transverse, short, triangular, sometimes acuminate, not decurrent; stalk with 2 parts, c. 10–15 mm long; apiculum obscure, 0–0.05 mm long; horns obscure, 0–0.05 mm long, forming a \pm truncate apex in median view; *valve* obliquely elliptic, 2.1–2.3 cm wide, seed cavity \pm porrect; red-brown wood zone c. 4–4.5 mm wide; pale wood zone c. 8–10 mm wide, 2 possibly 3 layered, the outer very narrow, c. 1.5–3 mm wide, terminating c. 0.75–0.83 way along fruit. *Seed* obliquely obovate to narrowly so, 2.3–3.1 cm long, 0.55–0.9 cm wide; *body* obliquely narrow-obovate, 10–15 mm long, coarsely rugose to coarsely tuberculate; distal ridge absent; *wing* decurrent c. 0.5–0.75 way down one side of the body, fully down the other, light brown to off-white or hyaline, with light brown to light yellow streaks.

Distribution (Map 2) and *ecology*: Restricted to the east margin of the New England plateau, east of Dorrigo. It is known from about 12 locations, mainly in an area including the Dorrigo National Park known as the Bellingen escarpment on the Dorrigo plateau, but also to the east in the Nymboida River gorge just downstream from the confluence with Wild Cattle Creek and on Urumbilum River, a tributary of the Orara River (Mr A.G. Floyd, pers. comm. 18.x.1987; Floyd 2160). It is recorded as common on hillsides; on skeletal soil between rock sheets; or on rock ridge, in yellow earth, in light brush or depauperate warm temperate rainforest.. Altitude 150 m (Floyd 2161) to 1020 m (Floyd 2160).

Conservation status: 2RC. Areas of occurrence are reserved as National Park or State Forest.

Notes

1. Within Sect. *Hakea* *H. ochroptera* is allied to *H. macraeana* and *H. macrorrhyncha* by its long flexile leaves, narrowly divergent from the branchlets, grooved along most of the lower side, and with long mucros. It is closest to *Hakea macraeana* (Fig. 1, K–N) by its fruit with scattered pustules on an otherwise smooth body and with a small transverse beak, but differs from it by its tomentose young branchlets, its glabrous perianth, its fruits with obscure horns, and its lighter coloured seed.
2. The epithet is adjectival and derives from the Greek, *ochros*, yellow, and *pteron*, wing, alluding to an important diagnostic difference from *H. macraeana*.

Additional specimens examined:

NEW SOUTH WALES. *North Coast*: W.R. Barker 5633, 10.ix.1988, Cultivated in A. Floyd's garden, Coffs Harbour; originally from Urumbilum River, c. 2.5 km SSW of Dairyville, AD. – W.R. Barker 5634, 10.x.1988, C. 100m by road SE of summit of Mt Moombil, AD. – A.G. Floyd 964, 30.v.1978, 1 km NW of Dibbs Head, Dorrigo N.P., NSW, NE. – A.G. Floyd 1092, 17.x.1978, Summit of Dome Mtn, Dorrigo N.P., NSW. – A.G. Floyd 2160, 2.x.1987, N upper slope of Mt Moombil, AD (many duplicates for distribution) – A.G. Floyd 2161, 3.x.1987, Cultivated in collector's garden at Coffs Harbour. Parent from Urumbilum River, W of Coffs Harbour, AD (duplicates for distribution) – W. Owen s.n., ix.1945, The Dome, Dorrigo, NSW190763. – L.J. Webb & J.G. Tracey 13628, iii.1973, Mt Moonbill-Dorrigo plateau, BRI, AD. – C.T. White 7491, 4.x.1930, Dorrigo State Forest, BRI.

The *H. sericea* Schrad. & J.C. Wendl.–*H. decurrens* R. Br. complex

H. sericea has been long conceived as a wide-ranging species of south-eastern Australia, distributed from the northern coastal New South Wales to Victoria and Tasmania, with naturalised occurrences overseas, e.g. in South Africa, New Zealand and south-west Europe, while *H. decurrens*, when recognised as distinct, has been considered to be confined to the western slopes of the Great Dividing Range in New South Wales. Burbidge (1970) recognised only *H. sericea*, apparently as covering the two species, but alluded to the existence of a species complex in which the Australian Capital Territory form might be distinct. Beadle (1972) considered that *H. sericea* and *H. decurrens* intergraded.

In more recent times, the naturalised range of *H. sericea* has been extended eastwards to South Australia with the recognition of the synonymy of *H. vittata* var. *subglabriflora* with this species as then constituted (W.R. Barker 1985, 1986).

Examination of material pertaining to the two species indicated that the only character distinguishing the traditional *H. decurrens* from *H. sericea* is its thin fruits (owing to lesser development of the outer layer of the pale wood zone in each valve), utilised by Brown (1830) when he described the former; potential differences in branch indumentum and length of decurrence of the ribs below the leaf bases are bridged in the Victorian populations of *H. sericea*. On the other hand, collections from the eastern coastal strip of Australia between south-eastern Queensland and south-eastern New South Wales are quite distinct on flower size and indumentum, supported by characters of leaf flexibility and flower colour. As a result, the southern populations of *H. sericea* are transferred to an expanded *H. decurrens* which now comprises three geographical races.

South-east Queensland occurrences of true *H. sericea* are on Mt Barney, Mt Maroon and Mt Mee. Collections from these locations were recognised in recent times (Ross 1986) as distinct from other Queensland species, being considered to be possibly a more glabrous form of *H. gibbosa* (Sm.)Cav., a species confined to the Sydney region of New South Wales.

The taxonomy of *H. sericea* s.lat. presented here is supported by the results of investigations into a viable biological control programme commenced in the 1960s to combat this major invasive weed in South Africa (Kluge & Naser 1991). Because of climatic similarities with the South African sites, Wilsons Promontory in Victoria was originally chosen as a source for early insects of potential to diminish seed set and seedling establishment. Results were poor. These weevils had come from *H. decurrens* which has two subspecies on Wilsons Promontory. The South African plants are in fact true *H. sericea* which is confined to New South Wales. Kluge and Naser had noted morphological differences between Victorian and New South Wales plants, with the latter matching the South African plants. As a result plants from New South Wales provenances of the weevil were trialed with substantial success. Kluge attributed the success and failure of these weevil strains to differences in host plant compatibility.

***H. decurrens* R. Br., Suppl. Prod. Fl. Nov. Holl. (1830) 27.**

Hakea tenuifolia var. *decurrens* (R. Br.) Domin, Biblioth. Bot. 89 (1921) 38.

Type citation: "Ora orient., mont. prope fl. Mac-Quarrie, 1818, D. Fraser."

Lectotypus hic designatus: Fraser 41, s.dat., Native in the Barren Lands in the Interior, height 5 foot/ Barren Lands of the Western Interior, Frutex 5 pedalis X[Oxley] 2nd Expedition (BMp.p.). *Other syntype*: [Fraser] 46, s.dat., Without locality (BMp.p.). *Possible isoelectotype or isosyntype*: C. Fraser s.n., 1818, Mount Tetley, Liverpool Plains, G-DC (?partly: upper specimen).

H. brachyrrhyncha F. Muell., First Gen. Report 17 (1853) *nomen nudum* (based on Mueller MEL 675268, MEL 524086); Meisn. in A.DC., Prod. 14 (1856) 401, *pro syn.*, under *H. acicularis* (as to Mueller NY).

H. acicularis R. Br. var. *lissosperma* auct. non (R. Br.)Benth.: Benth., Fl. Austral. 5 (1870) 515, p.p. (at least as to Wilson's Promontory and Stieglitz localities).

H. sericea auct non Schrad & J.C. Wendl.: Ewart, Fl. Vic. (1931) 407, p.p. (as to Tas. and most occurrences of var. *sericea*); Burbidge, Fl. Austral. Capital Terr. (1970) 146, p.p.; J.H. Willis, Hdbk Pl. Vic. 2. Dicot. (1973) 51, p.p. (excl. some NSW occurrences).

For further synonymy: see subspecies below.

Small trees or shrubs, 0.3–5 m tall, at least sometimes lignotuberosus; branchlets with 1 rib decurrent from each leaf, when young sparsely to densely appressed-sericeous or tomentose, persistent or quickly glabrescent. *Leaves* widely spreading, as much a 90°, ± straight, 1.5–8 cm long, shorter at shoot apex, 0.7–1.6 mm wide, rigid, longitudinally grooved below, often to halfway, sometimes at base or almost to apex, glabrous or sparsely tomentose to appressed-sericeous and quickly glabrescent, porrect with mucro 1.0–3.5 mm long. *Inflorescence* an axillary umbel forming in a cone-like involucre 1–3 mm long; inflorescence-subtending bracts 0.6–1.7 mm long, dark brown, glabrous to moderately appressed-pubescent or tomentose along midline, ciliolate; rachis single in axil, sometimes developing from old woody rachises of prior season, knob-like to slightly elongated, 0.5–2.2(2.8) mm long, densely tomentose or appressed-pubescent, with white and/or ferruginous hairs, sometimes supporting a single bud; flowers 1–6; *pedicels* 1.2–4.0(4.8) mm long, sparsely to moderately tomentose or appressed-sericeous, the hairs white, sometimes also ferruginous; *torus* oblique with gland on lower side; *perianth* 4.2–7.2 mm long, glabrous, white, cream-white, sometimes with a pink or mid-red limb, splitting into 4 tepals; *anthers* 0.4–0.7 mm long; *gland* small, U- or V-shaped, 0.3–0.5 mm high; *pistil* 8.5–12.2 mm long straightened, the style recurved, the pollen-presenter oblique, 0.6–1.1 mm long, with central cone 0.3–0.7 mm high. *Fruit* 1(?) in axil, persisting closed, 1.8–3.5 cm long, ovate or elliptic to depressedly so, rarely obovate in median view, finely to coarsely rugose to rugose reticulate, with crests rupturing, or with fine or coarse pustulate tubercles; beak small to moderately large, transverse to oblique, shortly to long decurrent down one side of fruit body, smooth or sparsely tuberculate, or finely to coarsely rugose-reticulate and fissured, or smooth; horns 1–5 mm long, often broken; stalk in 2 parts derived from pedicel and gynophore; *valves* obliquely narrowly to broadly ovate, 1.0–3 cm wide; seed cavity oblique relative to axis of fruit; pale wood zone 2-layered. *Seed* 17–23 mm long, 6.5–10.5 mm wide; seed-body in outline obliquely elliptic or obovate to circular, 6–10 mm long, finely to coarsely, unevenly tuberculate and/or rugose, sometimes with fine longitudinal ridges, or rugose-reticulate; wing completely encircling body, narrower down one side than other, usually dark blackish-brown, sometimes dark brown.

Distribution:

Refer to the subspecies for clarification.

The species occurs in Madeira, but which of the subspecies is present cannot be determined without seeing fruiting material.

Notes

Characters of the fruit vary on a geographical basis in this species, as newly constituted, resulting in the separation of three subspecies (Fig. 2, D–H). Inland plants on the western slopes of the Great Dividing Range in New South Wales are distinguished by the reduced amount of wood in the outer layer of the pale wood zone of each valve, resulting in the fruit body being much narrower in the median view than in most other needlewoods. These plants are referred to ssp. *decurrens*. The character should be examined in mature fruits, as this outer layer thickens as the fruits develop. Even thinner fruits are developed in other groups of *Hakea*, examples in Sect. *Hakea* being *H. nodosa* and *H. microcarpa* of eastern Australia and *H. recurva* of Western Australia. Plants found throughout much of Victoria and in adjacent far south-eastern New South Wales have a full-bodied fruit more typical of most species in the genus. These are referred to ssp. *physocarpa*. A second character is found in coastal sites of south-eastern Victoria. Here plants have a much thicker band of deep red-brown wood on the face of each open valve. These plants are referred to ssp.

platytaenia. Such thickening in the red-brown wood layer distinguishes taxa within unrelated groups of *Hakea*, e.g. *H. constablei* in Sect. *Hakea* and some members of the corkwoods (the *H. lorea* group: Blake 1963, W.R. Barker, in preparation).

Ssp. *physocarpa* extends into the scattered near-coastal locations occupied by ssp. *platytaenia*. However, population collections by Parris indicate that broadly banded red-brown wood zone in the fruits characterises plants at a specific site. It would be useful to make studies in these sites as to the degree of intergradation between the two taxa.

Typifications

H. decurrens R. Br.

The four branches on the lectotype sheet all belong to the one taxon but probably represent two collections since there is a separate label bearing the number 46 and the determination "*H. acicularis* ?". It is difficult to distinguish between two collections on the sheet; two of the branches have fruit and apparently come from the same source, the other two have flowers and also appear identical. Brown's annotations however refer only to *Fraser 41* and so only the bottom two branches of the sheet have been treated as the lectotype since the label with 41 on it is to be found closest to them. These two branches have flowers and fruits, both of which are described in the protologue. Presumably Brown saw all of the material on the sheet and so the upper two branches are syntype material. A case can be made (depending on interpretation of the ICBN) for considering the whole sheet to be the lectotype or even holotype (depending on the significance of the label bearing the number 46), since there is no evidence that Brown saw any other material of this species.

Confusion has been caused in the typification of this species also by the further collection of this species by Allan Cunningham when he revisited the site on the Liverpool Plains in May 1825. All of the material in Cunningham's herbarium apparently represents his collections from that time, even though he also cites Fraser's 1818 collection from Mt Tetley. There is no evidence that Brown ever saw the Cunningham collections even though they were made before the protologue, and so they have not been treated as type material.

H. brachyrrhyncha F. Muell.

It is difficult, with only one specimen in fruit (F. Muell., vii. 1853, K: ssp. *physocarpa*), to determine if Mueller's nomen nudum *H. brachyrrhyncha* was based on material of both ssp. *physocarpa* and ssp. *platytaenia*, the location on Wilsons Promontory possibly indicating the latter.

Specimens unable to be determined to subspecies level:

MADEIRA: L.O. Franquinho 52, xii.1970, Cultivated only in a few places in Madeira forming prickly hedges, BM. -R. Hegnauer 11999, 11.iv.1968, Madeira; tussen Camacha en Poiso, L.

NEW ZEALAND: A.J. Healy s.n., 28.v.1950, Between Waipu Cove and Hakura, east coast, Nth. Auckland, CHR 70931.

Key to the subspecies of *H. decurrens*

1. Red-brown wood zone on inner face of fruit valve beside seed cavity at widest point towards base 1–2.5 mm wide. Indumentum on branchlets appressed, usually quickly glabrescent, sometimes persisting to flowering, to tomentose.
 2. Fruit in median view ovate to elliptic or broadly so, 1.5–3.6 mm wide; pale wood zone (4.5)6–12 mm wide, the outer layer 2.5–5.5 mm wide ssp. *physocarpa* (p. 192)
 2. Fruit in median view ovate to obovate, 1.4–1.9 mm wide; pale wood zone 3.5–6 mm wide, 2-layered, the outer layer 1–2.5(3) mm wide ssp. *decurrens* (p. 195)
1. Red-brown wood zone on inner face of fruit valve beside seed cavity at widest point towards base 3–5 mm wide. Indumentum on branchlets tomentose, persistent to well after flowering ssp. *platytaenia* (p. 196)

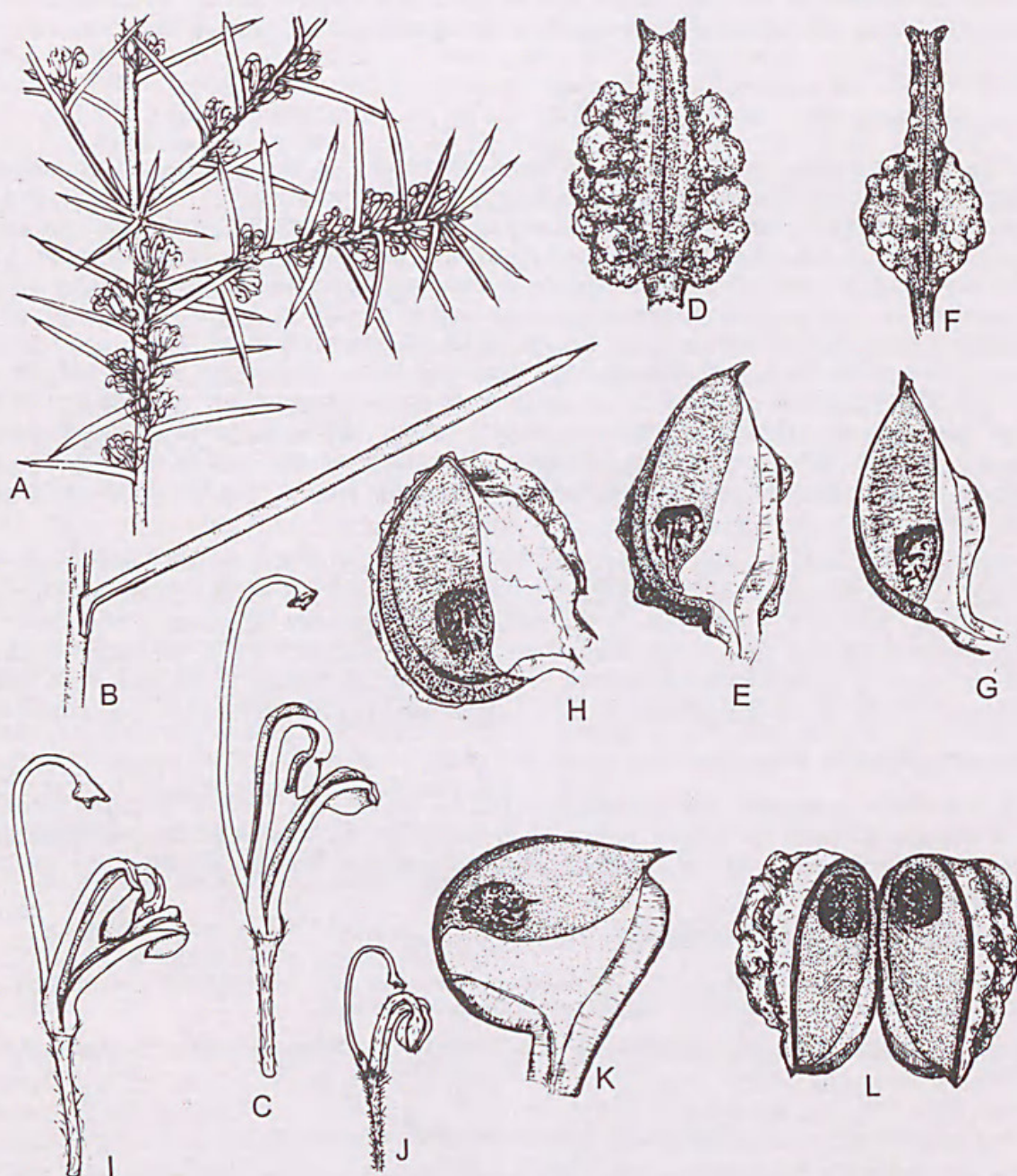


Fig. 2. *Hakea* Sect. *Hakea*, the "*H. sericea* group", 2. A-E, *H. decurrens* ssp. *physocarpa* (A, flowering branch $\times 0.75$; B, leaf $\times 2$; C, flower $\times 4.5$; D, fruit $\times 1$; E, valve, inner face $\times 1$). F-G, *H. decurrens* ssp. *decurrens* (F, fruit $\times 1$; G, valve, inner face $\times 1$). H, *H. decurrens* ssp. *platytaenia* (valve, inner face $\times 1$). I, *H. sericea* (flower $\times 4.5$). J-L, *H. gibbosa* J, flower $\times 2$; K, valve, inner face $\times 1$; L, open fruit $\times 1$). (A-C, Beauglehole 28152; D-E, Beauglehole 30817; F-G, Constable 5026; H, Smith MEL1537502; J, Camfield NSW58167; K-L, Cleland AD97848283). (Del. B. Chandler).

H. decurrens R. Br. ssp. **physocarpa** W.R. Barker, ssp. nov.

Ssp. *decurrens* fructibus lateraliter tumidis differt, et ssp. *platytaenia* taenia ligni angusta porphyrea in faciem interiorem valvae fructus et indumento in ramulis celerius glabrescentibus et appressioribus.

Holotypus: A.C. Beauglehole 30817, 23.iv.1969, Victoria, Grampians, Black Range, extreme N end, E side of Picnic Rocks; to several feet high in deep sand; flowers pink and on numerous plants; assoc. [plants]: *Thryptomene*, *Callitris*, *Banksia ornata*, *Hybanthus floribundus*, AD97931220. *Isotypus*: MEL542886.

Hakea longispina Gand., Bull. Soc. Bot. France 66 (1919) 229.

Type citation: "Victoria, Walter". *Holotype*: C. Walter s.n., s.dat., Victoria, LY (McGillivray 1973: "1902" is date of receipt). *Probable isotype*: C. Walter s.n., vi. 1896, Victoria, BR.

Hakea vittata R. Br. var. *glabriflora* J.M. Black ex J.H. Willis, Vic. Nat. 73 (1957) 150, p.p. (excluding French MEL 643057 from Wimmera).—*H. vittata* R. Br. var. *glabriflora* J.M. Black, Fl. S. Austral, edn 2, 2 (1948) 265, nom. inval. (lacking Latin description).

Type citation: "Stirling East". *Holotype*: J.B. Cleland s.n., Aug. 1944, Stirling East, AD 95643058. *Isotypes*: AD96807226 (Possible *isotypes*: J.B. Cleland s.n., 19 Aug. 1944, near Stirling East School, MEL 664231, NSW.)

Hakea sp. aff. *acicularis* R. Br.: Maiden, Proc. Linn. Soc. N.S. Wales 28 (1904) 747.

Hakea sericea auct. non Schrad. & J.C. Wendl.: e.g., Ewart, Fl. Vict., (1931) 407, p.p., as to var. *sericea*; W.M. Curtis, Student's Fl. Tasmania 3 (1967) 610; W.R. Barker, J. Adelaide Bot. Gard. 7 (1985) 245, p.p., excluding NSW material; W.R. Sykes, Fl. N. Zeal. 4 (1988) 999, p.p.; P.W. Ball, Fl. Europ. 1 (1964) 65.

Small tree or shrub 0.8–5 m tall. *Branchlets* sparsely appressed-sericeous to densely tomentose, sometimes with some hairs appressed, quickly glabrescent to persistent to after flowering. *Leaves* when very young and flexible sparsely sericeous (e.g. *Phillips CBG* 038852), quickly glabrescent. *Pedicels* sparsely to densely, appressed-sericeous to almost tomentose, with few to many hair arms raised. *Fruit* in median view ovate to elliptic, or broadly so, 2.1–3.2 cm long, 1.5–3.6 cm wide, in lateral view 1.3–2.5 cm wide; *valve* with red-brown wood zone 1–2.5 mm wide; pale wood zone (4.5)6–12 mm wide, 2-layered, the outer layer 2.5–5.5 mm wide. (Fig. 2, A–E)

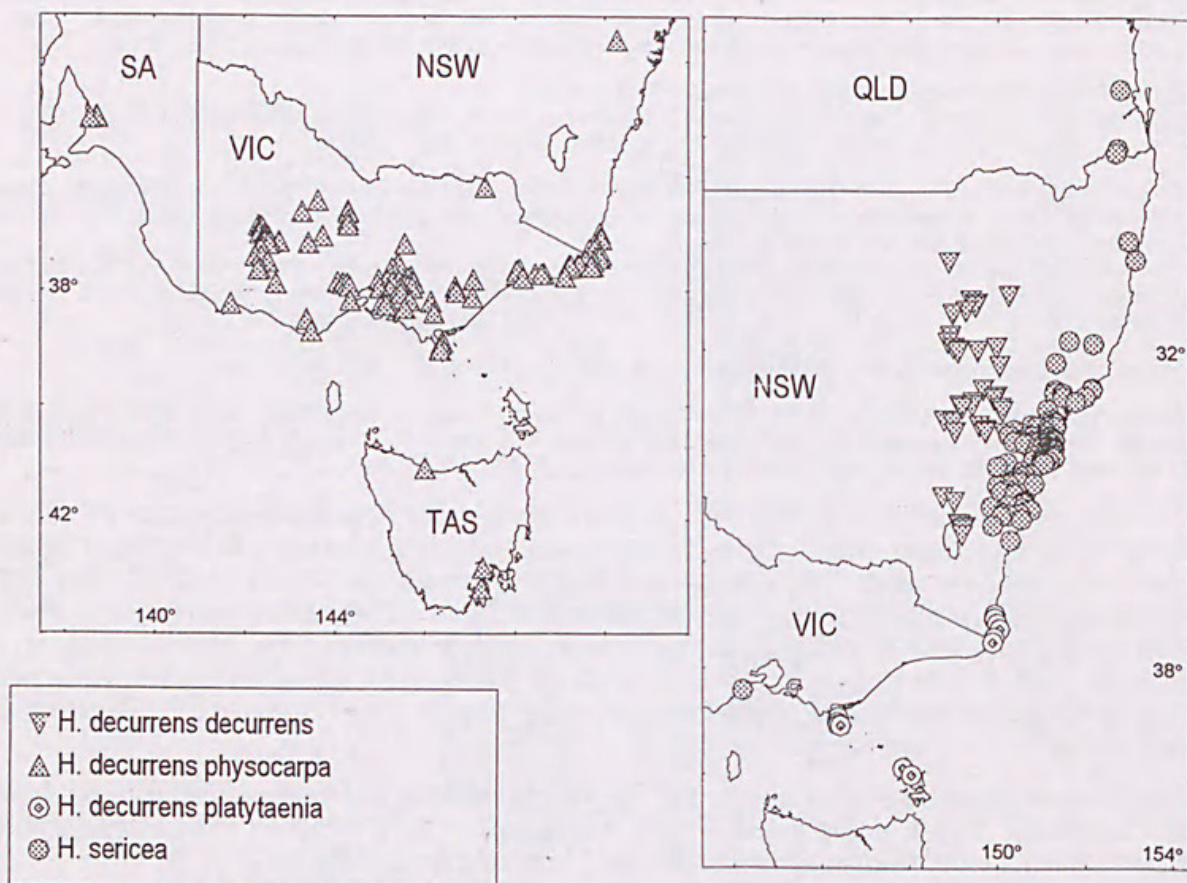
Distribution (Map 3) & *ecology*: In the Grampians, central and eastern Victoria, occurring in *Eucalyptus* forest, damp heath or dry scrubland in hilly areas on sand, clay, granite, basalt or sandstone, from sea level to 300 m. Flowering June–Sept.

The species has been naturalised at least since the 1930s in the Mt Lofty Ranges, South Australia, having been in cultivation nearby by 1925 (W.R. Barker 1985). Occurrences in the Blue Mountains, New South Wales, and in southern Tasmania near Hobart are likely to be adventive (see Note 1). It is also likely to be the plant known as *H. sericea* naturalised in Spain and Portugal (Ball 1964; Orey *et al.* 56).

Notes

1. Plants collected from Blackheath Golf Links in the Blue Mountains, and noted by New South Wales botanists as a "larger-flowered form" of *H. sericea*, are a probable introduction rather than a relictual stand forming the northernmost outpost of the subspecies. They have the full-bodied fruits of ssp. *physocarpa*. Like the populations in the Mt Lofty Ranges, South Australia (W.R. Barker 1985), these have probably originated as a garden escape, the taxon being commonly in cultivation (pers. observ.). The relatively recent collection of the plants support this, for the first of the three herbarium collections in NSW was made in 1947, despite the location being in an area visited from the earliest days of inland exploration and settlement of the Blue Mountains. Similarly, Tasmanian localities widely disjunct from the normal distributional and possibly climatic range of the species must be treated as doubtfully representing an indigenous occurrence, more likely being adventive or just cultivated.
2. The subspecies shows variation in branchlet indumentum and persistence, but this does not seem regionally correlated.

3. The epithet is adjectival and derives from the Greek *physa*, bellows, a swollen object, and *karpos*, fruit, referring to the broader more woody fruits which distinguish this plant from *ssp. decurrens*.



Map 3. Distribution of the "*H. sericea* group", 3. *H. decurrens* ssp. *decurrens*, *H. decurrens* ssp. *physocarpa*, *H. decurrens* ssp. *platytaenia*, and *H. sericea* in Australia. Tasmanian occurrences of *H. decurrens* ssp. *physocarpa* are doubtfully indigenous.

Typification

H. longispina Gand.

The BR specimen is a good match for the LY type material and is probably an isotype. Another specimen annotated as a possible isotype (*Walter NSW112286*) is unlikely to have such status, differing in its shorter leaves, older flowers and smoother fruits.

Selected specimens examined (203 seen):

SOUTH AUSTRALIA. *Southern Lofty*: W.R. Barker 1894, 29.v.1977, Watiparinga National Trust Reserve, Belair (a suburb of Adelaide), AD. –R.T. Lange s.n., 12.vii.1961, A few miles N of Stirling, down slope from road junction signposted "Woodhouse Golf Links" (Stirling, c. 15 km SE of Adelaide), AD.

NEW SOUTH WALES. *Central Tablelands*: Mr Hand, per O.G. Vickery s.n., 16.ix.1947, Blackheath, NSW 4430. – M. Tindale & E. Constable s.n., 27.iii.1952, Blackheath, Golf Club Grounds, NSW 19375. – *South Coast*: E.F. Constable 4399, 19.viii.1963, Head of Nadgee River, Nadgee Faunal Reserve, 12 m E of Timbillica (Ca 22 m S of Eden), NSW. –R. Coveny 2930, 30.vii.1970, 16.1 km (10 m) N of Timbillica on the Princes H/way (ca 29 km [18 m] S of Eden), NSW, W. – I.R. Telford 6819, 28.x.1977, Wallagarough River-Imlay Creek junction, CBG. – N.A. Wakefield 3637, 1.x.1950, Bellbird Gully (a few miles from Eden and Twofold Bay), MEL.

VICTORIA. *East Coastal Plains*: A.C. Beaglehole 62086, 4.xii.1978, 4 km NNE of Mirboo North, 24 km NE of Leongatha P.O., MEL. –P.F. Lumley G20.1, 17.xii.1979, Mallacoota, 2 km from Princes H/way on l.h.s. of the East Wigan Road, MEL. –J. Rodway s.n., viii.1940, Mornington, Pt Phillip, NSW 97014. –N.G. Walsh 180, 14.viii.1979, Montas road 0.6 km S of Old Orbost road, 4.5 km S of Tostaree, MEL. – *Eastern Highlands*: A.C. Beaglehole 31817, 17.xi.1969, Mallacoota Inlet National Park, Captain Creek area, c. 3 m direct NW of Mallacoota P.O., MEL. –M.D. Crisp 7127, 21.vii.1983, 6 km directly ENE of Gembrook, 4 km E along Black Snake Creek Road from Whites Corner, CBG, MEL. –D.B. Foreman 1036, 4.ix.1985, Torbet Road, 2 km from Gilderoy Road turnoff, 3 km W of Powelltown, MEL, AD. –K.R. Thiele 367, 1.viii.1982, Red Hill, just south of Cardinia Reservoir near Beaconsfield Upper, MEL. – *West Coastal Plains*: Anon. (Herb. F. Mueller) s.n., s.dat., Near Geelong, MEL 1536737. –G.E. Earl 297 & D.M. Parkes s.n., 8.vi.1983, Otway Region; Pipeline Track, MEL. –M.E. Phillips s.n., 15.ix.1961, Near Mt Clay, Portland, at Mr Fink's house, CBG 5572. – *Western Highlands*: L. Haegi 1453, 25.ix.1977, C. 0.5 km NW of Golton Gorge turnoff on Halls Gap-Mt Zero road, AD, NSW. –T.B. Muir 1206, 22.viii.1960, The Grampians, Pomonal Road c. 1.5 m from Halls Gap, MEL, UPS. –F. Robbins per A.C. Beaglehole 7974, 1.xi.1931, Bendigo, Whipstick, MEL. –R.V. Smith 59/225, 25.ix.1959, Bordmans Track, c. 2 m W of Mt Anakie, Brisbane ranges, MEL, AD. –(Rev.) J.B. Staer s.n., 1867, St Arnaud, MEL 1536731. –C. Walter s.n., ix. 1898, Grampians, Victoria, NSW 112286. – *Wilsons Promontory*: Anon. s.n., iv. 1853, on rocky declivities of Mount Hunter, MEL 1524086 – Anon. s.n., s.dat., near Mount Hunter, MEL 675268 (Herb. Sonder). –J. Galbraith s.n., x.1958, Mt Oberon, MEL 675420. –Dr Ferd Mueller s.n., 1853, Near Mount Hunter, Australia felix, NY (partly, as to larger flowered piece: ex Herb. Sonder 1854). –G.B. Stokes P.2, 15.viii.[19]62, Tidal River, Wilsons Prom., MEL.

TASMANIA. *Furneaux*: L. Rodway s.n., i.1894, Flinders Island, HO 92467. –M. Thompson 71, 15.iii.1976, Flinders Island, HO. – *North-West*: L. Rodway s.n., ix.1915, Sulphur Creek, HO 20389. – *East Coast*: Anon. s.n., 23.ix.1945, Lenah Valley, HO 20390. – *Questionable (East Coast)*: W.M. Curtis s.n., viii.1948, Flowerpot (near Hobart: probably cultivated), HO 20391.

PORTUGAL: E. Orey, D. Pereina & Reis 56, 15.xi.1966, Lusitania. Reg. Estremadura, Estrada da Pimanceira, proximo de e Mafra, BR.

H. decurrens R. Br. ssp. *decurrens*

H. decurrens R. Br., Suppl. Prod. Fl. Nov. Holl. (1830) 27.

Hakea tenuifolia var. *decurrens* (R. Br.) Domin, Biblioth. Bot. 89 (1921) 38.

Semi-prostrate to erect, bushy to scrambling shrub, 0.4–2.4 m tall. *Branchlets* sparsely to densely appressed-pubescent or -sericeous. *Leaves* sparsely to moderately appressed-sericeous, quickly glabrescent. *Pedicels* sparsely to moderately appressed-sericeous. *Fruit* in median view ovate to obovate, 1.8–3.0 cm long, 1.4–1.9 cm wide, in lateral view 1.0–1.8 cm wide; *valve* with red-brown layer 1.2–2 mm wide; pale wood zone 3.5–6 mm wide, 2-layered, the outer layer 1–2.5(3) mm wide. (Fig. 2, F–G).

Distribution (Map 3) & *ecology*: Occurs only in New South Wales throughout the western slopes and neighbouring tablelands regions. It occupies thick scrub to open *Eucalyptus* woodland or forest, often from hilly country, altitude 430–900 m. Flowers May–Sept., usually July

Note

The location Castlereagh, a town of the 1800s now a suburb of Sydney, attached to *Woolls* MEL 1537893 is likely to be erroneous. No other record of this species occurs in the Sydney region. The nearest locations are in the central and western Blue Mountains. It is most likely either that the location pertains to the region of the Castlereagh River or that the label is misplaced. Ssp. *decurrens* is known from several locations in the vicinity of the upper Castlereagh River.

Selected specimens examined (75 seen):

NEW SOUTH WALES. *North-Western Plains*: N. Perry s.n., vi.1967, Pilliga scrub, NSW 190676. – *North-Western Slopes*: W.A.W. de Bengeville s.n., x.1915, Warrumbungles Mountains near Coonabarabran, NSW 58236, AD 98714078. –B.R. Paterson s.n., 11.viii.1958, 24 km (15 m) from Coonabarabran, on Narrabri Road, NE 13993. – *Central Western Slopes*: G.W. Althofer s.n., 6.xii.1944, Dubbo-Mendooran road, NSW 58234. –N.D. Anderson s.n., 1.xii.1977, Adjacent to Womboin Plains Rd, c. 15 m SE from Gilgandra towards Mendooran, NSW 190677. –R. Coveny 4189, 16.iv.1972, The Mullions Range, 14 m (22.5 km) NNE of Orange, NSW, NT. –L.A.S. Johnson s.n., 11.iv.1953, Dividing Range, 12 m N of Rylstone, NSW 58233, AD 98714079. – *Central Tablelands*: P. Aethofe s.n., ix.1951, Capertee to Glen Davis, NSW 58270. –R. Lembit s.n., 15.xi.1985, Near Wentworths Sugarloaf, Cox's River, NSW 191781. –J. Pickard 487, 23.x.1969, Little Bald Hill, c. 6 km N of Hill End on Hargraves-Hill End road, NSW. *South-Western Slopes*: C.W.E. Moore 3124, 9.iii.1959, Site 21 NW

slope, Hume H/way 11.5 m from Yass, CANB. – *Southern Tablelands*: W.R. Barker 5681, 21.ix.1988, Black Mountain, natural occurrence c. 100 m N of National Botanic Gardens administration buildings directly up slope, AD. – E.M. Canning 2860, 8.vi.1969, C. 8.4 m from Yass, toward Goulburn, along Hume H/way, CBG. – M. Evans 2640, 7.x.1967, Mt Jerrabomberra, 2 m SW of Queanbeyan, CANB (2 sheets), AD. – I.R. Telford 994, 22.vii.1969, Molonglo Gorge, 3 km NE of Queanbeyan, CBG. – *Location doubtful (Central Coast)*: Woolls s.n., s.dat., Castlereagh, MEL 1537893. –

H. decurrens R. Br. ssp. **platytaenia** W.R. Barker, ssp. nov.

Subspeciebus duobus alteris *H. decurrentis* taenia ligni porphyrea in faciem interiorem valvae fructus latissima et indumento in ramulis persistentiore differt, etiam ssp. *decurrente* fructibus lignosissimis.

Holotypus: M. Parris 9714, 23.vii.1990, New South Wales, South Coast region, Ben Boyd National Park, AD99603472 (Plant H). *Isotypi*: AD99603473 (Plant F), CBG, and many others to be distributed. (Different letter suffixes following the collectors number represent different plants in the population).

Small, erect woody or stiff upright, shrub, rarely a small shrubby tree, 0.3–2 m tall. *Branchlets* moderately to densely tomentose, with some hairs appressed, rarely (partly *Crisp* 459) moderately appressed-sericeous, persistent to well after flowering (probably several seasons). *Leaves* glabrous, or sparsely tomentose with some hairs appressed and quickly glabrescent. *Fruit* in median view broad to depressed ovate to broad to transverse elliptic, 2.6–3.5 cm long, 2.6–3.6 cm wide; *valve* with red-brown wood zone 3–5 mm wide; pale wood zone 8–15 mm wide, 2-layered, the outer layer 3–5 mm wide. (Fig. 2H).

Distribution (Map 3) & *ecology*: Confined to near coastal regions of eastern Victoria from Wilsons Promontory eastwards into south-eastern New South Wales and on the Bass Strait Islands, in windswept heath. Flowers May–Sept.

Notes

The epithet is adjectival, from the Greek *platys*, broad, and *taenia*, ribbon, alluding to the broader red-brown layer of the fruit valve compared with the other subspecies.

Selected specimens examined (22 seen):

NEW SOUTH WALES. *South Coast*: D.E. Albrecht 410, 23.iv.1984, C. 0.3 km W by track from the Saltwater Creek camping ground, S of Eden, MEL 661931, AD 98443292. – Anon. (Herb. F. Mueller) s.n., s.dat., Twofold Bay, MEL 1536726. – R. Coveny 58076 & J. Armstrong s.n., 16.x.1974, Green Cape lighthouse, 26 km SE of Eden, NSW. – L.A.S. Johnson s.n., 2.xii.1950, Eden, NSW 58212. – E. Mullins 534, 4.ix.1978, Ben Boyd National Park; ca 2 km along track S from camping area at Saltwater Creek mouth, to Hegartys Bay, CBG 7807890. – M. Parris 9587–9590, 31 Aug 1989, Long Beach, near The Pinnacles, 7.5 km direct SE of Pambula, CBG, AD (each collectors number a different plant, the different letters appended referring to separate branches from the one plant; a number of duplicates of each number for distribution). – M.E. Phillips s.n., 8.x.1961, Green Cape, CBG 6074. – J. Pickard 1042, 1.vi.1970, C. 2 m S of H.Q. on road, Nadgee Nature Reserve, NSW. – J. Pulley 478, 479, 495, 20.v.1970, Quoraburagum Point, South Coast, CBG.

VICTORIA. *Eastern Highlands*: Anon. (Herb. F. Mueller) 132, s.dat., Howe Hill, MEL 675448. – *Wilson's Promontory*: Audas & St John s.n., 10.xi.[19]08, Martins Hill, Wilsons Promontory, MEL 1524084. – A. Meebold 2307, i.1929, Wilsons Promontory, M. – M.E. Phillips s.n., 21.xi.1961, Track to Lilly Pilly Gully, Wilsons Promontory, CBG 5560. – P.K. Smith s.n., 10.vi.[19]65, Oberons foot, Wilsons Prom[ontory], MEL 1537502.

TASMANIA. *Furneaux*: B.C. Crisp 459, 26.ii.1977, Flinders Is, summit of Mt Tanner, HO 28527 CBG 67560. – R.C. Gunn 2000, 30.viii.1845, Flinders Island & Cape Barren, NSW 58247, K. – J. Milligan 643, 30.viii.[18]44, Flinders Island, E, BM.

Hakea sericea Schrad. & J.C. Wendl., *Sert. Hannov.* 3 (1797) 27; Burbidge, *Fl. Austral. Capital Terr.* (1970) 146, p.p.

Type citation: no details given; presumably a plant grown in the Hannover Garden. *Syntypes*: not seen.

? *Banksia tenuifolia* Salisb., *Prod. Stirp. Chap. Allerton* (1796) 50.

H. tenuifolia (Salisb.) Britten, *J. Bot.* 54 (1916).

H. tenuifolia (Salisb.) Britten var. *tenuifolia*: Domin, *Biblioth. Bot.* 89 (192) 592, p.p. (as to NSW locations), *nom. illeg.*, [non *H. tenuifolia* Dum.-Cours., *Bot. Cult.* 5 (1805) 107, *nomen sedis incertae*].

Type citation: "Ex Port Jackson auct. Jac. Lee". *Syntypes*: not seen.

Banksia pinifolia Salisb., *Prod. Stirp. Chap. Allerton* (1796) 51, *nom. illeg.* (*B. gibbosa* Sm. in synonymy). *H. pinifolia* Knight & Salisb., *Cult. Pl. Nat. Order Prot.* (1809), 107, *nom. illeg.*

Conchium aciculare Donn., Hortus Cantabrig. 2nd edn (1800), *nomen nudum*; 3rd edn (1804) 21, *nomen nudum*.

Conchium aciculare Sm. ex Vent., Jard. Malmaison 111, t. 111 (1805), non Donn.

H. acicularis (Sm. ex Vent.) Knight & Salisb., Cult. Prot. (1809) 107.

B. acicularis (Vent.) J. Parm., Cat. Pl. Enghein (1818) 111.

Type citation: "Originaire de la Nouvelle Hollande cultivé à la Malmaison de graines rapportées du voyage de Capt. Baudin."

Holotype: Anon. (Herb. Ventenat) s.n., s.dat. Malm[aison], G.

Conchium compressum Sm. in Rees, Cycl. 9 (1807) no.5.

H. acicularis var. *smithii* Endl., Gen. Pl. Suppl. 4(2) (1848) 85 (based on *C. compressum* Sm.).

Type citation: "Sm. MSS." ("Near Port Jackson, Dr White" in Smith, Trans. Linn. Soc. Lond. 9(1808) 121).

Syntypes: none seen (White specimens in herb. J.E. Smith lack fruits).

H. sericea var. *sericea*: Ewart, Fl. Vic. (1931) 407, p.p. (as to Vic. occurrences).

Hakea sp. 1: E.M. Ross in T.D. Stanley & E.M. Ross, Fl. S. E. Qld, 2 (1986) 21.

Tall or low spreading shrub or small tree, 0.6–4.5 m high; lignotuber absent (*W.R. Barker* collns); branchlets with 1 rib decurrent from each leaf base, densely woolly tomentose when young, usually persistent long after flowering, sometimes glabrescent by that time. Leaves usually widely spreading, sometimes obliquely, rarely narrowly so, rigid or flexible, (1.3)2–4.3(5.3) cm long, 0.7–1(1.1) mm wide, with longitudinal groove on lower side, often towards base, sometimes to or almost to apex, initially moderately appressed-sericeous, with long shining coarse hair arms, quickly glabrescent, porrect, with mucro (1)1.2–1.8(2.0) mm long. Inflorescence an axillary umbel; forming in a cone-like involucre 1.4–2.2 mm long; inflorescence-subtending bracts 0.5–1.5 mm long, light to mid brown or yellow-brown, ciliolate, but otherwise glabrous; rachis single in axil, rarely developing from old woody rachises of prior season, obscure to elongated, 0.5–2.2(2.8) mm long, densely woolly tomentose, with white hairs and towards base (probably on shoots) rust-brown hairs, sometimes supporting a single bud near lowest flower, persistent; flowers (1)4–5(6), arranged singly, pedicels 2.2–4.6(5.0) mm long, moderately to densely villous to hirsute, with white hairs; torus oblique, sometimes almost transverse; perianth 2.5–4.7 mm long to the recurved apex, white or cream-white, glabrous, splitting into 4 free tepals displaced to the gland side of the flower opposite the displaced pistil; anthers 0.3–0.5 mm long with pollen; gland a small U-shaped to flat flap, (0.15)0.2–0.25(0.3) mm high, 0.15–0.25(0.35) mm wide laterally, with upper margin shallowly emarginate; pistil vertically rarely obliquely, inserted, with gynophore curving away from gland, (4.5)5–7(7.5) mm long, the style recurved, the pollen-presenter oblique, discoid, 0.1–0.2 mm high, 0.6–0.8 mm wide laterally, usually topped by a filiform erect apiculum 0.1–0.4 mm long, bearing the stigma at the apex. Fruits 1–2 in each axil, persisting closed for some seasons; body broad ovate to circular in median view, (2)2.5–3(4) cm long, finely to coarsely pusticulate, becoming rugose-reticulate, with crests rupturing, with the beak small to moderately large, transverse or oblique and shortly to long decurrent down the one side of the body, with surface usually similar, sometimes different from body; stalk with 2 parts derived from the pedicel and gynophore; horns 0.5–2(3) mm long, often relatively obscure; valve obliquely ovate to obliquely depressed ovate, (1.5)1.7–2.2(3.0) cm wide; seed cavity almost porrect to slightly oblique relative to the valve axis; red-brown wood zone 1.5–3 mm wide at widest near base of seed; pale wood zone 8–16 mm wide, 0.35–0.5 times width of valve, 2-layered, the outer layer 2–7 mm wide. Seed elliptic to obovate-elliptic or obliquely so, (16)19–25(31) mm long, (6)7–10(11.5) mm wide, dark brown or black; body obovate to broadly obovate or obliquely so, (4.6)5.5–8.7(9.0) mm long, finely rugose to rugose-reticulate or tuberculate, a distal absent; wing decurrent fully down one side of the body only or fully down both sides or completely encircling it, though of unequal width on each side. (Fig. 2I).

Distribution (Map 3) & *ecology*: Found in coastal regions and adjacent ranges from south-east Queensland (Mt Mee, Mt Barney, Mt Maroon) to south-eastern New South Wales. It has also been recorded from Anglesea, Victoria (*Lee* 353); this is most likely an adventive occurrence. The species occurs in dry sclerophyll forest and heaths. Flowers July–Oct.

It has also become naturalised in New Zealand and South Africa, where it is a troublesome weed (Sykes 1988; Kluge & Naser 1991). *H. sericea* has been recorded for Norfolk Island (e.g. Green 1994); fruiting material examined in its fine foliage resembles more *H. sericea* than *H. decurrens* ssp. *physocarpa*, but flowers are needed for unequivocal recognition. The little material seen from Europe is *H. decurrens* (q.v.). The published records of *H. sericea* from southern Europe (e.g. Ball 1964) may also be that species.

Notes

1. The restricted Queensland occurrences of this species have previously been recognised either as *H. gibbosa* (Bailey 1901) or a glabrous form allied to it or a new species (Ross 1986).
2. The authorship of *H. sericea* and of the genus *Hakea* itself has been changed by me (e.g. W.R. Barker 1986) to Professor H.A. Schrader's alone on the basis of an 1805 review of literature (Anon. 1805), probably by the editors of *Annals of Botany*, C. Koenig and J. Sims, which ascribed authorship of the relevant part of "Sertum Hannoveranum ..." to Schrader, discordant with that shown on the title page of the part in which it was attributed also to the artist J.C. Wendland. The title page of the first part of the "Sertum Hannoveranum ..." indicates that it was written solely by Schrader. However, with confirmation (Stafleu & Cowan 1985), it is likely that this reviewer simply missed noting the joint authorship indicated on the title pages of parts 2 and 3. A transition period of co-authorship is likely, considering that by the fourth part J.C. Wendland was acknowledged as the sole author.
3. Salisbury's (1796) *Banksia pinifolia* has consistently been cited as a synonym of *H. gibbosa* from soon after its publication (e.g. Smith 1807). This has probably arisen from Salisbury's indication that the two species were conspecific. Salisbury's substitution of his own epithet to replace the only name to that time coined from White's material, "*Banksia gibbosa*", was a common practice by him and J.E. Smith in that period (R.M. Barker & W.R. Barker 1990).

Typifications

While there is no authentic Salisbury material, herbarium collections of the period indicate that *B. pinifolia* was a fine-leaved form of *H. sericea*. These specimens, originate from various gardens in the late 1700s and early 1800s, were identified variously as "*Banksia pinifera*" and "*B. pinifolia*" (MO3336120; ex "Bernhardi Herbarium", dated 8.iv.1796), "*Hakea pinnata*" (E: ex "Hort. Bot. Glasg[ow]"), and "*H. pinifolia* Salisb." (K: ex "Jardin des plantes, Orangerie, 16e Mars 1819"). In addition, a BM sheet, annotated at some time with "*Conchium aciculare*" and "*Hakea acicularis*", may indicate that White was the original source of seed of these garden plants. The sheet has material with fine foliage very similar to the above specimens, one from the Smith Herbarium collected by White, another from "Hort. Kew". White's seed may have been distributed to Malmaison where Ventenat took up Smith's name "*Conchium aciculare*", and to Lee, the provider of Salisbury's specimens (cf. R.M. Barker & W.R. Barker 1990), upon which Salisbury coined the name "*Banksia pinifolia*".

Examination of Salisbury's description gives further support to this. Based solely on foliage, it is identical to that of his *B. tenuifolia*, published in the same place, apart from the reference to the former as having dense ("densis") leaves and the latter crowded ("confertis") ones. If Salisbury had both *H. sericea* and *H. gibbosa* he would have certainly distinguished them on their conspicuous leaf indumentum difference. In the absence of descriptions of flowers and fruits, he presumably did not have fertile material to assist him, nor would White's (1790) illustration of "*B. gibbosa*" have been likely to help him if he did have fruits as it does not bring out the transverse orientation of the seed in the fruit of the species.

Additional specimens examined (260 seen):

QUEENSLAND. *Moreton*: S.L. Everist 7084, 10.iii.1962, Mt Maroon north peak summit basin at foot of southern slope, BRI. –C.T. White 7862, 27.viii.1931, Mt Barney, BRI, NY. –P. Young 881, 17.ii.1985, Mt Mee State Forest, c. 50 km NW of Brisbane, BRI.

NEW SOUTH WALES. *North Coast*: W.R. Barker 5631 & I.R. Telford, 9.ix.1988, C. 2.5 km WNW of Kungala, c. 300 m N of turnoff to Kungala on the road by the Orara River between Grafton and Coffs Harbour, AD. –M.E. Phillips 357, 21.ix.1972, Near North Rothbury, CBG, NT. –J.B. Williams s.n., 15.viii.1965, c. 15 km N of Glenreagh, NW of Coffs Harbour, NE 43355. – *Central Tablelands*: NSW/ct: Constable E.F. s.n., 3.xii.1948, Mt Wilson, NSW 27331, W 10917, NY. – *Central Coast*: NSW/cc: W.R. Barker 5664, B.J. Conn & D.S. Gibbons, 17.ix.1988, Wisemans Ferry Road, c. 1.5 km by road E of Central Mangrove towards Somersby, AD. –S.T. Blake 19037, 24.viii.1952, Audley near Pt Hacking, in National Park, BRI, NSW. –A. Meebold 2704, ii.1929, Sutherland near Sydney, M, NY. – *Southern Tablelands*: D.J. McGillivray 1435, 22.ix.1965, c. 10 m S by W from Bungonia, NSW. – *South Coast*: R.D. Hoogland 10029, 16.ix.1965, Pigeon House Range, along road from Nerriga to Nowra c. 2 m E of the Endrick River, CANB (many dupl. distributed). –F.A. Rodway 15748, 24.viii.1953, Swan Lake, S of Jervis Bay, NSW. –C.J. Shepherd 817, 12.ix.1978, Kiola State Forest; Livingstone Creek catchment, 15.5 km NNE of Batemans Bay, CANB.

VICTORIA. *Western Coastal Plain*: H.M. Lee 353, 2.x.1986, D. Catling & H.M. Lee s.n., x.1988, Harvey St, Anglesea, AD.

NORFOLK ISLAND: Sykes W.R. Norfolk-620, 15.iv.1980, Melanesian Mission area (St. Barnabas' Chapel), CHR.

NEW ZEALAND: Orchard A.E. 3383, 20.vii.1972, North Island, Green Bay, a western suburb of Auckland, NT. – Orchard A.E. 3601, 14.x.1972, North Island, Whangaroa County, c. 10.5 km due W of Kaeo, at junction of Otangaroa and Taratara Roads, NT.

SOUTH AFRICA: Bos, J.J. 73, 18.vi.1953, Foot of Stellenbosch Mnt., behind "Coetzenburg", STE. –Fugler, S.R. 59, 20.ix.1976, Miss Grace's farm - Molenrivier. South Cape region, STE s.n.. –Walters I.B. 2031, 24.vii.1980, Near Wyzersdrift bridge, Goudini, Worcester, Cape Region, NBG 129976.

***H. pachyphylla* Sieb. ex Sprengel, a species of the *H. nodosa* R. Br. group
confused with *H. propinqua* Cunn. in the Sydney-Blue Mountains region**

H. propinqua was formerly considered to be widespread in central and northern tablelands and coast of New South Wales extending into south-eastern Queensland. Under this former circumscription, two newly named species in the *H. sericea* group, *H. actites* and *H. macrorrhyncha*, described herein, made up the northern occurrences in this range. In addition, many publications in the past have referred to two forms of the species in the Sydney region and adjacent mountains (e.g., Beadle & Carolin 1972; Stacy 1977). They constitute two very distinct species. Failure to formalise them taxonomically probably arose from the similarity of their non-fruiting herbarium specimens, for which flower colour was rarely provided, and their overlapping ranges of distribution. Under its revised circumscription *H. propinqua* is the white-flowered, winter-flowering small tree of the coastal plain and into the adjacent ranges, including the Blue Mountains. The yellow-flowered, spring-flowering small shrub restricted to the upper parts of the Blue Mountains is a separate species, distinct on habit, floral and fruit characters, to which the long synonymised *H. pachyphylla* of Sieber pertains.

The *H. nodosa* group comprises three species confined to south-eastern Australia. It is allied to the needlewoods, but is characterised by tiny white or yellow flowers and generally more flexile leaves than for example in most species of the *H. sericea* group (*H. macraeana* and *H. ochroptera* excepted). The perianths of this group are 1.5–2.2 mm long, those of the *H. sericea* group over 2.5 mm long; the pistils are similarly much shorter.

Key to the *H. nodosa* group of species

1. Leaves flexible, often flattened; plants producing woody and non-woody fruits; rachis simple or with up to 6 sessile branches on prior years rachis; seed marginal in the valve; [flowers cream-white to deep yellow; closed heath and swampy areas, SE SA, Vic, NE Tas; flowers May–Aug.]
.....*H. nodosa* (p. 200; Fig. 3A; Map 4)

1. Leaves rigid, always terete; plants producing only woody fruits; rachis simple; seed distant from the valve margin, though not exactly central
2. Conifer-like tree or shrub, 1–5 m high; flowers white; fruits 3.5–4.5 cm long; [Sydney region to Blue Mtns, NSW; flowers usually May–July] *H. propinqua* (p. 202)
2. Compact or spreading shrub, 0.5–2 m high; flowers yellow; fruits 2.9–3.5 cm long; [Blue Mountains, possibly also Budawang Ranges, NSW; flowers usually Aug.–Sep.] *H. pachyphylla* (p. 204)

H. nodosa R. Br., Trans. Linn. Soc. London 10 (1810) 179.

Type citation: "In Novae Hollandiae ora australia, prope Port Phillip; ad latera montium. (ubi v.v.)." Ex manuscript: "...Bauer no. 116, Bay XVI, April 30, Desc. May 3: 1802."

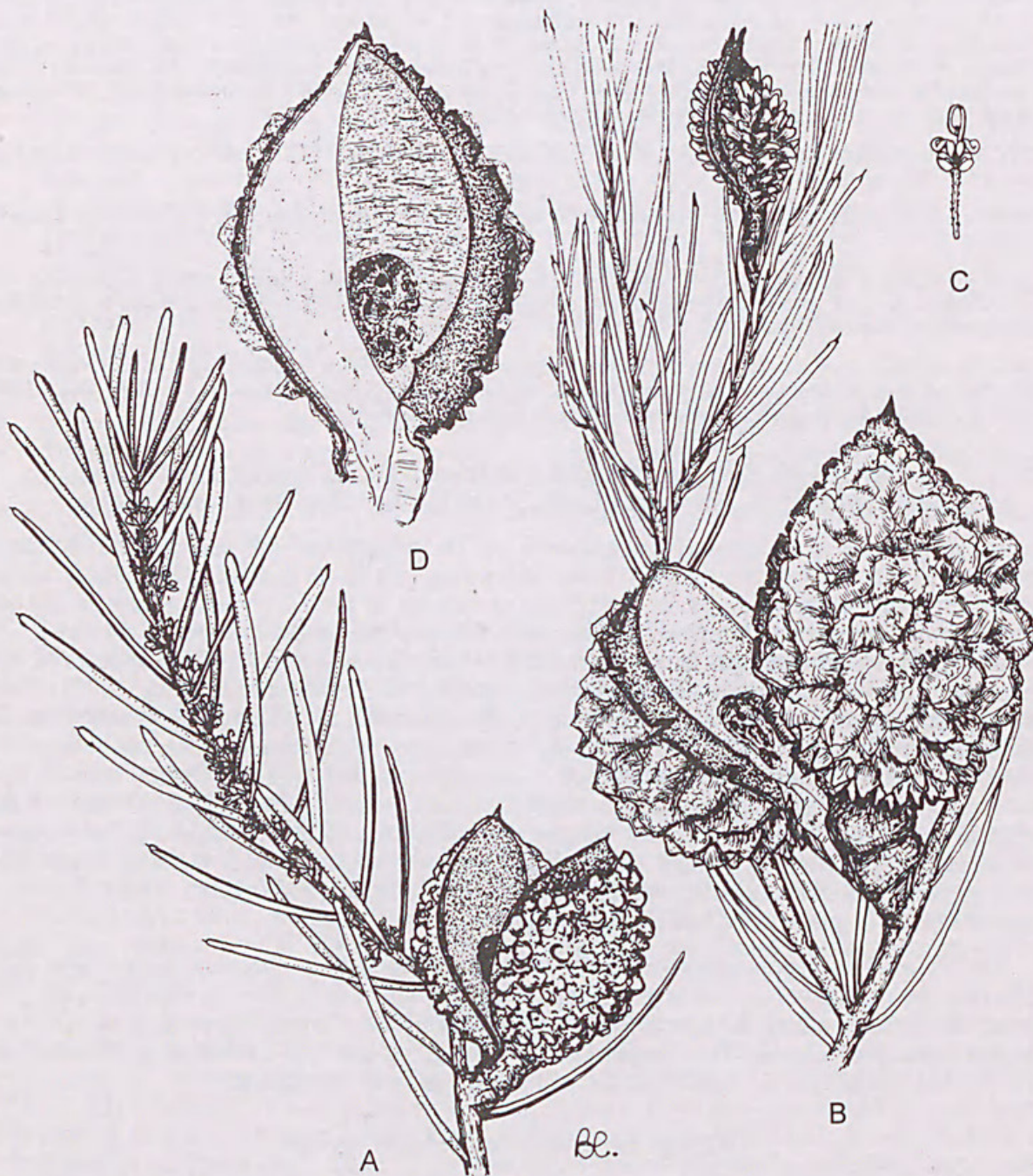


Fig. 3. *Hakea* Sect *Hakea*, the "*H. nodosa* group". A, *H. nodosa* (flowering and fruiting branch $\times 1$). B–D, *H. propinqua* (B, branch with young and mature fruit $\times 1$; C, flower $\times 3$; D, valve, inner face $\times 1$). (A, Wilson 769; B, D, Seur 391; D, Eichler 17010). (Del. B. Chandler).

Lectotypus hic designatus: R. Brown [J.J. Smith no. 3384], 1 v. 1802, Port Phillip / Iter Australiense, 1802-5, BM. *Isolectotypi*: R. Brown s.n., v. 1802, P[ort] Phillip, K; R. Brown s.n., 1802, Port Phillip, P (ex K); R. Brown [J.J. Smith no.], 3384 s.dat., Port Phillip, Victoria, Iter Australiense, 1802-5, E; R. Brown s.n., s.dat., P[ort] Phillip, Iter Australiense, 1802-5, E. *Isolectotypus possibilis*: R. Brown s.n., s.dat. Port Phillip, Arthurs Seat, Iter Australiense 1802-5, E.

H. flexilis R. Br., Trans. Linn. Soc. London 10 (1810) 180.

Type citation: "In Novae Hollandiae ora australia, prope Port Phillip; ad latera montium. (ubi v.v.)." Ex manuscript: "In lateribus Montis Arthur's Seat, ad Port Phillip, Feb. 1804."

Lectotypus hic designatus: R. Brown 3375, 24-25 i.. 1804, Port Phillip, in lateribus collium Arthur's Seat, / Iter Australiense 1802-5, BM. *Isolectotypi*: R. Brown s.n., January 1804, Port Phillip, / Port Phillip, Arthur's Seat, / Iter Australiense 1802-5, BM; R. Brown 3375, s.dat., Iter Australiense 1802-5, K; {R. Brown} s.n., i.. 1804, Port Phillip, Arthurs Seat, K (p.p.: middle of three specimens).

H. semiplana F. Muell. ex Meisn., Linnaea 26 (1854) 359.

Type citation: "Brighton, Australia felix [Victoria], Oct." *Lectotypus hic designatus*: Dr Ferd. Müller s.n., x. [18]52, Brighton, Australia felix, NY (herb. Meisner, ex herb. Sonder) p.p. *Syntypi alteri, non isolectotypi*: Anon. s.n., 1853, Gippsland, NY (herb. Meisner) p.p.; Anon. (Major Mitchell's Expedition) s.n., Interior of New Holland, NY (herb. Meisner) p.p.

H. semiplana F. Muell., First Gen. Report (1853) 17, *nomen nudum*.

Notes

The variability in leaf form and in fruit surface in *H. nodosa* has been alluded to in W.R. Barker (1986). Observation in the field indicates that there two fruit types can occur on a plant (W.R. Barker 5441-5, 5447, 5527). Most fruits had the typical breadth of species of Sect. *Hakea*, but, apparently developing towards the end of the pollination period, additional fruits compressed through the development of little woodiness are also present. These latter fruits were opening on the bush in April 1987; they presumably dehisce more frequently than the much woodier fruits, probably annually, as with fruits of other species with little woodiness. From the plants seen *H. nodosa* also can reproduce vegetatively by subterranean suckering. Mr W. Molyneux (pers. comm. 1992; Molyneux AD99625002) observed similar small smooth fruits and suckering in the eastern part of the species distribution.

Typifications

There are two collections which are Robert Brown's which can be readily assigned to the two Brownian species by the collecting dates and morphological characters presented in the manuscript and publication (leaf shape compressed in *H. nodosa*, more or less terete in *H. flexilis*, flowers present in the former not the latter, fruits smooth in the latter, tuberculate in the former). A third collection, in E, is sterile and has large subterete leaves. It may be an isolectotype of either of the two species or may be a separate gathering, possibly Bauer 116 referred to under *H. nodosa* in Brown's (unpubl.) manuscript, if that was a separate collection.

H. nodosa R. Br.

The BM specimens was chosen as lectotype, despite flowering branches being insect eaten, as it bears flowers and fruits, including a seed in an attached packet, and bears original labels written by Brown and is equal in condition and content to other specimens.

As in the K isolectotype, Brown has appended a note indicating a need to compare it with his *H. flexilis*, indicating it was part of his working herbarium.

Brown (unpubl.) has indicated that he made the type collection on April 30, but the additional date of May 1 has been added to a typed label on the lectotype.

H. flexilis R. Br.

The BM collection is chosen as lectotype as it is similar in condition and content with three branches, two with fruit, has a packet of seed, and includes an early manuscript name

"*Conchium molle*" in Brown's hand. There is no specimen with *H. flexilis* written in Brown's hand.

H. semiplana Meisn.

Only one specimen was cited by Meisner in the protologue, but three specimens of *H. nodosa* in his herbarium in NY are annotated with this name. No duplicates are apparent in MEL. The cited specimen is taken as the lectotype. It comprises two packets containing material of *H. nodosa*. Both are identified as *H. semiplana* in Meisner's hand.

Additional cited specimens:

VICTORIA. *Eastern Highlands*: W. Molyneux s.n., 4.x.1992, c. 4.5 km SSW of Toolangi, Paul Range, AD99625002. – *Western Coastal Plains*: W.R. Barker 5441-5 & R.M. Barker, 18.iv.1987, R.M. Barker per W.R. Barker 5527, 27.ix.1987, G.T. & J. Short's property, c. 22½ km SSW of Casterton, c. 3 km E of Casterton-Dartmoor road, AD. – W.R. Barker 5447, 19.iv.1987, Crown land along E boundary of G.T. & J. Short's property, ..., AD.

H. propinqua Cunn. in Field, Geog. Mem. N.S. Wales (1825) 327; Benth., Fl. Austral. 5 (1870) 513, p.p. (as to *Cunningham* specimens); Beadle in Beadle, Evans & Carolin, Fl. Sydney Reg. (1963) 187, p.p. (as to "coastal forms" with white perianth).

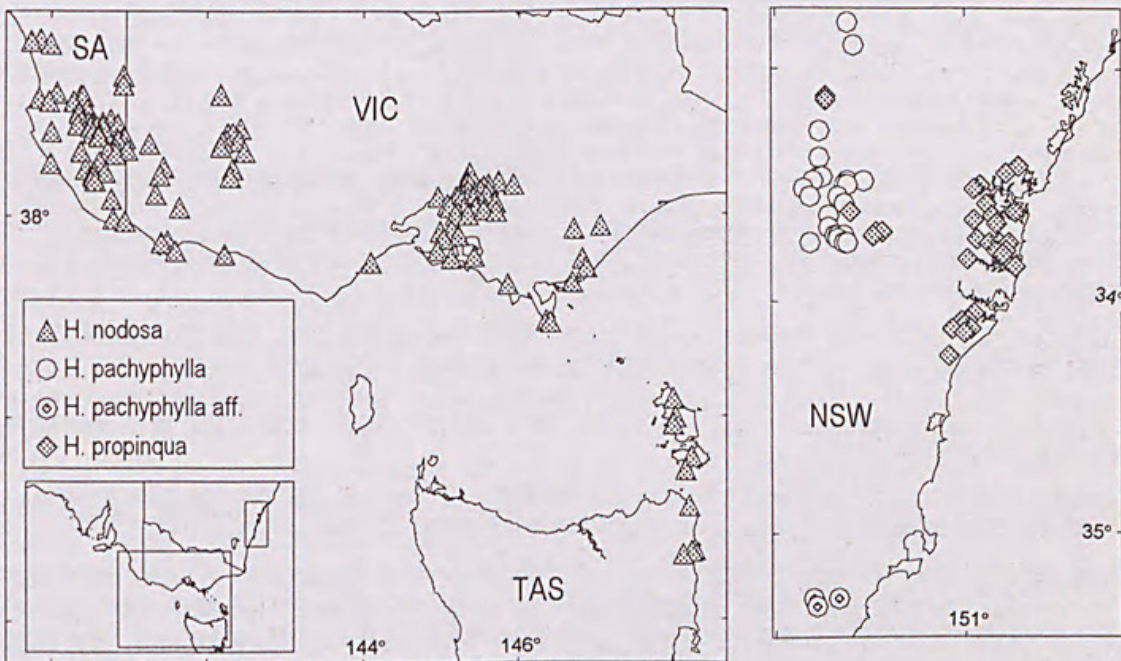
Type citation: "At about eighteen miles on the Blue Mountains." *Lectotypus hic designatus*: *A. Cunningham* s.n., x.1822, Near Caley's Repulse on an open very rocky elevated point of the road over the Blue Mount [ai]ns. 12-15 feet high; *Hakea propinqua*, C. (pachyphylla Sieb.) [All in A. Cunningham's hand], K (herb. A. Cunningham, p.p.: lower left specimen). *Probable syntypes, isoelectotypes*: *A. Cunningham* s.n., x.1822, Rocky ridges on the Blue Mountains, Port Jackson, G-DC (microfiche AD); *Anon. (Cunningham) 54*, x.1822, A tree 15 feet high on the Blue Mountains near Port Jackson, BR (in Cunningham's hand). *Possible isoelectotype*: *Anon. s.n.*, s.dat., s.loc., K (herb. A. Cunningham, p.p.: top right specimen of lectotype sheet). *Syntype, possible isoelectotype*: *Anon. 33*, Novr or Decr, 1822, A large shrub about 18 miles on the Blue Mountains, BM p.p. (in Brown's hand). *Possible syntypes, not lectotypes* (*H. pachyphylla* Sieber): *Cunningham 195 or 33* (2 labels), 1822, Blue Mountains, BM (probably mislabelled at least in part); *Mr Bar[nad] per B. Field 3*, s.dat., Without locality, BM p.p. (on sheet bearing isoelectotype *Cunningham 33*, annotated by Brown); *A Cunningham* s.n., s.dat., Without locality, K (herb. Cunningham). *Possible (iso)syntype, not isoelectotype*: *Anon. 33*, s.dat., Blue Mountains, 12 feet high, MEL1537936 p.p.

H. verrucosa auct. non F. Muell.: F. Muell., Fragm. 5:25 (1865) p.p. (with respect to fruiting specimens and description of the fruit in the protologue, and to cultivated flowering specimens of *H. propinqua* distributed overseas by Mueller as *H. verrucosa*).

Small symmetrically shaped (conifer-like) tree or shrub to c. 1–5 m high, non-lignotuberos, with its smooth single stem often swollen by evenly spaced fissured swellings; young branches in fresh state deepish red, at least when dried finely prominently longitudinally multi-ribbed through 3 main ribs decurrent from each leaf base well past node below, moderately to densely raised tomentose, quickly glabrescent and hardly apparent to persisting over much length to past flowering, the indumentum more persistent in the grooves between ribs. *Leaves* usually narrowly angled to branches and tending to point in one direction, terete but flat at very base with lateral flanges extending onto terete section, not grooved, (1.5)2.5–7(8.5) cm long, 1.0–1.3 mm broad, somewhat flexible, usually minutely densely colliculate, rarely scaberrulous particularly towards base; mucro 0.7–1.6 mm long. Inflorescence axillary, an umbelliform raceme; in bud with cone-like involucre of bracts, these glabrous but for white pubescent apex externally and ciliate margins towards apex, deciduous from an eventually ± swollen rachis base c. 0.5 mm long; *flowers* white, (4)6–10, singly arranged along rachis, without subtending bracteoles; rachis terete, very slender, simple, (0.6)1.5–2.5(3) mm long (excluding swollen involucre base), densely white tomentose; *pedicel* slender, 2–3.8 mm long, sparsely to moderately densely white tomentose (with same hairs as rachis); torus horizontal; *perianth* 1.5–2.2 mm long to apex of recurved distal part of tube, glabrous but for a few raised-armed white hairs on limb, splitting into 4 tepals; *anthers* 0.35–0.4 mm long; *gland* minute, U-shaped, (0.15)–0.2 mm high, 0.2(–0.25) mm wide laterally; *pistil* 4–4.5 mm long, straightened, the (0.2)–0.3 mm long stipe directed obliquely backwards, the pollen presenter obliquely inserted on style, discoid, 0.5–0.6 mm long laterally, 0.1(–0.2) mm high, sometimes with the central fine stigmatic projection 0.5 mm long. *Fruit* long remaining closed; when young (from

Barker 5666: Sept., Oct., Feb.) mid green with dense thick blunt plate-like longitudinally oriented yellow tubercles, often prominently 2-horned and with suture decurrent from between horns deep brown, in mature state deep brown-black with stout smooth stalk (4)10–15(21) mm long composed of pedicel (1)3–6(8) mm and stipe (3)6–10(15) mm long separated by prominent articulation, with main fruit body straight-inserted; beak smooth or sparsely tuberculate, short and broad, decurrent down the red-brown wood side only; rest of fruit body sharply to bluntly, densely, very coarsely tuberculate; apex obtuse with apiculum obscure or absent; horns to 1–2 mm long, often worn, sometimes as a result absent; valves broadly ovate-elliptic, 3.5–4.5 cm long, 2.5–3.0(3.8) cm wide, the seed tending to central through very wide red-brown wood zone (6)7–8(9.5) mm wide; white wood zone equal or wider, (7)7.5–10(12) mm wide, composed of one wide white/red-brown layer and a very narrow marginal white layer. *Seed* obliquely elliptic, 2.4–3.8 cm long, (1.1)1.2–1.3(1.5) cm wide; *seed body* obliquely obovate, 9–14 mm long, 5–9 mm wide, black, well-spaced broken, mainly longitudinally, high rugose to spaced mainly longitudinal plate-like tubercles, rarely fine low rugose; *wing* brown-black, decurrent 2/3–3/4 down one side, if compressed \pm narrow margin of seed body included, then extending all round. (Fig. 3, B–D).

Distribution (Map 4) & *ecology*: *H. propinqua* occurs in two separate areas in New South Wales, the first in near-coastal areas from Heathcote National Park through the bounds of Sydney and north to the ranges near the lower Hawkesbury, the second to the west in the lower Blue Mountains. It is scattered to locally abundant in *Eucalyptus* woodland or open forest, mixed sclerophyll scrub or shrubland on shallow sandy or loam soil on sandstone of ridgetops, hillsides, cliff bases or flats. Flowers (April) May–July (August), with a single October record.



Map 4. Distribution of the “*H. nodosa* group”. *H. nodosa*, *H. propinqua* and *H. pachyphylla*.

Notes

1. *H. pachyphylla* has been long confused with this species, but differs in its high Blue Mountains distribution, low bushy habit, yellow flowers and smaller fruits with more irregular and blunt warty outgrowths.
2. In my experience *H. propinqua* commonly has prominent swellings, apparently galls, on the branchlets (Barker 5666, 5678).

Typification

The protologue describes both flowers and fruits. The syntypes comprise flowers of *H. propinqua* and fruits of specimens of *H. pachyphylla*. There is considerable confusion amongst material which is associated on sheets with the syntypes and possible syntypes. Other specimens, including some *H. pachyphylla* (see below) are mounted on the lectotype sheet and there may have been some mixing of labels, so that further specimens may even be isoelectotypes or isosyntypes.

Cunningham in his 1817 journal of Oxley's Expedition (Currey 1967) refers to the "18th mile mark (from Emu Ferry) on the Blue Mountains" as being the site of a cairn erected by Caley and known amongst other names as Caley's Repulse.

The lectotype is chosen as it is amongst the best specimens, has the label fully annotated by Cunningham attached to it and is in the Cunningham herbarium.

Brown has indicated that a Sieber specimen in BM of *H. pachyphylla*, which Brown identified as *H. propinqua*, "agrees exactly with the specimen no. 3 in Barron Field's herbar[ium]". It is possible that this material is also a syntype of *H. propinqua* and that this is the source of the syntype material of *H. pachyphylla*, for it agrees well with the specimen mounted with the lectotype on the herb. Cunningham sheet and its apparent BM duplicate.

Selected specimens examined (82 seen):

NEW SOUTH WALES. *Central Tablelands*: E.F. Constable 4979, 19.viii.1964, 8 m NNE of Leura, on Mt Hay road, Blue Mountains, NSW. -R. Coveny 9454 & I. Telford, 18.v.1977, 2 km SSW of Glen Davis, NSW, CBG. -I.R. Telford 5029 & G. Butler, 25.x.1976, c. 40 km NNE of Lithgow, 2.5 km SSW of Glen Davis, Green Gully, CBG. - *Central Coast*: J. Armstrong 896, 1.vi.1976, West Hd Rd 2 km N of Salvation Creek-Kuring-gai Chase N.P., NSW. - W.R. Barker 5666, B.J. Conn & D.S. Gibbons, 17.ix.1988, Marra Marra Nat. Pk, c. 3.2 km by road SSE of Maroota School, on Wisemans Ferry - Dural road, AD. - W.R. Barker 5678 & D.S. Gibbons, 20.ix.1988, Wakehurst Parkway, Sydney, c.1.8 km from Warringah Road, AD. -C. Burgess s.n., 13.ix.1962, Waterfall, CBG 10541. -E.F. Constable s.n., 26.ii.1948, Woronora Dam, BR (2 sheets), NSW 5321 -R. Coveny 11609 & W. Bishop s.n., 1.ix.1983, Scouters Mountain, Heathcote National Park, NSW. - H.J. Eichler 17010, 7.v.1960, On Princes Highway ca 1.5 km SSW of Heathcoat, AD. -K. Moore s.n., ix.1963, Dillons Farm Rd, 1 m from Woy Woy turnoff, on the Somersby-Woy Woy road, NSW 182241. -J. Seur 391 & E. Wilksch s.n., 21.x.1978, Willoughby, Hallstrom Park Reserve, Flat Rock Creek gully, NSW.

H. pachyphylla Sieber ex Spreng., Syst. Veg. ed. 16, 4(2) Cur.Post.: 46 (i.-vi.1827); J.A. Schultes & J.H. Schultes, Mant.Syst.Veg.Linn. 3: 282 (vii.- xii. 1827) 282.

Type citation: "[Sieber] 35 ... Nov. Holl." Lectotypus hic designatus: Sieber 11, s.dat., Nova Hollandia, MEL 674170 (herb. Sonder). Isoelectotypes and possible syntypes: G-DC (microfiche AD), L, BR, H (2 sheets), M, K, G, MEL 1537928, MEL 674170, NY, MO.

H. propinqua auct. non Cunn.: Benth., Fl. Austral. 5 (1870) 513, p.p. (as to Sieber 11); Beadle in Beadle, Evans & Carolin, Fl. Sydney Reg. (1963) 187, p.p. (as to "forms from higher Mts" with yellowish perianth).

Compact, bushy to spreading or much depauperate shrub, 0.3-2 m high; non-lignotuberosus with single stem (Barker 5672); branchlets multi-ribbed through a rib decurrent from each leaf base past several nodes; branchlets initially densely appressed-pubescent with a few raised hair arms, \pm quickly glabrescent or persistent to flowering, mid-red when young. Leaves rigid ascending, often at a narrow angle to the subtending branch, (1.0)1.8-3.5(5.5) cm long, 1.1-1.8 mm wide, terete, when young sparsely +/- appressed pubescent, quickly glabrescent, also minutely densely "scaberulous" (? by retention of microscopic hair bases); base with narrow flange either side to some way up

leaf, sometimes with groove on lower side to a short way up; mucro c. 0.5–1.5 mm long. *Inflorescence* axillary, an umbelliform raceme; in bud with deciduous cone-like involucre of ciliate bracts; *flowers* (1–)3–6(7); rachis knob-like to terete, single, simple, 0.5–1.2 mm long, densely woolly-tomentose with white shortish soft (but not intertwined) hairs, possibly elongating after flowering as white pubescent to glabrous remnants, very slender to 0.5(2) mm long; *pedicels* slender, 1.8–3.3 mm long, moderately densely woolly tomentose; torus \pm horizontal; *perianth* 1.5–2 mm long (to curved apex), with tepals recurved such that limb back down to torus, glabrous but for sparsely raised tomentose or 1 or 2 raised hairs on limb, rarely glabrous throughout, split into 4 parts; *anthers* 0.25–0.35 mm long; *gland* minute, 0.15–0.2 mm high, c. 0.1–0.25 mm long; *pistil* bent back at base, (3.5)4.2–4.5 mm long (straightened), the stipe c. 0.2–0.25 mm long, the pollen presenter discoid, 0.5–0.6 mm side, hardly projected forward (c. 0.05–0.2 mm high). *Fruit* long remaining closed, when young (Nov.–Dec.) sharply coarsely tuberculate, with tubercles apparently contrastingly lighter colour than rest of surface (Hamilton NSW182525); when mature rachis 0.1–0.4 mm long, 0.4–0.9 mm diameter, separated from stalk by articulation and obliquely to widely divergent from it; stalk 0.3–0.6 mm long, 0.7–1.4 mm diameter, “straight” into body; beak tuberculate, short and broad, decurrent unequally down both sides of fruit body, on red-brown wood side broad, on white wood side very narrow; rest of fruit body very coarsely bluntly tuberculate; the apex truncate to broadly acute, with apiculum obscure to 0.2 mm, the horns obscure or absent; valves elliptic, 2.9–3.5 cm long, 2.3–2.6 cm wide, the seed cavity displaced from centre but not marginal; red-brown wood zone 6–7 mm wide; white wood zone, broader, 9(10) mm wide, comprising two obscure to distinct \pm equal layers, the inner yellow-brown, the outer whitish to yellow-brown. *Seed* elliptic to obliquely obovate, 22–25 mm long, 10–12 mm wide; *seed body* obovate, 8–10 mm long, 5–6 mm wide, brown-black, interrupted-rugose (scattered longitudinally parallel broken ridges), lacking apical extension onto the wing; *wing* hardly encircling the body, deep brown, decurrent broadly down one side, very narrowly down the other and very narrow around base.

Distribution (Map 4) & *ecology*: *H. pachyphylla* is confined to the upper parts of the Blue Mountains of eastern New South Wales. It is recorded as common or localised, on sandstone in shallow soil, usually on exposed sites, but also in a swampy area or in dry, small creekbed, often in heath or mallee-heath. Flowers August to September, with one 20 October record.

Typification

The choice of lectotype is amongst the better annotated possible syntypes.

The Sieber number 35 recorded in the protologue is incorrect. All type material seen and the subsequent description of the species by Schultes & Schultes (1827) and Dietrich's (1881) list of Sieber's Australian collections consistently record the collection number as 11, with Dietrich (l.c.) recording the number 35 as “*Grevillea oleoides* Sieber”. There is no evidence that Sieber might also have collected *H. propinqua*, as narrowly defined here.

Note

Three specimens most closely allied to *H. pachyphylla* come from the Northern Budawang Range (Pulley & Telford BR75, Carolin 7055) and the adjacent Little Forest Plateau (Mills NSW223475), about 130 km to the south of the range of distribution of *H. propinqua* and *H. pachyphylla* of the Sydney region and Blue Mountains. Like these two species they have ribbed branchlets, the leaves lack grooves, the rachises are simple and short (c. 0.6 mm long), and the fruits are bluntly warted with the seed distant from the valve margin though off centre in the valve. The flowers or buds on the Mills and Pulley specimens are of similar size to the *H. nodosa* group, and have the group's white-tomentose pedicels and a glabrous perianth. While Pulley & Telford BR75 differs from both in the very narrow leaves, possibly with a texture and flexibility akin to *H. nodosa*, but possibly indicative of a shade form, and in the shortness of the fruit beak, the Carolin and Mills

specimens match *H. pachyphylla* in fruit surface, shape and beak, as well as in the robust leaves. Population samples including flowers, with notes on colour, are required to confirm conspecificity with *H. pachyphylla*.

Selected specimens examined (50 seen):

NEW SOUTH WALES. *Central Tablelands*: W.R. Barker 5672, 19.ix.1988, Du Faur's Rocks, Blue Mtns Nat. Park, AD. -J.L. Boorman s.n., viii.1908, Zig Zag cutting (Clarence Siding), overlooking Lithgow, NSW 182522. -J.L. Boorman s.n., x.1914, Hassans Walls, Lithgow, NSW 182523. -C. Burgess s.n., 11.iv.1962, Above Centennial Glen, Blackheath, CBG 5563. -C. Burgess s.n., 18.viii.1958, Leura, CBG 6566. -E.F. Constable 6107, 21.ix.1965, Lake Medlow, Medlow Bath, 3 m NNW of Katoomba, Blue Mountains, NSW. -R. Coveny 12149, W. Bishop & R. Makinson, 17.ix.1985, "Little Switzerland" on Kings Tableland, Wentworth Falls, NSW, AD. -D.J. McGillivray 1421, 21.ix.1965, 14 m from Clarence on road following the disused Newnes railway line, NSW. -D.J. McGillivray 1590, 13.ii.1966, Bare Rock, c. 25 m directly E of Rylstone, NSW. -R. Melville 646 & Johnson L, 29.viii.1952, Kings Tableland, S of Wentworth Falls, Blue Mts, MEL, AD, BRI. -A. Rodd s.n., 4.vii.1965, Mt Banks, NSW 182526. -A.N. Rodd & D.J. McGillivray 1172, 26.iv.1965, 11 m N of Gaspers Mountain Army Airstrip, 9 m NE of Glen Davis on military road, NSW.

Specimens with apparently closest affinity to H. pachyphylla:

NEW SOUTH WALES. *South Coast*: R. Carolin 7055 & J. Grieve, 15.iii.1969, Byangee Walls, SYD; K. Mills s.n., 11.viii.1988, Banner C[ree]k, Little Forest Plateau, Morton National Park, NSW223475; J. Pulley & I. Telford BR75, 17.vi.1971, Northern Budawang Range, The Castle; rocky slope at base of cliff, SW aspect; sandy soil on sandstone; open *Eucalyptus* forest-heathland; 2 m shrub, CBG.

Further typifications and notes

***H. macraeana* F. Muell., Australasian J. Pharmacy 1(11) (1886) 430.**

Type citation: "Near the sources of the Shoalhaven-river and near the eastern tributaries of the Snowy-River, at elevations of nearly 4000 feet; W. Baeuerlen." *Lectotypus hic designatus*: W. Baeuerlen s.n. (p.p.), x.1886, Sources of the Clyde, 4000 feet, MEL1537921 p.p. (flowering branch). *Isolectypi et syntypi*: BM, K. *Isolectotypus possibilis, non syntypus*: W. Baeuerlen s.n., ix.1886, Monga, near Braidwood, NSW191568, but note different date. *Syntypi alteri*: W. Baeuerlen s.n. (p.p.), x.1886, Sources of the Clyde, 4000 feet, MEL1537921 p.p. (fruiting branches); W. Baeuerlen s.n. (p.p.), x.1886, Near Mt Currockbilly, MEL1536165; W. Baeuerlen 206, ix.1884, Braidwood District, MEL1537922 p.p.; W. Baeuerlen 206, ii.1885, Braidwood District, MEL1537922 p.p.; George McRae s.n., 1885, Braidwood, MEL1536164.

Two problems surround the material studied by Mueller around the time of publication of the protologue (Mueller 1886). One concerns a possible mixing of material of the various collections made by Baeuerlen between 1884 and 1886 and the other relates to whether the 1886 collections were used in drawing up the protologue.

The only Baeuerlen sheet bearing both flowering and fruiting branchlets is MEL1537921, dated October 1886. The other seven sheets possess either flowering or fruiting branchlets, with MEL1537922 bearing different branchlets with young and mature fruits, reflecting the two different collecting dates, as indicated by the November 1884 and February 1885 labels. The other specimens with mature fruit, on the sheets Baeuerlen MEL1536165 and Baeuerlen MEL1537921, are apparently from the one collection, probably made in October 1886. Both have a few old flowers with the tepals lost, similar to other October collections made in more recent times; the fruits, clearly from the previous season by their maturity, have similar surface features and size, and unlike the rest of the series of collections, the leaves give the impression of having been crushed together, perhaps in packing.

Of the flowering material, George McRae's 1885 collection is at an earlier bud stage with sparser buds than the Baeuerlen collections. The Baeuerlen material could all have come from the one flowering specimen; although there is some variation in leaf colour the flowers are at a similar advanced bud stage. The fact that the flowers in Baeuerlen's specimens are still in bud, albeit at a late stage, makes it unlikely that they were collected in October as indicated on the three labels pertaining to the lectotype and isolectotype(s), all annotated "Sources of the Clyde". Such a stage of flowering occurs in late August to September in the more recent collections of the species, flowering being well-advanced by October. Baeuerlen's September 1886 collection, sent to J.H. Maiden, is the only one of all the apparent duplicates which seems certain to be correctly labelled: it was the only material

possessed by Maiden and so not prone to the mixing that may have occurred in the MEL material.

It is likely, therefore, that Baeuerlen's flowering material was collected in September 1886 from Monga (or Sugarloaf Mountain: *Boorman NSW190748*) in the Budawang Range, south-east of Braidwood, and that Baeuerlen's fruiting material with a few scattered remnants of flowers was collected in October 1886 from "Near Mt Currockbilly", also in the Budawang Range. Baeuerlen made two earlier collections which were in fruit, one immature in November 1884, the other with mature fruit in February 1885, and both give the general locality "Braidwood District". MacRae's collection at an early bud stage was given a similarly general locality. These last collections may have come from areas south and west of Braidwood, perhaps mistakenly summarised by Mueller in the protologue as "near the eastern tributaries of the Snowy river" for neither the Shoalhaven nor the Clyde Rivers, which have the Budawang Range as their watershed, connect with the Snowy River.

Despite the proximity of the November 1886 date of publication of the protologue to the September and October 1886 dates of collection of some of the apparent syntypes, the syntypes *Baeuerlen 206* and *MacRae MEL1536164* are unlikely to have provided the sole basis of Mueller's descriptions. Only MacRae's bud material might have been available and it is too young. The buds in this specimen are moderately densely sericeous, whereas the inflorescence of the protologue is "almost glabrous" and a "petal" length is given, implying mature flowers were seen. The 1886 flowering material corresponds well in these aspects, having a few open flowers with sparsely pubescent tepals amongst the many mature buds. While there is perhaps some uncertainty that the fruiting material collected in October 1886 was not seen in drawing up the protologue, the flowering specimens, labelled as October 1886 but probably collected in September, appear to have been essential. Accordingly the copiously flowering specimen in MEL has been selected as the lectotype.

H. gibbosa (Sm.)Cav., *Observ. Puerto Jackson, Anales Hist. Nat.* 1 (1800) 214; *Icon.* 6 (1800) t.534.

Banksia gibbosa Sm. in J. White, J. Voy. Botany Bay N.S.Wales (1790) 224, t.22 fig. 2, basionym.

Conchium gibbosum (Sm.) Donn ex Sm. in Rees, *Cycl.* 9 (1807) no.1; Sm., *Trans. Linn. Soc.* 9 (1808) 119.

Conchium gibbosum, Donn, *Hort. Cantabr.*, ed. 3 (1804) 21, nom. inval. (published without description or reference to basionym).

Type citation: None. *Lectotypus hic designatus*: t.22 fig.2 in the protologue. *Epitypus consociatus hic designatus*: J. White s.n., 1793, New South Wales, LINN (herb. J.E. Smith no. 158.1, AD microfiche).

?*H. pubescens* Schrad. & J.C. Wendl., *Sert. Hannov.* (1798) 27, in note.

Type citation: none. Syntypes: none seen.

Conchium sphaeroideum Sm. in Rees, *Cycl.* 9 (1807) no.2.

Type citation: "Sent from Port Jackson with the preceding [*C. gibbosum*]" Syntypes: none seen.

Conchium cornutum Gaertn., *Fruct. Sem. Pl. (Suppl. Carp.)* 3 (1807) 216, t. 219.

Type citation: "In Nova Hollandia prope Port Jackson. Ex collectione Banksiana." Syntypes: *Banks & Solander s.n.*, 1770, New Holland, B (ex BM 25.iv.1911); none apparently in BM.

H. lanigera Tenore, *Fl. Napolitana* 1 (1811) 22, t.vi.

Type citation: "Questo bell'albero è coltivato da molti anni al Real Giardino di Caserta, d'onde è passato en quello delle piante, ...". Syntypes: none seen.

H. tamminensis C.A. Gardner, *J.Roy.Soc.W.Austral.* 47:57 (1964); W.R. Barker, *Nuytsia* 7 (1989) 1.

Type citation: "Hab. in distr. Avon prope Tammin in arenoso glareosis, fl. m. Julio-Aug., Gardner n. 11997". *Holotype*: PERTH.

Notes

1. Early records outside Australia include one from Montgomery in Africa in 1856 (*Martin G-DC*) and Norfolk Island in 1902 (*Maiden & Boorman NSW58172*), the latter as a hedge, the former with no further information. A record from Tammin, Western Australia (*Gardner 11997*) is either erroneous or the result of cultivation.

2. There is some doubt on the legitimacy of the basionym of *H. gibbosa*. In the protologue of *Banksia gibbosa* Smith (1790) was in two minds as to its conspecificity with *H. dactyloides*: "We suspect this to be the *Banksia dactyloides* of Gaertner, but if so his figure is by no means a good one; as he is generally very accurate, we are rather inclined to believe ours is a different plant and have therefore given it a new name". However, from this wording and by giving the plant a new name, Smith clearly decided that at least for the time *B. dactyloides* was different. He had accepted other Gaertner species, e.g. *B. pyriformis*, in the same paper. Under Article 34.2 of the ICBN relating to acceptance of names published with taxonomic doubt as validly published and Article 63 relating to illegitimacy of names through being superfluous, clearly *B. gibbosa* should be recognised as the earliest name for this species.

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