The *Hakea pedunculata* group of species (Proteaceae) and a new subspecies of *Hakea stenophylla* from Western Australia

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Abstract

R.M. Barker. The *Hakea pedunculata* group of species (Proteaceae) and a new subspecies of *Hakea stenophylla* from Western Australia. Nuytsia 12 (1): 1-8 (1998). The informal "Pedunculata" group of *Hakea* consists of four species from northern Australia, *H. arborescens* R. Br., *H. pedunculata* F. Muell., *H. persiehana* F. Muell. and *H. stenophylla* A. Cunn. ex R. Br. A key to the species is provided together with a discussion of relationships within the group. Each species is typified and a new subspecies, *H. stenophylla* subsp. *notialis* R.M. Barker, is described from Western Australia.

Introduction

In the forthcoming treatment of *Hakea* Schrad. (Proteaceae) for the "Flora of Australia" (R.M. Barker, W.R. Barker & L. Haegi in press), the species are arranged in informal groups since the infrageneric classification is still being tested and modified. This work presents a key to the group of species of *Hakea* known as the "Pedunculata" group, typifies each of the species and describes a new subspecies of *H. stenophylla*.

Hakea pedunculata group

The Pedunculata group of *Hakea* species is distinctive in having an axillary peduncle below the terminal buds or flowers. In all other species of *Hakea* the flower-bearing rachis arises directly from the axil and has flowers along its full length, but in this group of species there is a distinct non-flowering portion which has been designated as the peduncle. The peduncle is initially simple in all species, but may have two or three buds capable of developing further to produce a branched peduncle.

The group is further defined by being small trees or, more rarely, shrubs often with thick corky bark, obscure venation on the simple flat or terete leaves and large, distinctly woody and tardily dehiscent fruits which are retained on the plant on a much thickened rachis. These fruits are neither horned nor beaked, but they are apiculate and usually only one develops from each inflorescence. The only other *Hakea* group to be small trees with thick corky bark and occupying the same area as the *H. pedunculata*

group is the group commonly known as the Corkwoods. These are easily distinguished from the *H. pedunculata* group since they produce multiple fruits from the one inflorescence. These fruits are not noticeably woody and at maturity they open readily and are not retained on the plant.

Three of the species belonging to the Pedunculata group, *H. pedunculata, H. persiehana* and *H. arborescens* occur in northern tropical Australia, with the first two confined to northern Queensland and *H. arborescens* occurring in all three states. *H. stenophylla* is confined to Western Australia in the region between Onslow and the Murchison River.

Within the group there are two species pairs based on the size and the nature of the indumentum of the perianth, pistil length and pollen presenter shape (see Table 1).

H. arborescens and *H. persiehanas* have the same pollen presenter shape of an almost erect cone. They also have tiny flowers in which the perianth claw has white hairs in contrast to the rust-coloured hairs of the limb and both species have very short pistils. Although not indicated in the table, both also have short simple hairs at the base of the style, a characteristic otherwise unknown in *Hakea*. They can be distinguished from each other by the flat leaves of *H. arborescens* compared with the terete leaves of *H. persiehana*, but it is possible that this difference may break down in areas of overlap in the Chillagoe-Mareeba area of Queensland and this needs to be investigated further.

Hakea stenophylla and *H. pedunculata* have much longer pistils than the other pair of species and have the same pollen presenter shape - an oblique disc with a tiny central cone. The hairs on the perianth are usually white throughout, although they are sometimes only very sparse on the claw of *H. pedunculata*. While the perianth length measurement given in the table appears not to support it, the mature flowers are also much larger for *H. stenophylla* and *H. pedunculata* compared with the other two species. To achieve comparable perianth lengths across all of the *Hakea* species for the revision it was decided to measure perianth length at the point when the style was just about to break out from the tepals, but in these (and other) species this has proved not to be a good indication of the final flower size. The length of the pistil is a much better indicator.

Table 1. Comparison of the four species of the *Hakea pedunculata* group

Taxon	Leaves	Pollen presenter	Pistil length (mm)	Perianth length (mm)	Hairs on claw	Hairs on limb
H. stenophylla	flat	oblique disc	7-13	1.6-4	white	white
H. pedunculata	flat	oblique disc	8.5-12	3.5-4	± lacking	white
H. persiehana	terete	conical sub-erect	1.5-2	2-2.5	white	rust
H. arborescens	flat	conical sub-erect	1.5-2.5	2-2.5	white	rust

H. stenophylla and *H. arborescens* have often been confused in the past but they are clearly distinct species since they differ in flower size, branching of the peduncle and pollen presenter morphology. However, unless flowers are present, difficulty can be experienced in distinguishing between them since they do overlap in leaf size and the fruits are not always easily distinguishable. The blackened apex and

slightly smaller size and smoothness of fruits of *H. stenophylla* are not always easily recognized without comparative material. The apex of the fruit in *H. stenophylla* is abruptly acuminate in median view (fruit viewed with suture not visible) while that of *H. arborescens* is usually gradually attenuate, but may occasionally be abruptly acuminate. Peak flowering for *H. arborescens* is from November to March but there are sporadic records up to as late as June, while that for *H. stenophylla* is May to August. There appears to be no overlap in distribution, since *H. arborescens* occurs north of 20° latitude in all three states and *H. stenophylla* well south of 21° latitude in Western Australia.

Key to species of the *Hakea pedunculata* group

1 Flowers white-pubescent on pedicel and claw, ferruginous on limb; pollen presenter a sub-erect cone; pistil 1.5-2.5 mm long

2 Leaves flat, linear to narrowly obovate, 1-9 mm wide; shrub or small tree to 7 m high [tropical NT, Qld, WA; flowers Nov.-Mar. with sporadic occurrences up to June] ..... **1. H. arborescens**

2: Leaves terete, 0.7-1 mm wide; tree to 10 m high [Cape York Peninsula, Atherton region and north; flowers Nov.-Mar. with sporadic occurrences up to June] ..... **2. H. persiehana**

1: Flowers with only white hairs, these sometimes lacking on pedicel and claw; pollen presenter an oblique disc; pistil 7-13 mm long

3 Leaves narrowly to broadly obovate, 8-25 mm wide; peduncle subglabrous, not branched; branchlets glabrous; claw of perianth glabrescent, limb pubescent; fruit 2-3 cm long, 1-1.2 cm wide; seed occupying whole valve [mangrove or swamp areas of Cape York Peninsula, N of Cooktown; flowers Apr.-Aug., rarely as early as Feb.] ..... **3. H. pedunculata**

3: Leaves linear to narrowly obovate, 1-4(15) mm wide; peduncle white-pubescent, often branched; branchlets appressed-pubescent; claw and limb of perianth pubescent; fruit 3-4.5 cm long, 2-2.6 cm wide; seed not occupying whole valve [Onslow to Murchison River, WA; flowers May-Sep.] ..... **4. H. stenophylla**

1. Hakea arborescens R. Br., Trans. Linn. Soc. 10: 187 (1810). *Type citation:* "Carpentaria, in apricis prope littora." *Citation in Brown's unpublished manuscript:* "Island c [Allen Island], Nov. 20-21 1802, R. Brown no. 7", but he also adds "Islands a [Sweer's], b [Bentinck], c [Allen]" at the end of the description.

Lectotype here designated: Carpentaria, South Wellesley Islands, Islands a [Sweers], b [Bentinck] and c [Allen], [Qld], 17-27 Nov. 1802, *R. Brown, P. Good & Allen* no. 7 [*J.J. Bennett* no. 3362], (BM *p.p.*, 2 upper narrow-leaved specimens only) - Robert Brown's annotations on the lectotype specimen: ***Label 1*** (attached to blue J.J. Bennett numbered label bearing number 3362): "35 Hakea arborescens Prodr. 386/No. 7 desc post Carpentaria, Islands a,b,c, Novr 17-27, 1802"; ***Label 2***: "Conchium, island y 1 [Cotton Island], Feby 20th 1803, ad later collium/arbor parv., c[ort]: rimoso, fructu Conchii arborescentes a quo [vix] diversum/ Flores non visi/ H. arborescens var?"; *isolectotypes:* North Coast, *s.dat., R. Brown s.n.* (B ex Herb. K 1882); without locality, *s.dat., R. Brown s.n.* (B, Brown ded. 1816); North Coast [Carpentaria, Wellesley's Islands, Nov. 1802 on typewritten label], *s.dat., R. Brown s.n.* (BM); Islands of S of Carpentaria, 1802-5, *R. Brown* [*J.J. Bennett* no. 3362] *s.n.* (E, presented 1876); North Coast, 1802-5, *R. Brown* [*J.J. Bennett* no. lacking] *s.n.* (E); North Coast, *s.dat., R. Brown s.n.* (K *p.p.* received from J.J. Bennett Aug. 1880); North Coast, *s.dat., R. Brown s.n.* (MEL 108133 *p.p.*, NSW 131414);

Carpentaria, 1802-3, *R. Brown s.n.* (P-herb. Richard); Iter Austr., 1802-5, *R. Brown s.n.* (NSW 179418, NY ex E); *syntypes:* North Coast, *s.dat., R. Brown s.n.* (MEL 108133 *p.p.* excluding RHS specimen); without locality, *s.dat., R. Brown* [*J.J. Bennett* no. 3362] *s.n.* (K *p.p.* presented 1876); [NT]; The English Companys Is, Island y1 [Cotton], 20 Feb. 1803, *R. Brown s.n.* (BM *p.p.*).

Typification. Since the protologue is apparently drawn up from material collected by Brown, Good and Allen from Islands a, b and c between 17 and 27 November, 1802, there are a number of collections involved. There appear to be 3 collections on the lectotype sheet in BM:

Collection 1: The upper 2 branches, which have narrow leaves and flowers predominantly at bud stage. Specimens in B (2 sheets), E (2 sheets), P, the second BM sheet and the top right hand specimen in K and MEL would appear to match this.

Collection 2: The lower 2 branches which have wider leaves; both are at a similar stage of flowering. The majority of specimens (7 branches) on the MEL sheet appear to match this as do possibly the 2 left hand specimens on the sheet in K.

Collection 3: A single fruit to which label 2 apparently applies, collected on 20 Feb. 1803, from island y1. This fruit is not considered to be part of the lectotype since Brown described the fruit in his manuscript based on collections from islands a, b and c, not island y1. The single fruit on the K sheet may be part of the gathering from island y1, but since it is mounted with a narrow-leaved branch it could well represent the only fruit which has survived from the collections from islands a, b and c.

Label 1, indicating that the specimens are from islands a, b and c, would appear to apply to collections 1 & 2 distinguished here. Brown collected on islands a and c but only Good and Allen collected on island b (Vallance 1990). There is no way of distinguishing individual collections or which specimen belongs to which island. The narrow-leaved collection (collection 1) has been designated as lectotype since it is represented in many more herbaria than the wider-leaved collection 2.

Note. Hakea arborescens is possibly not specifically distinct from the next species, *H. persiehana*, since the two appear to differ only in the flat versus terete leaves. Field work in the overlap area is needed to resolve this problem.

2. Hakea persiehana F. Muell., Australasian J. Pharmacy 1 (11): 430 (1886).

Lectotype here designated: Endeavour River, 1883, *W. Persieh s.n.* (MEL 1536632); *probable isolectotypes:* Without locality, *s.dat., Anon.* 1139 (MEL 1536628); Endeavour River, *s.dat., W. Persieh s.n.* (B-herb. *Diels* 7890, ex herb. MEL); *syntypes:* Endeavour River, 1885, *W. Persieh* 573 (MEL 1536631); Endeavour River, 1886, *W. Persieh* 573 (MEL 1536630); *probable syntypes*: Endeavour River, 1886, *W. Persieh s.n.* (MEL 1537930 *p.p.*, not including fruit); Endeavour River, 1886, *W. Persieh* 757/725, (MEL 1536629); Endeavour River, 1886, *W. Persieh s.n.* (BM, K *p.p.*); *isosyntype* (part of the original collection, but not seen by Mueller for drawing up the protologue since it has mature fruits): Endeavour River, 1886, *W. Persieh* 725 (MEL 1537888); *possible isosyntype:* Endeavour River, 1886, *W. Persieh s.n.* (MEL 1537930 *p.p.*, fruit only).

Typification. The lectotype sheet consists of three flowering branches mounted with Mueller's description of the characteristics of the inflorescence, the rachis, petals, stigma and gland. These descriptions closely match those within the protologue. Neither of the probable isolectotypes has been

annotated by Mueller but the material closely matches that found on the lectotype. The sheet, *Anon.* 1139, contains an immature fruit within the envelope and this is presumably that referred to by Mueller in the protologue. The syntype sheets each consist of single flowering branches, apparently collected in 1885 since the date on MEL 1536631 has been changed from 1886 to 1885. The same change does not appear on the other sheet.

The probable syntypes (MEL 1537930 *p.p.* & MEL 1536629) were apparently both received by Mueller before the protologue since specific mention is made of them by Persieh in a letter to Mueller of November 21st, 1886 (mounted on MEL 674673 and translated by Doris Sinkora). Persieh thanked Mueller for his "favour of 3rd and 4th [November] inst." which possibly refers to a copy of the protologue since he thanked Mueller for naming "this pretty Hakea after your humble servant". He further mentioned that he sent "with those specimens branches and fruits No. 725 and 757, each time with a branch and fruit". The probable syntype specimen labelled 757/725 has no fruits present, but has been annotated by Mueller as "Hakea Persiehana" while the other sheet, which bears no number, matches the material on this sheet. *Persieh* 725 (MEL 1537888) can only be treated as isosyntype material since it bears mature fruits; in the protologue Mueller specifically mentioned only having seen immature fruits. The mature fruit in the envelope mounted on MEL 1537930 may have come from the collection *Persieh* 725 and thus be isosyntype material or it may be from the same gathering as that mounted on MEL 674643 which was sent in November or December 1886 and consists of fruits without any leaves. This was received too late to be considered part of the protologue, although the letter attached to it is invaluable in helping to identify type material.

The material in K and BM matches closely that specimen in MEL which has been labelled 757/725 and so almost certainly represents syntype material. The fruit on the K sheet cannot be considered as part of the type material since it is mature and much larger than the immature one cited in the protologue.

3. Hakea pedunculata F. Muell., Australasian Chemist & Druggist 6 (63): 23 (1883). *Lectotype here designated:* Endeavour River, 1883, *W. Persieh s.n.* [1031] (MEL 1537929); *isolectotypes:* K (received 8.1883), BRI 259703; *possible isolectotypes:* BRI 260982, K.

Typification. The lectotype sheet consists of five small branches with flowers or remnants of them and two fruits within a packet. The material in K labelled as a possible isolectotype consists of a small flowering branch which more or less resembles the lectotype collection but it is labelled as being received in December 1886 and is not annotated by Mueller. The BRI sheet labelled as a possible isolectotype matches the type material in that it is flowering and fruiting, but there is no date and no obvious evidence that it was seen by Mueller although some of the annotations on the original label are possibly by him. Another Persieh collection, BRI 358426, is not considered to be part of the type gathering since the branch is much larger and more robust than those of the type and it is not flowering or fruiting; it was not annotated by Mueller.

4. Hakea stenophylla A. Cunn. ex R. Br., Suppl. Prodr. Fl. Nov. Holl. 30 (1830). *Type citation:* "Ora septent. -occid., Bay of Rest, 1818, D. Cunningham".

Lectotype here designated: On red sandy flats in the vicinity of the Bay of Rest in Exmouth Gulf on the North West Coast of Australia/Hakea stenophylla C[unningham]. Bay of Rest, Red sandy flats, Feby 16. 1819 [1818], no. 109, 1st Voyage [all in Brown's hand], [*A. Cunningham*] (BM); *isolectotypes:* Hakea stenophylla Cunn." Br. A small Tree 12-15 ft high/arid sands/Bay of Rest N. W. Coast/ Lat. 22 [degrees] 17 [minutes] S, Long. 114 [degrees] 20 [minutes] E/ Feb. 109/1818/ 108?/1 Voy, *A. Cunningham* (K *p.p.* herb. Cunningham); Bay of Rest, N.W. Coast, *s.dat., Anon. [A. Cunningham] s.n.* (K *p.p.*); Hakea stenophylla Cung. [Cunningham] no. 109, Mermaids 1st Voy!, Bay of Rest (B)

Typification. The lectotype consists of two branches, both with fruit but lacking any flowers as might be expected for February. It bears a label annotated by Brown. Since there is no way of knowing whether Brown saw the other Cunningham material in drawing up the protologue this sheet has been designated lectotype, even though it may well be the holotype.

Notes. A new subspecies of *H. stenophylla* is described below, although it is felt that further research may show this subspecies to be worthy of specific rank. As discussed in more detail in the notes under the two subspecies, it appears that they differ in habit and possibly habitat, (but notes on some specimens do not support this), perhaps also in presence or absence of a lignotuber and possibly in branching of the peduncle (but there is too little flowering material of subsp. *stenophylla* to confirm this). For the moment they can only be definitely distinguished with fruiting material, but even this is not always reliable and hence the subspecies status.

Key to subspecies of *Hakea stenophylla*

1 Spreading shrub, usually less than 2 m tall; fruiting valve with red-brown wood zone 1.5-2.5 mm wide, pale wood zone 3-6 mm wide; seed covering *c.* three quarters valve surface; fruit apex erect, or if recurved, usually recurved away from red-brown layer of valve ..... subsp. ***stenophylla***

1: Erect shrub or small tree to 4 m high; fruiting valve with red-brown wood zone 2.5-4 mm wide, pale wood zone 8-10 mm wide; seed covering *c.* half valve surface; fruit apex erect or, if recurved, usually recurved towards red-brown layer of valve ..... subsp. ***notialis***

4a. Hakea stenophylla A. Cunn. ex R. Br. subsp. **stenophylla**

Low spreading shrub, 0.5-2(5) m high, up to 2 m wide. *Peduncle* branched or not. *Perianth* 2.5-4 mm long. *Fruit* with apex erect or, if recurved, usually recurved away from red-brown wood zone (except for *Phillips* 28) of valve; valve with red-brown wood zone 1.5-2.5 mm wide, pale wood zone 3-6 mm wide, seed covering *c.* three quarters valve face.

Selected specimens examined. WESTERN AUSTRALIA: On the Exmouth-Minilya Highway, *c.* 99.5 km by road N of Minilya road-house, *c.* 15.1 km by road N of turnoff to Coral Bay (near Point Maud), 5 Sep. 1995, *W.R. Barker* 7402 (AD, duplicates to be distributed); 20 miles [32 km] S of Minilya River, North West Coastal Highway, 1 Sep. 1960, *A.S. George* 1460 (PERTH); Cape Range National Park; Oil Well No. 2, at W end of Charles Knife road, *c.* 11 km by road WNW of Exmouth-Carnarvon road, 29 Aug. 1977, *E.N.S. Jackson* 3065 (AD); 15 km E of Onslow, 27 June 1976, *A.A. Mitchell* 76/154 (PERTH); Dorre Island, Shark Bay, 15 July 1959, *R.D. Royce* 5904 (PERTH).

Distribution and ecology. Subsp. *stenophylla* is found in the Cape Range to Minilya River area of Western Australia, and also on Dorre Island in Shark Bay (see notes). It may also occur in the Murchison River area where subsp. *notialis* is more usually found (*q.v.*). It grows in red sand hills or coastal sand dunes, usually with spinifex.

Flowering period. May to September.

Notes. The specimen *Royce* 5904 from Dorre Island is non-flowering but has a fruit which places it with subsp. *stenophylla.* The plant is recorded as a low windswept shrub about 45 cm high and has much

wider (7-15 mm wide) and thicker leaves than are usually encountered within this taxon. These leaf characteristics can presumably be attributed to the windswept habitat

Notes on the collection *Barker* 7402, record the specimens as coming from multi-stemmed shrubs shooting from the base, suggesting that subsp. *stenophylla* is lignotuberous. The erect habit of subsp. *notialis* could indicate that that subspecies is non-lignotuberous, but this should be investigated further.

The habit difference cited in the key seems to apply in the majority of cases but it should be noted that the type specimen has been annotated by Cunningham as coming from a small tree 12-15 feet [3.5-4.5 m] high, and so this character needs to be treated with caution.

4b. Hakea stenophylla subsp. **notialis** R.M. Barker, *subsp. nov.*

Hakea stenophylla "Murchison" (*G. Phillips* 27), manuscript designation used on PERTH collections.

Subspecies nova Hakeae stenophyllae sed differt a subsp. stenophylla valvae fructus zona rubro-brunneo 2.5-4 mm latoa, zona pallido 6-10 mm latoa et semine c. dimidioum valvae faciei tegenti.

Typus: White flowers, insignificant. Large fruits, tree 15 ft, leaves hooked on end. Sandplain yellow. Vegetation 15-20 ft and prolific. Murchison sandplain, 320 mile post, North West Coastal Highway, Western Australia, 20 July 1972, *G. Phillips* 27 (*holo:* PERTH 1983547; *iso:* K, NSW, NT).

Erect *shrub* or small *tree*, 2-4 m high. *Peduncle* always 2-3-branched. *Perianth* 1.6-2.5 (?4) mm long. *Fruit* with apex erect or recurved towards red-brown wood zone (except *Smith* 1682) of the valves; valve with red-brown wood zone 2.5-4 mm wide, pale wood zone 6-10 mm wide, seed covering *c.* half valve face.

Specimens examined. WESTERN AUSTRALIA: Shark Bay, Oct. 1877, *Anon. (Herb. Mueller) s.n.* (MEL 108016); 37 miles [59 km] S of Denham, July 1970, *T.E.H. Aplin* 3356 (AD, PERTH); 35 km NE of Kalbarri, 19 May 1968, *J. Bannister s.n.* (PERTH); between Hamelin and Tamala, 10 Oct. 1973, *J.S. Beard* 6787 (NSW, PERTH); 392 mile peg on North West Coastal Highway, 30 Oct. 1966, *A.C. Burns* 1060 (PERTH); 414 mile post on Great Northern Highway [North West Coastal], 15 May 1968, *H. Demarz* 87 (PERTH); 413.5 miles [*c.* 668 km] along Great Northern Highway [North West Coastal], 7 Aug. 1969, *H. Demarz* 1485 (CANB, PERTH); Murchison River, 6 Jan. 1961, *C.A. Gardner* 12294 (PERTH); 32 miles [51 km] N of Murchison River, North West Coastal Highway, 18 Feb. 1962, *A.S. George* 3240 (PERTH); 135 km N of Northampton on Carnarvon Road, 14 July 1964, *D.W. Goodall* 1196 (PERTH); 20 km W of Hamelin Homestead, *T.J. Hawkeswood* 59 (PERTH); Carnarvon-Geraldton Highway, 8 Aug. 1965, *F. Humphreys s.n.* (PERTH); 410 mile peg, Carnarvon Highway, 19 Dec. 1962, *F. Lullfitz* 1969, (KINGS PARK, PERTH); 34 miles [54 km] S of Wannoo (near 422 mile post), 17 Sep. 1968, *M.E. Phillips s.n.* (CANB, NSW); 85 miles [136 km] N of Murchison River Bridge, Great Northern Highway [North West Coastal], 12 July 1959, *R.D. Royce* 5850 (PERTH); 392 mile peg N of Murchison River, 9 July 1963, *F.G. Smith* 1682 (PERTH); Tamala Station, May 1960, *R.W. Vollprecht s.n.* (PERTH).
Specimen examined with affinities to subsp. notialis (see notes): Murchison Bridge, 380 mile post North West Coastal Highway, *G. Phillips* 28 (CANB, MEL, NT, PERTH).

Distribution and ecology. Subspecies *notialis* is found in the area between Carnarvon and the Murchison River in Western Australia. Some of the earlier-collected specimens record it from the Great Northern Highway but these are actually from what is now known as the North West Coastal Highway. It grows in sandplain or heath.

Flowering period. Flowers May to August.

Etymology. From *notialis,* the Latin equivalent for southern, in reference to the fact that this subspecies occupies the southern portion of the distribution of *H. stenophylla.*

Notes. The collection *Phillips* 28 from the Murchison River area, where subsp. *notialis* is the usual taxon found, has the fruit valve with a red-brown wood layer 2.5-3 mm wide and the apex recurved towards this red-brown layer as in typical subsp. *notialis.* However, the seed occupies more than half of the valve and the white wood layer is less than 6 mm wide, characteristics of subsp. *stenophylla.* Similarly recurvature of the apex in the fruit of *Smith* 1682 which belongs with subsp. *notialis* is away from the red-brown wood zone, which is more characteristic of subsp. *stenophylla.* It may be that the direction of recurvature of the apex is not a reliable character for separating the taxa and the width of the pale wood may be modified with further collections.

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References

Vallance, T.G. (1990). Jupiter Botanicus in the bush: Robert Brown's Australian field-work, 1801-5. Proc. Linn. Soc. NSW 112:49-86.