JOURNAL of the ADELAIDE BOTANIC GARDENS

AN OPEN ACCESS JOURNAL FOR AUSTRALIAN SYSTEMATIC BOTANY

flora.sa.gov.au/jabg

Published by the
STATE HERBARIUM OF SOUTH AUSTRALIA
on behalf of the
BOARD OF THE BOTANIC GARDENS AND STATE HERBARIUM

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

Government of South Australia
Department of Environment, Water and Natural Resources

Board *of the* Botanic Gardens *and* State Herbarium

J. Adelaide Bot. Gard. 13: 95-110 (1990)

NEW SPECIES, NEW COMBINATIONS AND OTHER NAME CHANGES IN *HAKEA* (PROTEACEAE)

R.M. Barker

C/- State Herbarium, Botanic Gardens,
North Terrace, Adelaide, 5000.

Abstract

Six new taxa of *Hakea* are described from the south-west region of Western Australia; these are *H. psilorrhyncha* and *H. obliqua* ssp. *parviflora*, *H. pendens*, *H. newbeyana*, *H. bicornata* and *H. horrida*. The new combinations made here are *H. teretifolia* ssp. *hirsuta* (Endl.) R.M.Barker, *H. pandanicarpa* ssp. *crassifolia* (Meissn.) R.M.Barker, *H. spathulata* (Benth.) R.M.Barker, and *H. longiflora* (Benth.) R.M.Barker. *H. drupacea* (Gaertn.f.) Roemer & Schultes and *H. denticulata* R. Br. are earlier names which must replace *H. suaveolens* R. Br. and *H. rubriflora* Lamont respectively, while *H. lasiocarpha* R. Br. replaces *H. dolichostyla* Diels. *H. brownii* Meissn. is a distinct species separate from *H. baxteri*, while *H. roei* Benth. is a synonym of *H. pandanicarpa* ssp. *crassifolia*.

Introduction

The following new species, new combinations and name changes in *Hakea* arose from a joint revision of the genus undertaken by Dr W.R. Barker, Dr L. Haegi and the author of this paper. While a primary aim of the project was to prepare a treatment of *Hakea* for the Flora of Australia project, a full revision is planned. The restrictions on length of descriptions within the *Flora of Australia* has led to the new species being described here together with a discussion of their relationships. New combinations have been made and justified here and the reasons for changes in the names of some familiar species are also discussed.

The new species and name changes discussed here relate only to that part of *Hakea* which was the author's responsibility and there are still about 12 new species to be described by Drs Barker and Haegi. Using Bentham's 1870 classification in *Flora Australiensis* the genus was subdivided such that Dr Haegi had responsibility for all of sect. *Conogynoides*, excluding only *H. varia* and related species (species numbers 83-85, series *Enerves*). Dr Barker took responsibility for sect. *Grevilleoides*. Sect. *Hakea* was shared between Dr Barker and the author, Dr Barker tending to cover eastern Australian species while the author mostly covered Western Australian species. Sect. *Manglesioides* and the *H. varia* group were also treated by the author.

NEW SPECIES

Two new taxa within the *H. obliqua* R. Br. complex

Within what has previously been known as *H. obliqua* in Western Australia there are two distinct species, one from the sand plain heaths of the Esperance region and the other from the heaths north of Perth. As the name *H. obliqua* (also known as H. brooksiana [brookeana] F. Muell., see Blackall & Grieve 1988) applies to the species from the Esperance region, the northern species is here described as new. This species, *H. psilorrhyncha*, has a longer pistil, longer anthers and longer pedicel and perianth than *H. obliqua* (Table 1). In fresh material it also has a very distinctive pollen presenter (Fig. 1), being very swollen behind the face which contains the stigma and presents the pollen; in dried specimens this pollen presenter collapses but it can still be distinguished from that of *H. obliqua* by its different point of attachment to the style (Fig. 2). and its length (Table 1). There is also a difference between the two species in fruit and seed characters. The fruit of *H. obliqua* (Fig. 2) has a small apical beak with corky outgrowths over most of the fruit body while that of *H. psilorrhyncha* has a longer, smooth and tapering beak in contrast to the corky outgrowths

Fig. 1. Flowering specimen of *H. psilorrhyncha* R.M. Barker showing the distinctive pollen presenter.

The new species is known to be non-lignotuberous as it is killed by fire (George 1984) but *H. obliqua* has still to be investigated for this character.

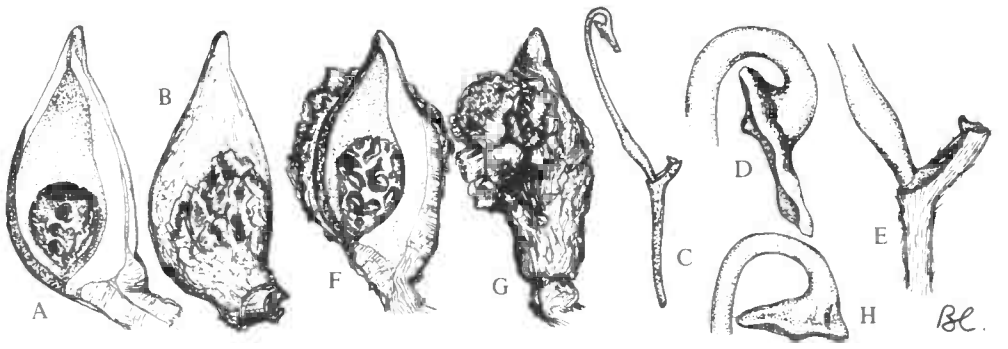

Fig. 2. Comparison of *H. obliqua* R. Br. and *H. psilorrhyncha* R.M. Barker. A-E, *H. psilorrhyncha*. A and B, inside and outside of fruit, ×1; C, flower, tepals removed, ×2; D, pollen presenter, ×12; E, gland, ×5; (all *Wilson 3878*). F-H, *H. obliqua*. F and G, inside and outside of fruit, ×1 (cult. Adelaide Bot. Garden); H, pollen presenter, ×12 (*Aplin 4217*).

at the base of the fruit body. While it is not known for certain, the two species may also differ in the presence and absence of a lignotuber.

Overlapping in distribution with both of these species (Fig. 3) is a new taxon which is here treated as a new subspecies of *H. obliqua*, although it is possible that field work may reveal further characters to justify distinguishing it as a new species. For the present only floral characters can be used to separate it from typical *H. obliqua* ssp. *obliqua*. A comparison of these characters, which include pedicel and perianth length, is given in Table 1. The new subspecies has been named ssp. *parviflora* because of the smaller flower size than the typical subspecies.

It may be that the taxon occupies a different ecological niche to that of *H. obliqua* and *H. psilorrhyncha*, both of which occur in sand heaths in their respective areas. Ecological annotations on specimens refer to it as being occasional in heath to 1 m together with *Petrophile ericifolia*, *Melaleuca pungens* and *Calytrix leschenaultii*, in yellow sand over laterite, to *Banksia* woodland, to sand with *Actinostrobus arenarius*, to *Melaleuca acuminata* and *Thryptomene prolifera* heaths in yellow sandy loam and to open dwarf scrub with low heath and sedges on white sand.

Another species within the *H. obliqua* complex, *H. polyanthema* Diels, occurs in the same area as *H. psilorrhyncha* and *H. obliqua* ssp. *parviflora* but it has much smaller flowers (Table 1) and is easily distinguished by the contrasting white hairs on the claw and rust-brown hairs

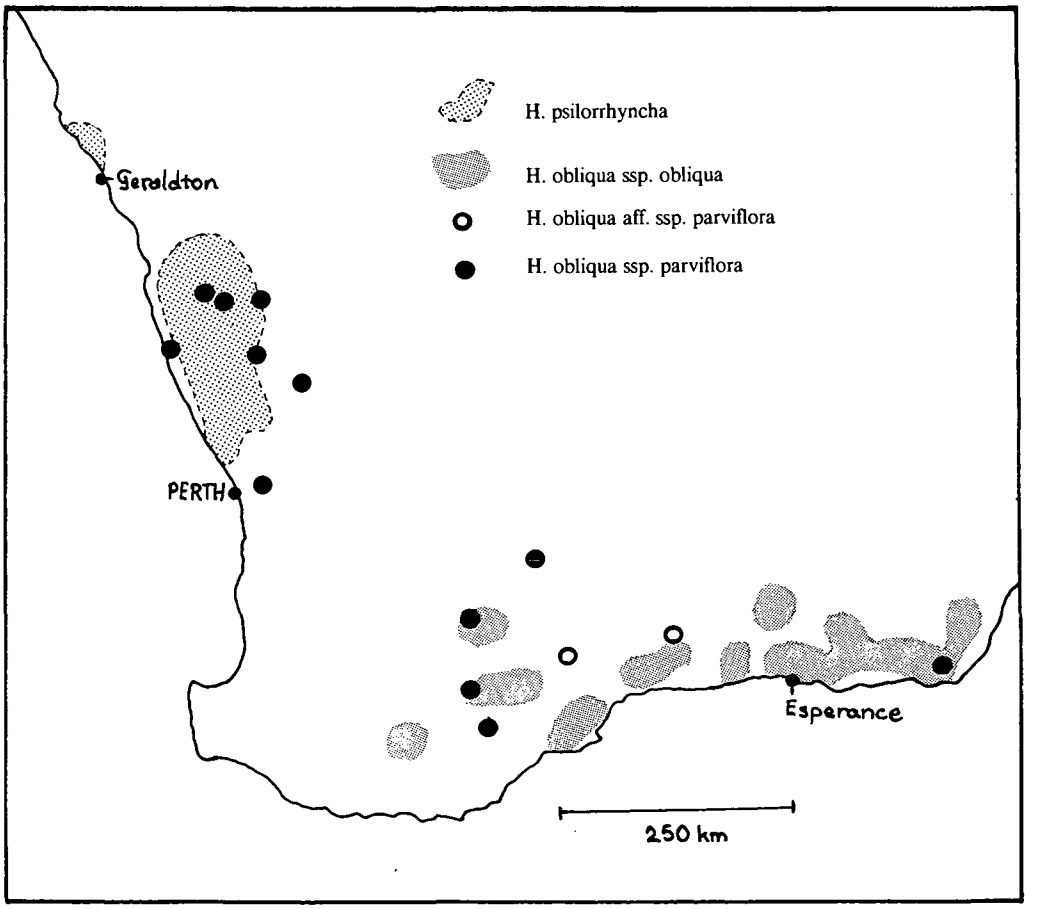

Fig. 3. Distribution of *H. psilorrhyncha* R.M. Barker, *H. obliqua* R. Br. ssp. *obliqua* and *H. obliqua* R. Br. ssp. *parviflora* R.M. Barker.

on the limb, while *H. psilorrhyncha* and *H. obliqua* ssp. *parviflora* have hairs the same colour throughout the perianth. If flowers are lacking then *H. psilorrhyncha* and *H. polyanthema* can be distinguished by the width of their leaves, 1.1-2.5 mm broad in *H. psilorrhyncha* and 0.8-1.2 mm broad in *H. polyanthema*, or if fruits are present, by the lack of a long smooth beak and the lesser development of corky tissue in *H. polyanthema*.

Table 1: Comparative length measurements of the pedicel, perianth, pistil and anthers of the species of the *H. obliqua* complex.

	pedicel length	perianth length	pistil length	anther length
H. obliqua ssp. obliqua	3.5-6 mm	5.5-7.5 mm	6.5-10 mm	0.5-0.6 mm
H. obliqua ssp. parviflora	1.5-2.5 mm	4.5-5.5 mm	6-6.5 mm	0.5 mm
H. polyanthema	1.5-2.5 mm	3.5-4.2 mm	5 mm	0.4 mm
H. psilorrhyncha	6-8 mm	6.5-9 mm	10-11 mm	1 mm

Hakea psilorrhyncha R.M. Barker, sp. nov.

H. obliqua auct. non R. Br.: A.S. George, Introd. Proteaceae W. Austral. 68, p. 96, 97 (1984); Grieve in Blackall & Grieve, How to know W.A. Wildflowers, Pt 1, 2nd edn, p. 123 (1988), p.p. (excl. specimens from Ravensthorpe and Esperance).

Species nova prope *H. obliquam* sed differt pistillo, pedicello, perianthio et antheribus longioribus, rostro fructus laevi, et ala seminis corpus non cingenti.

Holotype: *P.G. Wilson 3878*, 1.xi.1965, c. 25 km NW of Badgingarra (PERTH); isotypes: AD, 1 duplicate to be distributed.

Illustration: A.S.George, Introd. Proteaceae W. Austral. 68, pl. 96, 97 (1984).

Erect shrubs with smooth grey bark, 1-4 m tall, non-lignotuberous; branchlets and young leaves densely appressed-sericeous, hairs ferruginous initially, becoming white, persistent until flowering on branchlets, quickly glabrescent on leaves. *Leaves* simple, terete, rigid, ± straight, obliquely or widely spreading with respect to branch, 2-5 (-9.6) cm long, 1.5-2.5 mm broad, grooved basally on lower side at base or not; mucro 2.5-3.5 mm long, porrect. *Inflorescence* an axillary umbel; involucre 5-5.5 mm long, outer bracts appressed-pubescent in upper half, mid-brown, yellow or paler in lower half. *Flowers* 6 or 8; rhachis developing directly from leaf axil, simple, obscure, with white and rust-brown hairs; pedicel 6-8 mm long, densely appressed-sericeous, hairs cream-white or golden, extending onto perianth; torus oblique with gland on upper side; perianth dilated in basal half, recurved apically, 6.5-9 mm long in late bud; anthers 1 mm long, dark-coloured; pollen red-brown; gland large, U-shaped, 1.6-1.7 mm long, 0.2 mm high; pistil 10-11 mm long; style recurved apically and remaining so, red; disc of pollen presenter obliquely inserted on style and not centred, parallel to main axis of style, white, 1.5-1.8 mm long; stigma tiny, impressed in face of pollen presenter, not centred. *Fruit* on branchlets substantially thicker than others of same age, solitary, 3.5-5 cm long, in lateral view obliquely ovate, 1.5-2.3 cm wide, basally with lines of large stout corky projections decurrent on one side with smooth, gradually attenuate beak, dehiscing fully down one side, almost fully down the other; seed scar marginal, oblique. *Seed* obliquely ovate, 24-28 mm long, 12-15 mm broad; seed-body 10-13 mm long, black, with slender dagger-like projections or unevenly dissected, white about margin; wing completely encircling seed-body but body not centred, mid- to dark-brown.

Distribution & ecology

Found in sand or clay in mallee or open heath between Geraldton and Perth, W.A.

Flowering: September to October.

Note: The name 'psilorrhyncha' is derived from two Greek words *psilos*, smooth, and *rhynchos*, snout, referring to the the beak of the fruit.

Specimens examined

WESTERN AUSTRALIA: *Anon.* (Herb. A. Morrison) *s.n.*, s. dat., without locality (E s.n.); *T.E.H. Aplin & R. Coveny 3122*, 2.ix.1970, 65 miles (104.6 km) NNW Gingin (NSW,PERTH); *P. Armstrong 80*, 16.ix.1979, 10 km S of Moore River (PERTH); *B. Barnsley 866*, 24.i.1979, 2 km W of Brand H/way along Green Head Rd (CBG); *E.M. Bennett 1368*, 30.ix.1966, 5 miles from Coorow to Eneabba (PERTH); *J. Benyon s.n.*, 17.ix.1981, Between Morawa and Eneabba (CBG); *W.E. Blackall 4893*, 24.ix.1940, Three Springs (PERTH); *W.E. Blackall 4893*, ix.1940, W of Three Springs (PERTH); *H.F. & M. Broadbent 1842*, 15.x.1953, 15 m NW of Moora (BM); *E.M. Canning s.n.*, 22.ix.1968, 4.3 miles from Arrowsmith River towards Three Springs on Dongara-Three Springs rd (CBG 37457); *E.M. Canning s.n.*, 23.ix.1968, 13.5 miles from Three Springs towards Eneabba (CBG 30490); *R. Filson 8430*, 31.viii.1966, New Geraldton road, 30 miles NNW of Regans Ford (MEL); *C.A. Gardner 1930*, 22.ix.1926, Watheroo (PERTH); *C.A. Gardner s.n.*, 1948, Near Coorow (PERTH s.n.); *C.A. Gardner s.n.*, 27.ix.1960, Gunyidi (PERTH s.n.); *C.A. Gardner & W.E. Blackall s.n.*, ix.1926, Northampton (PERTH s.n.); *C.H. Gittins 1668*, ix.1967, 14 miles W of Coorow (BRI, NSW, PERTH); *W. Greuter 17910*, 9.viii.1981, Badgingarra road house on Great Northern H/way (ca 200 km N of Perth) (MEL); *E.A. Griffin 958*, 3.viii.1977, 7 km S of Eneabba (PERTH); *T.J. Hawkeswood s.n.*, 17.iii.1979, 5 km S of Cataby (Dandaragan West) (PERTH); *R.J. Hnatiuk 760080*, 3.viii.1976, 15 km N of Cataby Creek (PERTH); *N. Hoyle 89*, 9.ix.1985, Brand H/way, 15.5 km N from intersection of Coorow-Greenhead Rd and Brand H/way (PERTH); *A. Morrison s.n.*, 14.xi.1906, Mogumber, Moore River (E); *A.F. Oldfield 366*, s. dat., Sand plain, near the Culjong? (MEL 675730); *M.E. Phillips s.n.*, 23.ix.1968, 1 mile onto Nebru Rd, ca 5 mile from Three Springs (CBG 27464); *M.E. Phillips s.n.*, 28.ix.1968, 27 miles from Gingin towards Regan's Ford (CBG 28086); *R.W. Purdie 5076 & A.S. George s.n.*, 18.ix.1983, ca 16.5 km from Mogumber along Moore River rd (CBG); *R.D. Royce 9609*, 5.x.1971, Watheroo National Park, W of Watheroo (PERTH); *P.S. Short 2411 & L. Haegi s.n.*, 14.xi.1983, 27 km by road SW of Three Springs on Eneabba Rd (AD, MEL, PERTH); *N.H. Speck [928]*, 20.ix.1952, W of Moora (CANB191346); *H. Steedman s.n.*, 1.ii.1935, Mogumber (PERTH); *D.J. Whibley 4812*, 1.xi.1974, c. 8 km W of New Badginarra (AD); *P.G. Wilson 3878*, 1.xi.1965, ca 25 km NW of Badgingarra, which is ca 175 km N of Perth (PERTH 2 duplicates).

CULTIVATED: *T. Reichstein 2008*, 18.xii.1978, Adelaide Botanic Garden (Border M6-N6) (AD [dupl.]).

H. obliqua ssp. **parviflora** R.M. Barker, ssp. nov.

Subspecies nova prope *H. obliquam* ssp. *obliquam* sed differt parvioribus (4.5-5.5 mm longis) floribus et pedicelis, foliis et fructibus angustioribus et fructibus vix subere tegenti.

Holotype: *E.C. Nelson 17237*, 28.viii.1973, 20 km west of Coorow (PERTH); isotype: CANB.

Compact shrub, 1-1.5 m tall. *Leaves* 2.5-6 cm long, 1.2-1.5 mm broad, densely appressed-pubescent when young, hairs ferruginous, quickly glabrescent. *Inflorescence* axillary umbel of 2-6 paired flowers, always with developing ferruginous vegetative shoot at base of very short rachis; rachis appressed sericeous, hairs white; pedicel 1.5-2.5 mm long, densely appressed-sericeous, hairs white or cream-yellow, extending onto perianth; perianth 4.5-5.5 mm long; anthers 0.5 mm long; pistil 6-6.5 mm long; style recurved apically so that disc of pollen presenter is parallel with it; stigma impressed in disc, not centred. *Fruit* 2.5-3.5 cm long, smooth with some corky tubercles, in lateral view obliquely ovate, 1.3 cm wide.

Distribution & ecology

Found on the plains between Geraldton and Perth and further to the east in the Lake Grace area. Found in low heaths in sand with such species as *Petrophile ericifolia*, *Melaleuca pungens* and *Calytrix leschenaultii*, with *Melaleuca acuminata* and *Thryptomene prolifera*, with *Actinostrobus arenarius* or within *Banksia* woodland.

Flowering: August to September.

Specimens examined:

WESTERN AUSTRALIA: *Anon.* (Herb. F. Mueller) *s.n.*, x.1867, Scrubs N of Stirling Range (MEL 108013); *W.R. Barker 2446*, 16.ix.1977, ca 20 km by road NNE of Borden on main road to Lake Grace (AD); *J.S. Beard 7847*, 17.ix.1976, 3 miles S of Namban River (NSW, PERTH); *W.E. Blackall 2583*, 13.ix.1932, Between Watheroo & Coorow (PERTH); *J.M. Brown 88*, 7.ix.1984, Dragon Rock Nature Reserve, 36238, 75 km E of Kulin (PERTH); *S. Chambers 82*, 5.ix.1966, Strathmore rd, S of Jurien Bay (PERTH); *J. Drummond 10*, s. dat., without locality (K); *J. Drummond 43*, s. dat., Swan River (K); *J. Drummond 330*, 1843, Swan River (BM, G, K, OXF); *J. Drummond 33 [?0]*, s. dat., without locality (MEL 108011); *J. Drummond II, 330*, s. dat., without locality (MEL 108012); *J. Drummond [& L. Preiss] 92*, s. dat., without locality (MEL 108015); *J. Gilbert s.n.*, 1848, Swan River (BM); *J.W. Green 4416*, 27.ix.1975, 19.2 miles (30.9 km) W of Lake Grace on rd to Dumbleyung (PERTH); *K.F. Kenneally 5822*, 8.ix.1976, Wongan Hills, 194 km NE of Perth (PERTH, 1 duplicate); *?Maxwell s.n.*, s. dat., Inland, Cape Paisley (NSW 179878); *E. McCruin 47*, 5.ix.1957, 162 m[ile] p[ost] Geraldton H/way (PERTH); *E.C. Nelson ANU 17237*, 28.viii.1973, 20 km W of Coorow (CANB, PERTH); *J.H. Willis s.n.*, 10.ix.1963, ca 6 miles (10 km) SE of Borden (MEL 675743).

Specimens aff. *H. obliqua* ssp. *parviflora* but lacking flowers.

WESTERN AUSTRALIA: *M.A. Burgman & C. Layman MAB2890*, 12.xii.1983, 22.75 km SE of Muckinwobert Rock, 7.2 km SW of Rawlinson Rd on West Point Rd (PERTH); *A.S. George 16760*, 2.viii.1986, 4.5 km N of Rabbit Proof Fence, North Rd from junction with Matthew Rd, N of Cunderdin (PERTH); *N.L. McKenzie 525*, i.1972, Nyabing-Pingrup (PERTH); *N.L. McKenzie 614*, i.1972, Nyabing-Pingrup (PERTH); *B.G. Muir 483 (4.7)*, 2.vi.1977, Marchagee Reserve, 23601, 10 km N Marchagee, 9 km S Coorow (PERTH).

CULTIVATED: SOUTH AUSTRALIA: *W.R. Barker 5514*, 15.ix.1987, On dune-top by Jeff Barr's farmhouse ('Woodlands'); on 'old road' to Blyth, ca. 18 km by road N of Balaklava (AD).

A new species in the *H. verrucosa* F. Muell. group

This species has been known for some time in cultivation, although its occurrence in the wild appears to be restricted. It is unique in the genus and very distinctive by its pendent flowers, hence the name *H. pendens*. The most closely related species are apparently *H. verrucosa* F. Muell. of Western Australia, *H. purpurea* Hook. of Queensland, *H. bakeriana* F. Muell. & Maiden of New South Wales and possibly *H. rhombales* F. Muell. of Northern Territory, South Australia and Western Australia. With each of these species *H. pendens* shares the characteristics of large pink or red flowers (often with a white stage) in which the perianth parts do not split fully into 4, but instead only split along the dorsal suture to release the style. It is possible that this characteristic may not truly indicate close relationships but merely be a pollination syndrome, the most likely pollinator being birds. In the case of *H. rhombales*, which differs from this group of species in a number of other respects, the flowers are unpleasantly scented, a characteristic not usually associated with bird pollination.

H. pendens is also distinct in this group of species by its conical pollen presenter, the rest of the species having oblique or lateral pollen presenters in which the cone is absent or obsure. It also possesses shorter pistils (14-15.5 mm long) while the rest of the species have pistils in excess of 20 mm long. The fruit of *H. pendens* is almost indistinguishable from that of *H. purpurea* but in the absence of flowers and distributional data these two taxa should still be separable. *H. purpurea* has simple or compound terete leaves, while *H. pendens* only ever has simple terete leaves; the simple terete leaves of *H. purpurea* are usually longer (2.5-9.5 mm long) than those of *H. pendens* (2-4 mm long), and always narrower (0.8-1.5 mm wide compared with 1.9-2 mm wide). In fruiting specimens *H. pendens* is easily distinguished from *H. verrucosa* by the lack of horns on the fruit, from *H. rhombales* by the lack of crested ridges along the suture of the fruit and from *H. bakeriana* by the smaller fruits lacking a verrucose surface.

Hakea pendens R.M. Barker, sp. nov.

?Hakea sp. 5 (Parker Range), Briggs & Leigh, Rare or threatened Austral. Pl, 123 (1988).

Species nova prope *H. verrucosam* et *H. purpuream* sed differt inflorescentibus pendentibus, donatore pollinis conico et floribus parvioribus.

Holotype: *P. Luscombe s.n.*, 1.ix.1978, Near Marvel Loch (PERTH).

Shrub 1.9-2.7 m tall, 2.5-3.1 m wide; branchlets densely appressed-sericeous, persistent at least until flowering, becoming glaucous. *Leaves* simple, terete, crowded, straight, rigid, 2-4 cm long, 1.9-2 mm broad, ungrooved, densely appressed-sericeous, hairs ferruginous, quickly glabrescent, not glaucous; mucro 1-2.5 mm long. *Inflorescence* axillary, umbelliform raceme, at apex of old branched rachises, pendent. *Flowers* 6 or 8; rhachis knob-like, hirsute, hairs rust-coloured and white; pedicel cream-white, pink distally, 6.5-7.5 mm long, glabrous, glaucous; torus oblique with gland on lower side; perianth c. 7-8 mm long, recurved apically, glabrous, light pink at base, darker above, limb white inside and out, splitting fully down one side only, eventually splitting into 2 pairs; anthers 0.7 mm long; gland U-shaped, 0.6-0.7 mm long, 0.1-0.2 mm high; pistil 14-15.5 mm long; style recurved apically, ?eventually porrect; pollen presenter conical, 0.7-1 mm high. *Fruits* 1-4 on elongated woody rhachis, 2.8-3.1 cm long, obliquely obovate in lateral view, 1.4-1.8 cm wide, black-pusticulate, dehiscing fully down both sides; beak transverse and substantially decurrent down one side, surface similar to rest of fruit body; horns obscure; apiculum c. 2 mm long; seed scar marginal, oblique. *Seed* obliquely elliptic, 17 mm long, 7 mm broad, rounded proximally, acute distally; seed-body 6.5 mm long, very flattened, rugose-reticulate to almost smooth; wing broadly down one side of seed-body, narrowly down other, black or dark brown, reddish around seed-body.

Distribution & ecology

Found in the Parker Range area of Western Australia in ironstone or in stony ridges in stony loam of mixed scrub.

Flowering: September.

Note

A specimen of this plant cultivated at Willunga Botanic Gardens (South Australia) has leaves which are not as crowded as those in herbarium collections and also has occasional leaves which are compound terete; the compound terete leaves are bi- or tri-partite apically. At the time of release of the pollen presenter from the perianth flowers in this specimen are predominantly white with a pale pink ring at the base of the perianth. The pink coloration of the claw develops after this stage.

Specimens examined

WESTERN AUSTRALIA: *J.S. Beard 5934*, 18.vii.1970, Parker Range, on summit ridge (KINGS PARK); *Kennecott Explorations s.n.*, 19.v.1969, reserve SW of Southern Cross (PERTH); *P. Luscombe s.n.*, 1.ix.1978, near Marvel Loch (PERTH); *K. Newbey 9218*, 14.ix.1981, Mt Caudan, Parker Range, ca 48 km SE of Southern Cross (PERTH).

A new species within the *H. varia* R. Br. complex

Within this group, which is defined by its terminal and axillary inflorescences in which the flowers are glabrous and curved in bud and by the conical pollen presenter and horned fruits, I have recognized 7 species. Only one of these is new, but it already had a manuscript name provided by Charles Gardner and I have chosen to retain his name, *H. horrida*, as it seems eminently suitable for such an unapproachable plant. Herbarium annotations show that this new species has frequently been confused with *H. dolichostyla* Diels (see below).

H. horrida is distinctive in the *H. varia* complex as well as in the genus *Hakea* by its leaf shape. It is the only species to have leaves which are deeply pinnatisect. It is also one of the few species in the genus to lack a gland at the base of the ovary, a characteristic it shares with *H. ilicifolia* R. Br., also in the *H. varia* complex. These two species also have a short pubescence on the surface of the ovary and fruit. They differ in leaf shape with *H. ilicifolia* having the typical holly-shaped leaves of the specific epithet.

Hakea horrida C. Gardner ex R.M. Barker, sp. nov.

Species nova prope *H. variam* sed differt foliis pinnatisectis, ovariis et fructibus pubescentibus, et floribus sine glande.

Holotype: *P. Wilson 3249*, 16.ix.1964, 32 km east of Lake King township (AD); isotypes (n.v.): B, L, PERTH, UC.

Spreading or dense, intricately branched, rigid shrubs, 0.6-2 m tall, 0.7-2 diameter; branchlets red, moderately appressed-pubescent, glaucous with age. *Leaves* rigid, grooved on upper side, densely appressed-pubescent, quickly glabrescent, 4-9.5 cm long overall, subpinnatisect above 1-2.5 cm long 'petiole', divided di- or trichotomously into 5-11 (-14) flattened segments 0.6-2.5 cm long, 1-2.5 mm broad; mucro 2-3.5 mm long, porrect. *Inflorescence* axillary or terminal umbelliform raceme; involucre 6.5-8 mm long, bracts densely woolly-tomentose, hairs white on lower bracts, ferruginous on upper bracts. *Flowers* 18-22, paired; rhachis 2.5-4 mm long, densely villous with short white hairs; pedicel 3-6 mm long, glabrous apart from sparse hairs at apex similar to those on ovary; torus oblique, gland absent; perianth 2-4 mm long, white to yellow, ?not fragrant, splitting into 4 free segments, claw separating before limb, recurved behind limb, limb glabrous or with sparse hairs similar to those on ovary, densely papillose externally; anthers 0.5-0.6 mm long; pistil 5.5-8 mm long; ovary lacking gynophore, pubescent with short ?glandular hairs; style porrect to recurved; pollen presenter conical, 0.8-0.9 mm high. *Fruit* obliquely ovate in lateral view, 1.5-2 cm long, 1-1.5 cm wide, black-pusticulate, shortly pubescent; horns 3.5-4.5 mm long, slightly incurved; seed scar filling whole valve apically, marginally at base. *Seed* obliquely obovate, 9-13 mm long, 5-6.5 mm broad; seed-body 4-5.5 mm long, unevenly dissected; wing broadly down one side of seed-body, narrowly down other or encircling seed-body, grey.

Distribution & ecology

Found in drier areas of south west Western Australia in the Ongerup to Newdegate area. Records include from gravel loam, sand, sandy loam with lateritic gravel or pebbles, in scrub, closed heath, open *Eucalyptus eremophila* mallee or *Casuarina acutivalvis* shrubland. It flowers from August to October.

Note

A gland was not found on any herbarium sheets but cultivated *H. horrida* at Wittunga Botanic Garden was found to have a small white upright gland present in most flowers. Some of the flowers also had pale pink pollen presenters. The provenance of this material needs investigation. It is possible that it is the product of hybridization with another species, possibly *H. varia* R. Br. which sometimes has red pollen presenters or possibly species from sect. *Manglesioides* which is closely related to the *H. varia* complex. *H. lissocarpha* R. Br. and *H. suaveolens* R. Br. (= *H. drupacea*, see below) from this group both produce pink pollen which gives the pollen presenter a pink appearance.

Specimens examined

WESTERN AUSTRALIA: *D.J. Backshall 130*, 15.iv.1984, Dunn Rock Nature Reserve, 30 km SW of Lake King (PERTH); *W.E. Blackall 3089*, 23.ix.1933, Between Pingrup & Lake Magenta (PERTH); *C.A. Gardner 13987*, 27.viii.1962, Newdegate (PERTH); *R. Hnatiuk 761316*, 22.ix.1976, 20 km W of Newdegate (PERTH); *F.W. Humphreys 143*, 13.x.1966, E of Lake King (PERTH); *F. Lullfitz 3678*, 27.viii.1964, 1 mile W of Newdegate (PERTH); *D. Monk 296*, 7.viii.1978, Frank Hann National Park (PERTH); *B.G. Muir 438 (3.1)*, 1.vii.1976, West Bendering Reserve, 25681, ca 6.5 km E Bendering siding, ca 22 km NNE Kondinin (PERTH); *K. Newbey 390*, 26.viii.1962, 10 miles E of Ongerup (PERTH); *K. Newbey 2639*, 7.ix.1967, 13 miles W of Lake King (PERTH); *K. Newbey 6490*, 12.xi.1979, 2 km NW of 90 Mile Tank, Norseman-Lake King Road (PERTH); *R.W. Purdie 5347*, 26.ix.1983, 32 km E of Lake Grace along road to Newdegate (CBG); *R.D. Royce 6682*, 14.ix.1961, 6 miles S of Lake Grace (PERTH, 1 duplicate); *A. Salkin 40/2A*, 7.ix.1974, Lake King (CBG); *P.G. Wilson 3249*, 16.ix.1964, Coolgardie District; 32 km E of Lake King township, Lake King, ca 380 km ESE of Perth (AD); *P.G. Wilson 5758*, 11.x.1966, 16 km W of Lake King township (PERTH); *J.W. Wrigley 5519*, 6.xi.1968, 9 miles from Lake King, toward Newdegate (CBG, NSW).

CULTIVATED: *W.R. Barker 5531*, 28.ix.1987, Ken Stuckey's private garden at 'Kandara', ca 3.5 km WSW of Furner which is ca. 20 km direct N of Millicent, in swale ca. 50 metres W of house (AD); *B. Murfet M2/168*, 23.viii.1972, K. Stuckey, Furner, South Australia (CBG 45315); *J. Kitcher 5747*, 26.viii.1969, Kings Park Botanic Gardens (PERTH).

Two new species in the *H. strumosa* Meissn. group of species

This group of species is defined by terete leaves, axillary, cauliflorous or terminal inflorescences with the rachis forming on rachises from the previous year, the rachis short and hirsute and supporting 4-12 paired flowers, the perianth glabrous or sparingly hirsute, usually curved in bud and splitting into 4 free parts. The pollen presenter varies from oblique to almost lateral to subporrect, while the gland is always a small flap at the front of the torus. The fruit is always woody and horned and retained on the bush on a thickened rachis. Species included in this group are *H. cycloptera* R. Br. and *H. vittata* R. Br. of South Australia, and *H. strumosa* Meissn., *H. commutata* F. Muell. and *H. circumalata* Meissn. of Western Australia, together with two new Western Australian species described here.

The first of these new species, *H. newbeyana*, has in the past been confused with *H. oldfieldii* Benth. This confusion dates back to the first description of *H. oldfieldii* when Bentham (1870) based his description on two collections, one by Oldfield and one by Roe. The Oldfield collection corresponds with the species presently known as *H. oldfieldii*, while the Roe collection corresponds with the new species. Lectotypification will ensure that present usage of the name *H. oldfieldii* is retained. The new species, *H. newbeyana*, agrees with *H. oldfieldii* by having straight buds and a conical pollen presenter but differs by possessing an undulate disc at the base of the conical pollen presenter (the undulate disc lacking in *H. oldfieldii*), by the much larger fruits (2.5-3.5 cm long vs 1.6-2.3 cm long), by the young branchlets and leaves being ferruginous rather than glabrous and by the development of new rachises on the old woody rachises of the previous season as well as arising directly from the leaf axil as in *H. oldfieldii*.

Within the group of species composing the *H. strumosa* group, *H. newbeyana* differs from them all by its straight buds, conical pollen presenter and by its yellow flowers.

Hakea newbeyana R.M. Barker, sp.nov.

?*Hakea sp. 5* (Parker Range), Briggs & Leigh, Rare or threatened Austral. Pl. 123 (1988).

Species nova prope *H. oldfieldii* et *H. strumosam*, sed ab *H. oldfieldii* differt rhachidibus ramosis et pubescentibus, ramulis foliisque juvenilibus pubescentibus et ab *H. strumosa* gemmis rectis et ala seminis corpus non cingente et donatore pollinis conico et floribus flavis.

Holotype: *L. Haegi 1202*, 5.x.1976, Ca. 21 km NW of Holt Rock P.O. on track to Hyden, Coolgardie District (AD); isotypes: HO, NSW, PERTH.

Spreading, rounded, rigid shrubs, 1-3 m tall; branchlets and young leaves densely appressed-sericeous, hairs ferruginous, quickly glabrescent, branchlets becoming glaucous. *Leaves* simple, terete, straight or incurved, 2.5-7.5 cm long, 1-2.2 mm broad, not grooved; mucro porrect, 1-3 mm long. *Inflorescence* usually axillary, more rarely cauliflorous, umbelliform raceme, developing directly from axil or more usually on old woody rachises of previous seasons; involucre 4-4.5 mm long; bracts ciliate, glabrous, not glaucous. *Flowers* 6-8, paired; rhachis 1-4 mm long, densely hirsute, hairs white or more rarely rust-brown; pedicel 2.5-3.5 mm long, glabrous, not glaucous; torus oblique with gland on lower side; perianth 2-3 mm long, yellow, glabrous, not recurved behind limb, splitting into 4 free segments; anthers 0.3-0.4 mm long; gland a curved flap 0.1 mm high; pistil 3.8-4.5 mm long; style porrect and remaining so; pollen presenter ± porrect, cone 0.3-0.4 mm high on a basal undulate disc. *Fruit* solitary on short rachis, in lateral view obliquely broadly elliptic or elliptic, 2.5-3.5 cm long, 1.5-2.5 cm wide, smooth, black-pusticulate; beak decurrent down one side of fruit body; apiculum 1-3 mm long; horns often obscure in mature fruits, 1.5-2 mm long. *Seed* obliquely elliptic, 14-20 mm long, 6-11 mm broad; seed-body 8-9 mm

long, slightly rugose-reticulate or smooth and flattened, difficult to distinguish from wing; wing broadly down one side of seed-body, narrowly and partly down other, black.

Distribution & ecology

Found in the Hyden - Newdegate area of Western Australia in sandy loam, in mallee or salmon gum woodland.

Flowering: September to October, rarely as early as June or July.

Note

The species is named after the prolific collector of *Hakea* in Western Australia, the late Ken Newbey.

Specimens examined

WESTERN AUSTRALIA: *D.J. Backshall 95*, 15.iv.1984, Dunn Rock Nature Reserve, 30 km SW of Lake King (PERTH); *J.S. Beard 5934*, 18.vii.1970, Parker Range, on summit ridge (PERTH); *E.M. canning 7360*, 7.xi.1968, Ca 1 mile from Newdegate, toward Lake Grace (at 248 m.p.) (CBG); *Cronin s.n.*, 1893, Lake Deborah (MEL 1537829); *H. Demarz 10549*, 16.i.1985, Lake Magenta Road (PERTH); *R. Filson 9359*, 10.x.1966, Kumarl to Lake King Road, 74 m W of Kumarl (MEL 34956); *L. Haegi 1202*, 5.x.1976, 21 km NW of Holt Rock PO, on track to Hyden. Holt Rock, ca 160 km SE of Merredin (AD, PERTH); *K. Hill 646 & L. Johnson et. al.*, 8.xi.1983, 43.2 km W of Hyden on road to Kendinin (NSW); *F.W. Humphreys 151*, 11.x.1966, East of Hyden (PERTH); *M. Koch 2201*, x.1913, Kukerin (NSW, PERTH); *R.H. Kuchel 2035*, 21.ix.1964, Ca 16 km S of Kulin (Kulin, ca 230 km ESE of Perth) (AD, PERTH); *F. Lullfitz 3898*, 26.xi.1964, 39 miles south of the crossroads, in heavy mallee, Forrestania (PERTH); *N.L. McKenzie 515*, i.1972, Nyabing-Pingrup (PERTH); *K. Newbey 981*, 29.ix.1963, 3 mls north of Nyabing (PERTH); *K. Newbey 981D*, 26.iv.1964, 3 mls north of Nyabing (PERTH, 2 sheets); *K. Newbey 6181*, 3.x.1979, 7 km WSW of Lake Cronin, ca 77 km E of Hyden (PERTH); *A.E. Orchard 1102*, 20.ix.1968, Neridup, ca 3 km NE of Howick Hill, in Location 251 (CANB); *R.W. Purdie 5350*, 26.ix.1983, 32 km E of Lake Grace along rd Newdegate (CBG); *R.A. Saffrey 326*, 7.viii.1968, Gate at RP E of Mt Madden (AD,PERTH); *P.G. Wilson 5736*, 10.x.1966, 72 km E of Lake King on rd to Daniell (PERTH).

CULTIVATED: *J.H. Willis s.n.*, 8.x.1969, Cultivated at Dripstone by Peter Althofer (MEL 672101).

The second new species in the *H. strumosa* group, *H. bicornata*, seems to be most closely related to *H. newbeyana*. Both species differ from the rest of the group by the seed wing not completely encircling the seed-body although it does extend down both sides of the seed-body. Both species also have pedicels and perianths which are glabrous and yellow or cream-white, whereas the rest of the species in the group either have hairs on the pedicel or perianth or have flowers which are not yellow overall. *H. newbeyana* and *H. bicornata* differ from each other predominantly in their fruit structure, that of *H. bicornata* being much smaller than *H. newbeyana* and also possessing a pair of long slender horns in contrast to the often obscure horns in *H. newbeyana*. They possess very similar conical pollen presenters with the cone seated on a wider undulate base. However, whereas in *H. newbeyana* the conical presenter is porrect and the buds and style are straight, in *H. bicornata* it is obliquely or almost laterally inserted and the styles, and hence the buds, are recurved. *H. newbeyana* and *H. bicornata* also differ vegetatively in that the terete leaves of *H. bicornata* are longer than those of *H. newbeyana*.

Hakea bicornata R.M. Barker, sp. nov.

Species nova prope *H. strumosam* et *H. newbeyanam* sed differt ab *H. strumosa* fructibus parvioribus, floribus eburneis et ala seminis corpus non cingente et ab *H. newbeyana* foliis longioribus, donatore pollinis recurvo, et gemmis recurvis, et fructibus parvioribus et cornibus longioribus.

Holotype: *W. Archer 2605901*, 26.v.1990, 10.5 km NW Clyde Hill, 37 km ENE Mt Heywood (AD, duplicates to be distributed).

Multistemmed, much branched shrubs, 1-1.3 m tall, lignotuberous; branchlets densely appressed-pubescent, hairs ferruginous, quickly glabrescent. *Leaves* simple, terete, not grooved,

7-13 cm long, 1.2-1.5 mm broad, densely appressed-sericeous, hairs ferruginous, quickly glabrescent, not glaucous; mucro 1.5-2.5 mm long. *Inflorescence* axillary, umbelliform, developing directly from axil or on woody rachises from the previous season. *Flowers* usually 8, paired; rhachis very short, moderately appressed pubescent, hairs rust-brown; pedicel 3.5-4.5 mm long, glabrous, not glaucous; torus oblique with gland on lower side; perianth c. 2.5 mm long, cream-white, glabrous, recurved behind limb, splitting into 4 free segments; anthers 0.3-0.4 mm long; gland small flap, 0.1 mm high; pistil 4-4.5 mm long; style recurved and remaining so; pollen presenter conical, obliquely inserted, 0.7-0.8 mm long. *Fruit* solitary on short rachis, in lateral view obliquely broadly elliptic or obovate, 1.5-2.2 cm long, 1.2-1.5 cm wide, black-pusticulate on pale grey bark; beak absent; apiculum obscure; horns 5-6 mm long, very narrow, often broken. *Seed* obovate, 11 mm long, 5.5 mm broad; seed-body 3.5 mm long, rugose-reticulate; wing broadly down one side of seed body only, black or dark brown.

Distribution & ecology

A rarely collected species, known from only four collections, from the Cape Arid National Park area in Western Australia. It is found on lateritic clay or clay loam over granite in shrubland and flowers in August.

Note

The specific epithet derives from the Latin *bicornatus*, two-horned, in reference to the conspicuous horns of the fruits of this species.

Specimens examined

WESTERN AUSTRALIA: *A.S. George 2079*, 6.xii.1960, ca 19 mls SSW of Mt Ragged (PERTH); *A.S. George 15853*, 7.viii.1980, NW base of Mt Ney (PERTH); *P. van der Moezel 493*, 14.ix.1984, 10 km E of Scaddan on Scaddan Road.(PERTH); *A.E. Orchard 1102*, 20.ix.1968, ca 3 km NE of Howick Hill (AD, PERTH).

NEW COMBINATIONS

H. pandanicarpa R. Br. and *H. crassifolia* Meissn.

H. pandanicarpa subsp. **crassifolia** (Meissn.) R.M. Barker, comb. et stat. nov.

Basionym: *Hakea crassifolia* Meissn. in Lehm., Pl. Preiss. 1: 570 (1845). Syntypes: *L. Preiss 550*, 19.xi.1840, In saxosis ad latera callium Konkoberup promontorii Cape Riche (G, HBG, LD, LE, MEL 108123, M, MO, NY p.p., P).

H. pandanicarpa R. Br. has previously been separated at species level from *H. crassifolia* Meissn. on the basis of the surface of the fruit, the former having large tetrahedral corky protuberances, the latter a smoother surface, cracked in a similar manner to drying mud. These two extremes are very distinctive and to some extent supported by distribution with the larger fruit protuberances being produced by plants growing in the more easterly part of the distributional range around Esperance and the smoother fruits from the more westerly locations around Ravensthorpe. However, there are many intermediates and it cannot be justified maintaining these two taxa as species in the absence of any supporting characters. The two taxa have here been reduced to subspecies and as *H. crassifolia* is the later name, it has now become ssp. *crassifolia* of *H. pandanicarpa*.

Infraspecific taxa within *H. teretifolia* (Salisbury) Britten

Hakea teretifolia ssp. **hirsuta** (Endl.) R.M. Barker, comb. & stat. nov.

Basionym: *H. pugioniformis β hirsuta* Endl., Gen. Pl. Suppl. 4(2): 85 (1847), based on *H. pugioniformis β* R. Br., Trans. Linn. Soc. 10: 179 (1810). Syntype: *R. Brown 381*, 1804, Port Dalrymple [BM (Cat. no. 3381) p.p.].

H. teretifolia (Salisbury) Britten of south-eastern Australia can be divided into two subspecies which have in the past been recognised as distinct species or different varieties of *H. teretifolia*. There are some specimens which are difficult to allocate to either taxon, hence the rank of subspecies, a rank which is being consistently allocated and the only one recognised for infraspecific taxa within *Hakea* in the revision.

The hairs on the pedicel and perianth of the typical subspecies, which seems to be confined to the sandy heaths and sandstone areas of the Sydney region, are sericeous while those of ssp. *hirsuta* which is more widespread, occurring in coastal heaths from Sydney to Tasmania, with a disjunct occurrence in the Grampians of Victoria, are tomentose.

Endlicher did not see specimens of *H. teretifolia* var. *hirsuta* but merely adopted Robert Brown's two unnamed taxa, designated α and β under *H. pugioniformis*; Endlicher's name derives from the characteristic used to distinguish Brown's α and β namely "calyx sericea" and "calyx hirsuta". Brown commented that *H. pugioniformis β* was perhaps a good species.

H. erinacea Meissn. and *H. longiflora* (Benth.) R.M. Barker

Hakea longiflora (Benth.) R.M. Barker, comb. et stat. nov.

Basionym: *Hakea erinacea* Meissn. var. *longiflora* Benth., Fl. Austral. 5: 505 (1870). Syntypes: *J. Drummond s.n.*, s. dat, Swan River [B, K, L (2 sheets), MEL 1537917].

H. longiflora is found only in the Mt Lesueur area, north of Perth, in low open heath. Although restricted in distribution, it is apparently reasonably common (pers. comm. S.D. Hopper). In this area it overlaps in distribution with *H. erinacea* Meissn. which it resembles closely. The two species can be distinguished by the length of the perianth, 6.5-12 mm long in *H. longiflora* and 4-7.5 mm long in *H. erinacea*, the length of the pistil, 12-14 mm long in *H. longiflora* and 6-9 mm long in *H. erinacea*, by the ungrooved lower leaf surface of *H. longiflora* compared with the grooved lower surface of *H. erinacea*, by the distal ridge of the seed wing only extending a quarter of the way to the apex in *H. longiflora* but continuing to the apex in *H. erinacea* and by a difference in hair covering on the branchlets and young leaves. In both species the indumentum on the branchlets and young leaves is villous, but in *H. longiflora* they are sparser, 0.6-0.9 mm long and mixed with shorter hairs while in *H. erinacea* the hairs are moderately dense to dense, soft, suberect and shorter (0.2-0.3 mm long).

All of these differences apart, the most distinctive characteristic of *H. longiflora* is the 3.5-4.5 mm long lateral pollen presenter, much longer than that of *H. erinacea* which is 1.6-2.5 mm long, a more usual length for a lateral pollen presenter in *Hakea*. As the stigma is not centrally placed on the pollen presenter there are very distinct differences between the pairs of perianth lobes in the length of the limb, the placement of the anthers, and the size of the anthers. Why such a long pollen presenter should have developed in this species is not known at this stage but it may become obvious if comparative pollination studies were to be carried out on this species and *H. erinacea*. The only other species of *Hakea* to have a lateral pollen presenter approaching that of *H. longiflora* in length is *H. platysperma*. In this species the widely spreading perianth lobes and large red gland producing copious nectar differs markedly from *H. erinacea* and *H. longiflora* and *H. platysperma* is probably either bird or mammal pollinated.

H. auriculata Meissn. and *H. spathulata* (Benth.) R.M. Barker

Hakea spathulata (Benth.) R.M. Barker, comb. et stat. nov.

Basionym: *H. auriculata* var. *spathulata* Benth., Fl. Austral. 5: 510 (1870). Syntypes: *J. Drummond I, 615*, 1839, Swan River (B, BM [2 sheets], G-DC, G, K, MEL 672144, NY p.p., TCD); possible syntype: *J. Drummond ?93*, s. dat., Swan River (K, herb. Hooker — not cited in protologue).

Already recognized as a variety of *H. auriculata* by Bentham in 1870, *H. spathulata* is distinct from *H. auriculata* by its spathulate leaves which are usually not auriculate. The leaves of *H. spathulata* tend to all be of the same shape on a bush although frequently it is only the apical leaves which are green, those lower down persisting but becoming brown. In *H. auriculata* leaves at the apex of the branches are much narrower and usually tricuspidate while those below are much broader, with no colour differences. The flowers of *H. auriculata* are greenish-white, cream or pink and frequently found amongst the tricuspidate leaves at the apex of the branch. Those of *H. spathulata* are deep red, possibly with a yellow limb, and are usually to be found amongst the older brown leaves of *H. spathulata*. Furthermore, although it is in need of investigation it is possible that *H. auriculata* is non-lignotuberous as it forms an erect compact bush in contrast to the several-stemmed, lignotuberous *H. spathulata*. Both species occur in the sand heaths between Perth and Geraldton.

NAME CHANGES

H. denticulata R. Br. instead of *H. rubriflora* Lamont

Unfortunately when Lamont (1973) described his new species of *Hakea*, *H. rubriflora*, he was unaware that it was conspecific with the earlier *H. denticulata* R. Br. This species was first described by Robert Brown in 1830 in his supplementary treatment of Proteaceae and the description was based on a William Baxter collection from King Georges Sound. The type material consists of branches which lack any flowers and consists predominantly of leaves which are much larger and more toothed than the normal range for this species. They coincide instead with the juvenile leaves of this species. The presence of a few appressed hairs on the leaves and stem of the type specimen and on another possible isotype is sufficient to indicate that the two are conspecific. No other species of the *H. prostrata* complex, to which these species belong (Barker, Barker & Haegi, in preparation), has appressed hairs, and none of the other species has so many teeth per side of an individual leaf.

H. drupacea (Gaertn. f.) Roemer & Schultes instead of *H. suaveolens* R. Br.

Amongst those collections of horticultural interest in Europe in the earlier part of the nineteenth century were a number of *Hakea* species (Cavanagh 1990, Nelson 1990). Consequently there are a number of obscure names within the genus which can sometimes on further study prove to be earlier than names we usually associate with the species. Such is the case with *H. suaveolens* R. Br.

The name *H. suaveolens* R. Br. is predated by the earlier *Conchium drupaceum* Gaertn. f. When Robert Brown (1810) described *H. suaveolens* he was obviously unaware that is was conspecific with *Conchium drupaceum* of C.F. Gaertner (1807). Roemer and Schultes (1818) made the combination *Hakea drupacea* although they were obviously unaware of the identity of the species as the entry was "?Hakea drupacea". Their publication was a mechanical listing of the species which belonged to *Hakea*, with the assumption that anything described under

Conchium was a *Hakea*. Bentham (1870) appears to have been the first to suggest that *Conchium drupaceum* might be *H. suaveolens*.

Had he not misidentified it as *H. gibbosa*, Labillardiere, the collector of the type specimen of *Conchium drupaceum*, may well have described his collection as a new species, as he did for the rest of his collections of *Hakea*. In describing 3 new species of *Hakea*, Labillardiere (1804) made reference to differences between the new species and *H. gibbosa*, when presumably his comparisons were made with respect to what now has to be known as *H. drupacea*.

H. lasiocarpha R. Br. instead of *H. dolichostyla* Diels

While the name *H. dolichostyla* Diels has erroneously been applied to *H. horrida* on herbarium specimens (see above) in the past, the true *H. dolichostyla* (Diels 1904) is conspecific with *H. lasiocarpha*, described much earlier by Robert Brown (1830). A part of the *H. varia* complex, this species is easily distinguished from the rest of the complex by its much larger flowers, up to 8 mm long, and by its much longer, 23-25 mm long, pistil. In the absence of flowers however, there is no way of distinguishing this species from *H. varia*. The type of *H. lasiocarpha*, collected by William Baxter from 'between the two ranges of mountains inland from King Georges Sound' is almost lacking in flowers but for a few old remnants amongst the leaves. Had these not been present it would have been impossible to apply the name *H. lasiocarpha* to a specific taxon.

Two distinct species, *H. baxteri* R. Br. and *H. brownii* Meissn.

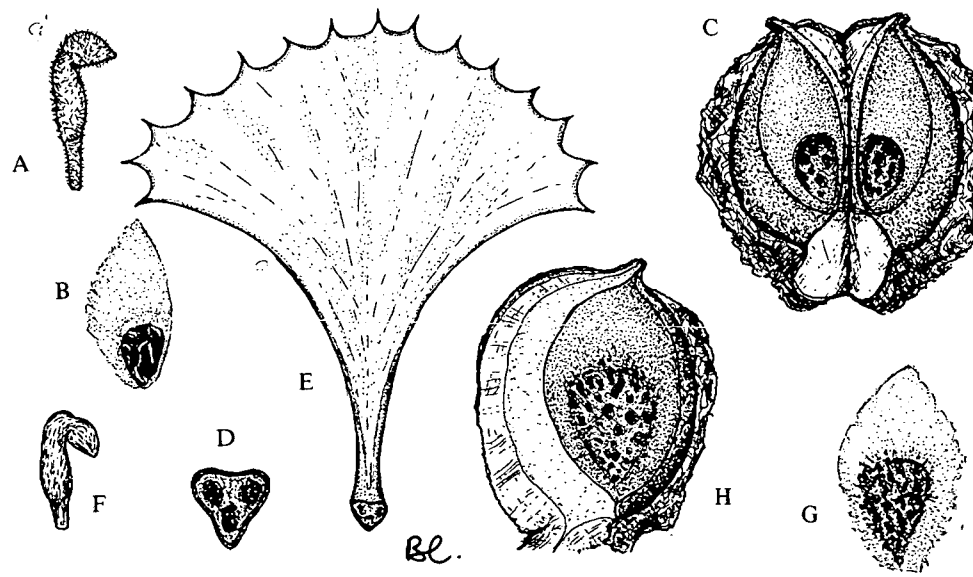

Fig. 4. Comparison of *H. baxteri* R. Br. and *H. brownii* Meissn. A-E, *H. baxteri*. A, bud, ×2 (*George 403*); B, seed, ×0.75; C, fruit, ×0.75; D, leaf scar, ×2.5; E, leaf, ×1; (all *Phillips CBG 016644*). F-H, *H. brownii*. F, bud, ×2; seed, ×0.75; H, fruit, ×0.75; (all *Purdie 5313*).

Two species of south-west Western Australia, both of which are characterised by fan-shaped leaves, and which cannot be distinguished vegetatively except on lignotuber differences, have usually been called *H. baxteri* R. Br. (Bentham 1870, George 1984, Blackall & Grieve 1988). However there are two distinct species which can be separated on floral and fruiting characteristics as well as distribution. A name already exists for the second species, *H. brownii* Meissn. *H. baxteri*, the rarer of the two species, is found in the Stirling Ranges area, while *H. brownii* is found in the sand plains and sand heaths north of Perth. *H. baxteri* has larger, 7-9 mm long vs. 5-7 mm long, flowers in which the ferruginous hairs are woolly tomentose rather than appressed as they are in *H. brownii*. Within the open woody fruits of *H. baxteri* (Fig. 4) there is a band of red-brown porous tissue along the suture; this band is very broad at the base of the fruit but narrows towards the apex. In contrast, the red-brown tissue in the fruits of *H. brownii* is narrower and of a similar width from base to apex. Furthermore, in *H. baxteri* the seed wing extends broadly and fully down one side of the seed-body and narrowly down the other, but it does not completely encircle the seed-body as it does in *H. brownii*.

H. baxteri is non-lignotuberous while *H. brownii* is lignotuberous (George 1984).

H. roei Benth.

The name *H. roei* still persists in the Western Australian literature (Blackall & Grieve 1988) and it has often been misapplied to *H. cygna* ssp. *cygna* (herbarium identifications). There is no doubt that the type is conspecific with *H. pandanicarpa* ssp. *crassifolia*.

Acknowledgements

The major part of this work was carried out at the State Herbarium of South Australia on an ABRS grant, which covered my own employment and also the employment of personnel for the construction of a *Hakea* data base. The data base has proved very useful in preparing this paper. Beth Chandler was also employed as artist on this project and the few illustrations which appear here are taken from the plates she prepared for inclusion in the Flora of Australia. My co-workers, Laurie Haegi and Bill Barker, are thanked for suggesting my participation with them in revising the genus. They initially set up the DELTA files with the help of Tom Stubbs and Alex Gunjko of the Information Systems Branch of the Department of Environment and Planning and my introduction to this mode of carrying out taxonomic revisions has been relatively painless, very rewarding and, in the long run, time saving. My special thanks to Bill for his particular comments on this paper.

References

Bentham, G. (1870). Hakea. In "Flora Australiensis". vol. 5, pp. 489-532. (Reeve & Co.: London).

Blackall, W.E. & Grieve, B.J. (1988)." How to know Western Australian wildflowers". Part I. Restructured and revised second edition by B.J.Grieve. (University of Western Australia Press: Perth).

Brown, R. (1810). On the natural order of plants called Proteaceae. *Trans. Linn. Soc. London* 10: 15-226.

Brown, R. (1830). "Supplementum primum prodromi florae Novae Hollandiae exhibens Proteaceas Novas quas in Australasia legerunt DD. Baxter, Caley, Cunningham, Fraser et Sieber. . .". (R. Taylor: London).

Cavanagh, T. (1990). Australian plants cultivated in England, 1771-1800. *In* Short, P.S. (ed.) "History of systematic botany in Australasia" pp. 273-283. (Australian Systematic Botany Soc. Inc.).

Diels, L. (1904). Hakea. In Diels, L. & Pritzel, E., Fragmenta Phytographiae Australiae occidentalis. *Bot. Jb.* 35: 158-166.

Gaertner, C.F. (1807). "Supplementum carpologicae seu continuati operis Joseph Gaertner de fructibus et seminibus plantarum voluminis tertii". (Leipzig).

George, A. (1984). "Introduction to the Proteaceae of Western Australia". (Kangaroo Press: Kenthurst).

Labillardiere, J. (1804-1807). "Novae Hollandiae plantarum specimen". 2 vols. (Paris).

Lamont, B. (1973). *Hakea rubriflora* (Proteaceae), a new species from Western Australia. *J. Royal Society W. Austral.* 55: 97.

Nelson, E.C. (1990). 'and flowers for our amusement': the early collecting and cultivation of Australian plants in Europe and the problems encountered by today's taxonomists. *In* Short, P.S. (ed.) "History of systematic botany in Australasia" pp. 285-296. (Australian Systematic Botany Soc. Inc.).
Roemer, J.J. & Schultes, J.A. (1818). "Systema vegetabilium". 10th Edn. vol. 3. (Stuttgart).