

ADDITIONS TO THE GENUS *ACROTRICHE* R. BR.
(EPACRIDACEAE)

BETSY R. JACKES* AND JOCELYN M. POWELL

(Accepted 28 3.1979)

ABSTRACT

Jackes, Betsy R. (Department of Botany, James Cook University of North Queensland, Queensland, Australia 4811) and Jocelyn M. Powell (National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, New South Wales, Australia 2000) 1980. Additions to the genus *Acrotriche* R. Br. (Epacridaceae). *Telopea* 1 (6): 421–428.—*Acrotriche plurilocularis* Jackes, sp. nov. from south-west Western Australia is described, and the combination *A. baileyana* (Domin) Powell is effected. Some new locality records are given for *A. aggregata* R. Br., *A. patula* R. Br. and *A. ramiflora* R. Br. as well as a key to all species.

INTRODUCTION

Members of the genus *Acrotriche* R. Br. are low, intricately branched shrubs with rigid, crowded leaves and small flowers. The genus is distinguished from two closely allied genera, *Leucopogon* R. Br. and *Monotoca* R. Br., in having an erect tuft of hairs near the tip of each corolla lobe; in *Leucopogon* the corolla lobes are bearded whilst in *Monotoca* they are naked. The genus ranges in distribution from Queensland through New South Wales and Victoria to Tasmania, South Australia and southern Western Australia, occupying forested and more open habitats along the coast and adjacent ranges. Some species are widespread but most are of more localized occurrence; all appear to be tolerant of poor soils.

Paterson (1960) revised the taxonomy of the group and described and discussed leaf and floral anatomy of the 12 species distinguished (Paterson 1961, 1962). Since then a new species has been found in south-west Western Australia, and recent study of *Monotoca baileyana* Domin, of restricted distribution in Queensland, has indicated that it belongs in *Acrotriche*. The present contribution provides a similar treatment for the 2 species and accommodates them within the key. Some new locality records are given also for *A. aggregata* R. Br., *A. patula* R. Br. and *A. ramiflora* R. Br.

* Department of Botany, James Cook University of North Queensland, Australia 4811.

KEY TO THE SPECIES

- A. Flowers in clusters or in dense spikes, less than 8 mm long.
- B. Leaves pungent-pointed.
- C. Leaves flat, margins not recurved.
- D. Leaves with microscopic hairs on lower surface; ovary usually 6–10-celled
..... *A. aggregata* (Q., N.S.W.)
- DD. Leaves with undersurface smooth or with very small protuberances; ovary
4–5-celled *A. divaricata* (N.S.W.)
- CC. Leaves shallowly or deeply grooved between the veins and/or margins recurved.
- E. Shrubs usually less than 15 cm in height, with adventitious roots
..... *A. prostrata* (Vic.)
- EE. Shrubs usually more than 15 cm in height, without adventitious roots.
- F. Leaf margins recurved.
- G. Leaves lanceolate, 5–12 × 2–5 mm. Flowers in globular
clusters on the stem at ground level.... *A. halmaturina* (S.A.)
- GG. Leaves linear-lanceolate, 7.5–11 × 1–1.5 mm. Flowers
in spikes on old wood *A. rigida* (N.S.W.)
- FF. Leaf margins not recurved.
- H. Leaves ovate to ovate-lanceolate, 2.3–5 mm wide
..... *A. patula* (S.A., W.A.)
- HH. Leaves lanceolate to linear-lanceolate, 0.6–2 mm wide.
- J. Leaves thick, rigid, lanceolate, with deep grooves
between the veins..... *A. affinis* (Vic., S.A.)
- JJ. Leaves thinner, not rigid, linear-lanceolate, with
shallow grooves between the veins
..... *A. serrulata* (N.S.W., Vic., S.A., Tas.)
- BB. Leaves with a blunt callous point, not pungent.
- K. Leaves 18–30 × 6–11 mm, undersurface glaucous..... *A. baileyana* (Qld.)
- KK. Leaves 5–12 × 2–5 mm, undersurface green.
- L. Ovary 4–5-celled, smooth. Fruit 2–3 mm diameter, somewhat fleshy
..... *A. cordata* (Vic., S.A., W.A.)
- LL. Ovary 8–10-celled, shallowly ribbed. Fruit 4–5 mm diameter, dry...
..... *A. plurilocularis* (W.A.)
- AA. Flowers in open spikes, 8–17 mm long.
- M. Leaves 2.5–3 mm long..... *A. depressa* (Vic., S.A., W.A.)
- MM. Leaves 6–11 mm long.
- N. Flower spikes scattered along old wood, 8–10 mm long, with 6–10 flowers
each. Leaves 1–2 mm broad, scabrous above with microscopic hairs
between the veins below..... *A. ramiflora* (W.A.)
- NN. Flower spikes densely crowded near the base of the stem, 10–17 mm long,
with 8–16 flowers each. Leaves 2–4 mm broad, with long hairs on both
sides, with some microscopic hairs between the lower veins.....
..... *A. fasciculiflora* (S.A.)

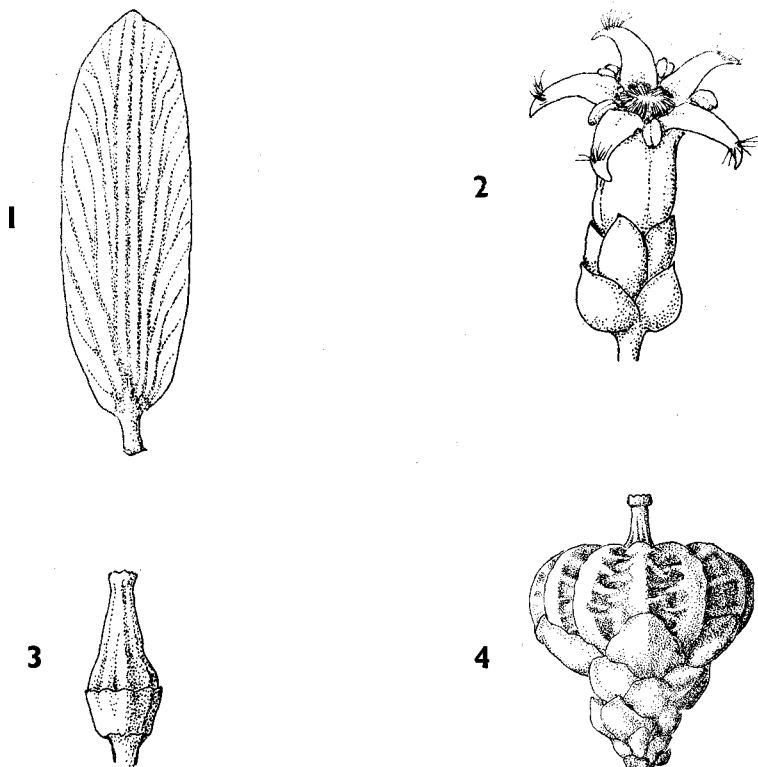
***Acrotriche plurilocularis* Jackes, sp. nov.**

Frutex rigidus, ramosus, cortex atrogriseus ad ater. Folia oblongo-lanceolata, 8–12 mm longa, 2–3 mm lata, apice obtuso et calloso, praeter capillos minutissimos intervenios in pagina abaxiali glabra. Ovarium 8–10-loculatum, leviter costatum. Fructus viridis, glaber, costatus, depresso globularis, 4–5 mm diametro, 2–3 mm altus, pressione in 8–10 nuculas separabilis.

HOLOTYPE: WESTERN AUSTRALIA: Pallinup River, 4 km from the coast, rocky loam, 18–36 ins, *K. Newbey* 2998, 23.xi.1969 (PERTH). ISOTYPES: AD, BRI, CANB, CHR, K, L, MEL, NSW.

A rigid, much-branched shrub, forming clumps c. 0.7 m high, c. 1 m in diameter; in areas not subject to fire may be 1 m high and have a diameter up to 2.5 m. *Bark* dirty-grey to black. *Leaves* oblong-lanceolate, shortly petiolate, flat, 8–12 mm long, 2–3 mm wide; apex obtuse with a small callous point, glabrous except for microscopic hairs between the veins on the abaxial surface. *Inflorescence*: flowers green, usually

2-4 in axillary clusters. *Bracteoles* glabrous, keeled, 1.5 mm long. *Sepals* glabrous, lanceolate, obtuse, 2.0-2.5 mm long, 1.5 mm broad. *Corolla* green, tube 3 mm long, lobes 2 mm long; numerous hairs at throat arising from a cushion. *Stamens*: anthers dark pink, oblong, 0.7 mm long. *Ovary* glabrous, 1 mm long, 1 mm diameter, 8-10-celled, with shallow ribs; proximal half covered by a lobed nectary c. 0.5 mm high. *Style* ribbed at base, 1 mm long; stigma 4-5-lobed. *Fruit* green, glabrous, depressed-globose, strongly ribbed, 4-5 mm diameter, 2-3 mm high; splits under applied pressure into 4-5 double nutlets or 8-10 single nutlets (Figures 1-4).



Acrotriche plurilocularis

1. Leaf, abaxial surface, $\times 6$. 2. Flower, $\times 6$. 3. Pistil, $\times 6$. 4. Fruit, $\times 6$.

DISTRIBUTION: South-west Western Australia from Cape Riche eastwards to Hopetoun, mainly confined to lateritic breakaways under *Eucalyptus astringens*, where it varies from a rare to a dominant shrub.

SPECIMENS EXAMINED: 25 km west of Bremer Bay, loam, 2 ft, *K. Newbey* 2878, 14.ix.1969 (AD, BRI, CANB, CBG, CHR, K, L, MEL, NSW, PERTH, RSA); 2 km south of Kundip, breakaway loam, 2 ft, *K. Newbey* 2923, 11.x.1969 (AD, CANB, NSW, PERTH).

ANATOMY

For studying leaf and ovary anatomy, herbarium material was reconstituted and then dehydrated in an ascending ethanol system and embedded in paraplast wax. Sections were cut on a rotary microtome at 12 μm , then stained in a combination of safranin and light green in ethanol. All drawings were made using a camera lucida.

A. Leaf (Fig. 5).

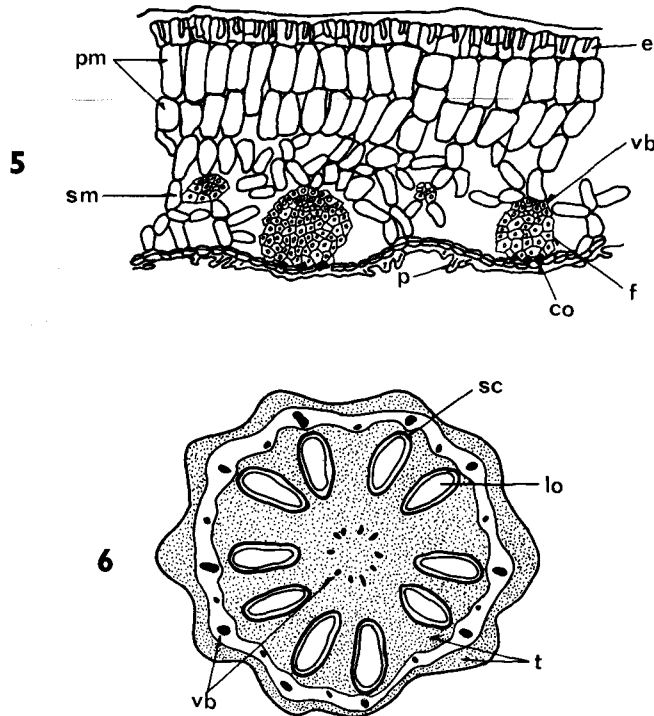
The leaves of this species are similar to those of the narrow-leaved form of *A. cordata* (cf. Paterson 1961, p. 204). The average thickness of the leaf varies from 0.275–0.31 mm with the adaxial cuticle (c. 0.0086 mm) approximately twice the thickness of the abaxial cuticle. The adaxial epidermal cells are large, usually c. 0.043 mm long and are heavily thickened except for the outer tangential walls. The abaxial epidermal cells are much smaller (c. 0.013 mm long) and thickened mainly on the inner tangential walls. Papillae similar to those occurring in *A. depressa* are found in the shallow grooves between the major veins.

Two to three rows of palisade mesophyll are associated with some spongy mesophyll. Fibres form a crescent-shaped group below the vascular bundles. Calcium oxalate crystals are found adjacent to the abaxial epidermis below the main veins.

B. Ovary (Fig. 6).

The structure of the ovary is similar to that of *A. fasciculiflora* with respect to the thick-walled cells adjacent to the locular epidermis. These cells become sclerotic in the mature fruit (cf. Paterson 1962, p. 63).

The vascular bundles of the ovary wall are located within a cylinder of elongated thin-walled cells. The remaining ground tissue consists of tannin-filled parenchyma. Numerous calcium oxalate crystals are present in the style.



Acrotiche plurilocularis

5. T.S. Leaf, $\times 115$: co = calcium oxalate crystals, e = epidermal cells, f = fibres, p = papillae, pm = palisade mesophyll, sm = spongy mesophyll, vb = vascular bundle. 6. T.S. Ovary, $\times 30$: lo = locule, sc = sclerotic cells, t = tannin-filled parenchyma, vb = vascular bundle.

DISTINGUISHING FEATURES

Vegetative specimens of this species closely resemble the narrow-leaved form of *Acrotriche cordata* with which it occasionally occurs. It can be distinguished from the latter, however, in several features: the leaves tend to be thinner and the veins less prominent, there are numerous small papillae between the veins, and calcium oxalate crystals may be detected externally adjacent to the lower epidermis below the main veins, unlike those in *A. cordata* (Paterson 1960, 1961). Newbey records that "the habit is different in that this species is single stemmed and *A. cordata* is many stemmed as a result of its ability to sucker freely around the base after a fire", also "the branches of *A. cordata* are thinner and covered by smooth light grey bark." He notes that, when in flower, *A. plurilocularis* can be detected some distance away because of a "strong, sweet, almost sickly" smell.

The fruit of this species is distinctive in being dry, strongly ribbed and splitting into 4-5 paired nutlets or 8-10 single nutlets when pressure is applied.

***Acrotriche baileyana* (Domin) Powell, comb. nov.**

BASIONYM: *Monotoca baileyana* Domin, Repert. Spec. Nov. Regni Veg. 12: 98 (1913).

HOLOTYPE: North-eastern Queensland: Mount Bartle Frere, *F. M. Bailey* (K). ISOTYPE: BRI.

Erect, much-branched shrub, c. 0.5-4.0 m high, young branches pubescent, older branches hairless with very dark brown-grey bark, often covered with fine mosses or liverworts. *Leaves* crowded, spreading, shortly petiolate, elliptical, flat, 18-31 mm long, 6-11 mm wide, with mucronate tip; margins smooth; both surfaces glabrous, upper surface dark green, lower surface strikingly glaucous; venation inconspicuous on upper surface, many fine veins obvious on lower surface; petioles 1.5-2.0 mm long; leaf scars prominent. *Inflorescence*: flowers small, greenish white, 5-9 in axillary-positioned spikes on old wood mainly below the leaves; each flower sessile within a short subtending bract and two bracteoles. *Bracteoles* strongly keeled, 1.4 mm long, 1.5 mm across, minutely scabrous along mid-line of outer surface, otherwise glabrous. *Sepals* glabrous, broadly ovate, 1.6-1.7 mm long, 1.5 mm wide, persistent. *Corolla-tube* 1.6-1.8 mm long, lobes acute, 1.4-1.5 mm long, 0.7 mm wide towards the base, with a tuft of hairs on the inside near the tip; some fine hairs at throat. *Stamens* filaments 0.6 mm long, anthers 0.6 mm long, 0.35 mm wide. *Ovary* glabrous, subconical, 0.7 mm long, 0.9 mm across, tapering to style, 5-7-celled; nectary slightly lobed, 0.4 mm high. *Style* 1.0 mm long, 0.45 mm wide; stigma inconspicuous. *Fruit* deep scarlet, glabrous, depressed-globose, 6-7 mm diameter, with a somewhat fleshy mesocarp.

DISTRIBUTION: Known from the Russell River, Mt Bartle Frere and from Walshs Pyramid, Queensland.

SPECIMENS EXAMINED: QUEENSLAND: **Cook District**: Mt Bartle Frere, *F. M. Bailey*, *Meston's B. K. Expedition 1889*, (BRI 222381)—ISOTYPE (yng fl., fr.); Mt Bartle Frere, *S. Johnson*, 1891 (MEL 1509858); *S. Johnson* 1892 (MEL 1509859); Mt Bartle Frere, North Peak, near summit, S. slope, in low dense scrub, 5 000 ft [1 520 m], intricate shrub of 6-8 ft [2.0-2.5 m], leaves green above, whitish beneath, fruit bright red, sour, *S.T. Blake 15235*, 31.viii.1943 (BRI 224969, pollen voucher *J.M.P. 1278*, fl., fr.); Mt Bartle Frere, in low scrub, 4 500-5 000 ft [1 370-1 520 m], *J. Martin & B. Hyland 1887* (BRI 029248, fr.); summit area of Mt Bartle Frere, 17° 24' S, 145° 48' E., occasional shrub 70-80 cm high amongst granite boulders on ridgetop, leaves strikingly glaucous below, flower buds greenish white, *J. M. Powell 829*, *J. Armstrong & B. Gray* 17.ix.1977 (NSW, pollen voucher *J.M.P. 1277*, voucher for chemical analyses, BRI, HO, K, L; yng. fl.); *J. M. Powell 831*, *J. Armstrong & B. Gray* 17.ix.1977 (NSW, BRI, CANB, K, L; fl., fr.); *J. M. Powell 832*, *J. Armstrong & B. Gray* 17.ix.1977 (NSW, BRI, K, L, MEL; fl.); Russell River, *S. Johnson* 1892 (MEL 1509857); Walshs Pyramid, *D. Vallance* 6.viii.1935 (BRI 226318; yng fl.).

ANATOMY

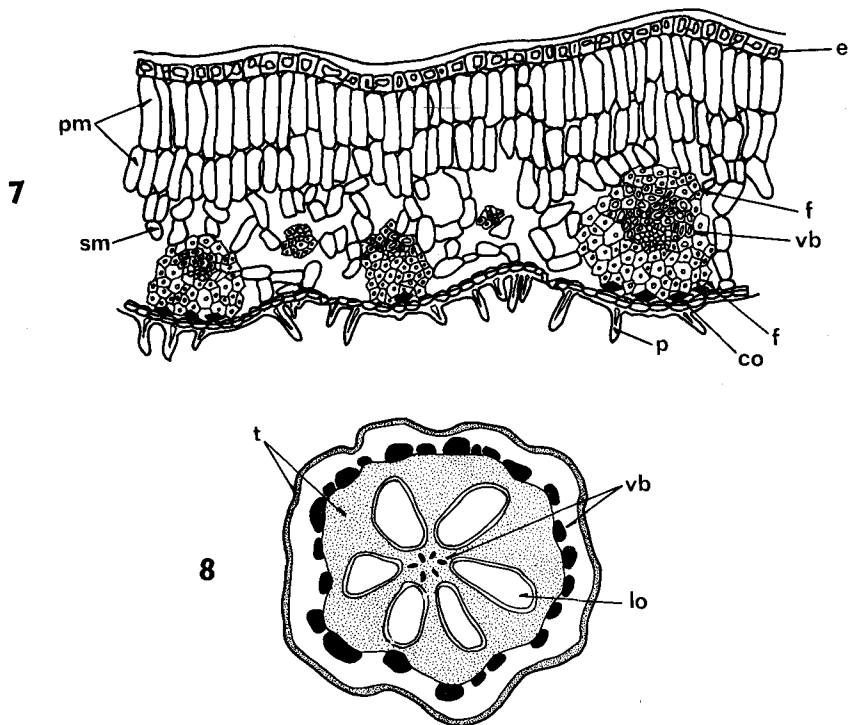
A. Leaf (Fig. 7).

The leaves of this species are similar to those of *A. aggregata* (cf. Paterson 1961, p. 201) but they are usually broader and somewhat thicker. A transection of a mature leaf shows an average thickness of 0.25–0.34 mm; the upper cuticle is approximately twice the thickness of the lower cuticle. The papillae which cover the abaxial surface, resulting in its glaucous appearance, are up to 0.064 mm long. The adaxial epidermal cells are relatively large (c. 0.016 mm long) and are uniformly thickened on all four walls; the abaxial epidermal cells are smaller and thickened mainly on the inner tangential walls.

As in *A. aggregata*, the xylem and phloem elements of the vascular bundles are well defined, and fibres may completely surround a major vein. Two rows of palisade tissue were present in all leaves examined; fat globules were present in some of these cells. Calcium oxalate crystals were present only below the veins.

B. Ovary (Fig. 8).

The small squarish cells of the epidermis are tannin-filled. Beneath are 4–5 rows of parenchyma in which the vascular bundles are situated. Numerous large parenchymatous cells together with some small tannin-filled cells occupy the area between the locules and between the ventral vascular bundles in the central column. The locular epidermis is composed of small tannin-filled rectangular cells.

*Acrotriche baileyana*

7. T.S. Leaf, $\times 115$: co = calcium oxalate crystals, e = epidermal cells, f = fibres, p = papillae, pm = palisade mesophyll, sm = spongy mesophyll, vb = vascular bundle. 8. T.S. Ovary, $\times 50$: lo = locule, t = tannin-filled parenchyma, vb = vascular bundle.

NEW LOCALITY RECORDS

1. *Acrotriche aggregata* R. Br.

From recent collections the known range of this species is now extended to include the Cairns hinterland, Hinchinbrook Island, and Paluma Range, Isla Gorge, Blackdown Tableland and Glasshouse Mountains, in all of which it is quite common on the rainforest margins. Formerly known in Queensland only from the Wallangarra area, and in New South Wales from rainforest and wet sclerophyll areas of the Northern Tablelands (Paterson 1960, p. 79).

SPECIMENS EXAMINED: QUEENSLAND: de Witts Lookout, Mt Spec, rocky area associated with *Casuarina* and *Banksia*, *W. R. Birch* 1.vii.1974 (JCT S.5690); Isla Gorge, 25° 09' S, 149° 57' E, dissected sandstone plateau, in moist gully, *S. L. Everist* 8063, 28.ix.1968; Mt Spec near Paluma Dam in ecotonal area, *B. Jackes* 26.x.1963 (JCT S.4319); Delinge's Inlet, Left Arm, Hinchinbrook I., *R. A. Jackes* 2.viii.1964 (JCT S.6414); Wallum trig track, Atherton Tablelands, 17° 16' S, 145° 23' E, *J. M. Powell* 679 & *J. Armstrong* 9.ix.1977 (NSW, BRI, K, L); Rainbow Falls, Blackdown Tableland, 23° 51' S, 149° 05' E, margin of creek, sandstone rock platforms, *J. M. Powell* 894 & *J. Armstrong* 21.ix.1977 (NSW, voucher for chemical analyses, BRI, CANB, K, L, MO, RSA); Ngungun, Glasshouse Mountains, *H. U. Stauffer* & *S. T. Blake* 5519, 7.i.1964.

2. *Acrotriche patula* R. Br.

A variant of this South Australian species has been found in southern Western Australia. The Western Australian plant has larger flowers which are darker green than in previously reported collections from South Australia (Paterson 1960).

SPECIMENS EXAMINED: WESTERN AUSTRALIA: 1 km S of Hatters Hill, rocky loam, 2–2 ft 6" [0.6–0.75 m] high, *K. Newbey* 3300, 4.ix.1970 (CANB, NSW, PERTH).

3. *Acrotriche ramiflora* R. Br.

This species, known previously only from Ellens Peak, Stirling Range (Paterson 1960), has been collected at Ongerup in southern Western Australia.

SPECIMENS EXAMINED: WESTERN AUSTRALIA: Ongerup, usually found on clay or clay-loam soils, associated with breakaway country, 1–2 ft [0.3–0.6 m] high and up to 3 ft [1 m] across, *K. Newbey* 22.viii.1969 (NSW 141323).

ACKNOWLEDGEMENTS

We wish to thank Mr Leigh Winsor, Histologist, James Cook University, for preparation of the material for anatomical study, Mr D. S. Gallagher, English Department, James Cook University, for assistance with the Latin diagnosis and Ms M. Perkins for drawing some of the figures.

REFERENCES

- Bailey, F. M., (1899)—Botany of the Bellenden-Ker Expedition. In Report of the Government Scientific Expedition to Bellenden-Ker Range, pp. 29–80. Government Printer: Brisbane.
- Domin, K., (1913)—Sixth contribution to the Flora of Australia. Report. Spec. Nov. Regni Veg. 12: 95–99.
- Meston, A., (1889)—Bellenden-Ker Range (Wooroonooran), North Queensland. In Report of the Government Scientific Expedition to Bellenden-Ker Range, pp. 3–28. Government Printer: Brisbane.
- Paterson, Betsy R., (1960)—Revision of the genus *Acrotriche* R. Br. (Epacridaceae). Proc. Linn. Soc. New South Wales 85: 75–93.
- Paterson, Betsy R., (1961)—Systematic studies of the anatomy of the genus *Acrotriche* R. Br. I. The leaf. Austral. J. Bot. 9: 197–208.
- Paterson, Betsy R., (1962)—Systematic studies of the anatomy of the genus *Acrotriche* R. Br. II. The flower. Austral. J. Bot. 10: 55–64.