A SECOND SPECIES OF *RHODODENDRON* (ERICACEAE) FROM AUSTRALIA

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Recent study of floral diversity within Australian *Rhododendron* (Ericaceae) has resulted in the recognition of two species, *R. lochiae* F. Muell. and *R. notiale* Craven, *sp. nov.* Both species are described and illustrated, and their distributions mapped. An identification key is provided.

Keywords. Rhododendron lochiae, *Rhododendron notiale*, section *Vireya*.

INTRODUCTION

The sole Australian species of *Rhododendron* described to date, *R. lochiae* F. Muell., is well known in horticulture, especially in Australia. The species occurs in montane regions northwest and south of Cairns, north Queensland, and belongs in the largely Malesian *R.* sect. *Vireya* ser. *Javanica* Sleum. (Sleumer, 1960). The first published record of *R. lochiae* being in cultivation is at Kew, England (Hutchinson, 1939); the plant(s) were apparently grown from seed sent to Kew in 1936 by H. Solomon of Sydney, New South Wales. An early herbarium specimen derived from cultivated material (Essendon [Melbourne], 23 xii 1943, *Hodgins* s.n. (MEL)) indicates that *R. lochiae* was being grown in Melbourne, Victoria at about the same time (R. Hodgins, pers. comm. to the second author). Until recently, the species has been represented in Australian gardens by a single form, apparently first distributed generally by B. Hodgins, a Melbourne nurseryman, in the 1940s (hereinafter referred to as the 'Hodgins form'). This form, despite the popular belief that it came from Mt Bartle Frere, Bellenden Ker Range, must be regarded as being of unknown provenance; morphologically it does not agree with material collected from the Bellenden Ker Range but does agree with material collected in upland regions to the northwest of Cairns. The Hodgins form has been hybridized often with other species of sect. *Vireya*, as it gives a remarkably vigorous F1 generation albeit usually with a strong reddish pink corolla colour.

In recent decades there has been increasing interest among horticulturists in obtaining additional genotypes of the species, especially to extend the gene pool used in breeding programmes. Accessions presently in cultivation in Australia have come from the following localities: Devils Thumb, Mt Finnigan, Mt Lewis, Mt Spurgeon, Thornton Peak, and Windsor Tableland. The Hodgins form despite its unknown provenance should also be included here. All of the Vireya hybrids with *R. lochiae*

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in their parentage that have been registered to date with the *Rhododendron* cultivar registration authority, the Royal Horticultural Society, Wisley, involve the Hodgins form.

In 1992, the second author drew the attention of the first to a form of *R. lochiae* which has curved corollas. The plants of this form in cultivation apparently derive from the wholesale nursery operated by R. Elliot, then at Montrose, Melbourne, Victoria, who had been given by D. L. Jones propagating material that Jones had collected on Mt Bartle Frere in 1975.

Subsequently, studies of living and herbarium material by the first author have resulted in the conclusion that there are two species of *Rhododendron* in north Queensland, one with a straight corolla tube and anthers dispersed around the throat (*R. lochiae*) and another with a curved corolla tube and anthers clustered at the top of the throat (*R. notiale* sp. nov., described below). Sleumer (1960) included both corolla forms within the single species, *R. lochiae*. Of the specimens he cited under *R. lochiae* (as *R. lochae*) and also studied by LAC, *Sayer* s.n. [135], *Johnson* s.n. and *Kajewski* 1278 are referred below to *R. notiale*, whereas *Merrotsy* s.n., *McLean* s.n. and *Brass* 2284 are referred to *R. lochiae*.

DIFFERENCES BETWEEN *R. LOCHIAE* AND *R. NOTIALE*

The major differences between the two species are given in Table 1, the most obvious perhaps being the curved vs. straight corolla tube and the clustered vs. dispersed anthers.

The two Australian species are less distinct vegetatively. It would seem that they are very closely related and are presumably the contemporary product of speciation processes in effect since the dispersal of the lineage, undoubtedly from New Guinea, to north Queensland. The two species apparently have generally similar ecology, occurring in the summit regions of peaks and tablelands of wet tropical north Queensland. Both grow terrestrially or as lithophytes, with *R. lochiae* also having been recorded as an epiphyte. The altitudinal ranges recorded by collectors are 910–1330m for *R. lochiae* and 1200–1520m for *R. notiale*. The species do not occur sympatrically. The distance between the most southerly population of *R. lochiae* and the most northerly population of *R. notiale* is about 75km, and the intervening region, with the exception of a few isolated higher points, has a lower elevation (about 600m or less) than that at which either species has so far been collected.

A comparison of the collection dates of wild-collected specimens does not indicate that there is a difference in the flowering times of the two species. *Rhododendron lochiae* has been collected in flower in each month from August to March inclusive, while flowering material of *R. notiale* has been collected in October, November and January. Collectors unfortunately do not indicate whether their specimens were typical of the phenological condition of the population overall at the time of collection, and seasonal variation from year to year will also affect local flowering times. Consequently, it is not possible to conclude from herbarium material whether or not

TABLE 1. Comparison of main morphological differences between *Rhododendron lochiae* and *R. notiale*.

	Ultimate apex of leaf	Pedicel	Corolla	Corolla limb	Corolla tube	Filaments	Anther position	Anther colour	Ovary	Style	Style position
lochiae	entire	subpendulous at anthesis, erect to suberect in fruit	straight	± at right angle to tube	pubescent on inner surface	pubescent	dispersed around throat (sparse or absent in upper part)	very dark red	densely pubescent	stellate-lepidote in proximal ⅔–¾	in lower part of tube
notiale	often retuse, sometimes entire	subpendulous to erect in flower, erect in fruit	curved	at oblique angle to tube	glabrous on inner surface	glabrous	clustered in upper part of throat	yellowish	sometimes pubescent	stellate-lepidote in proximal ⅓–½	in upper part of tube

flowering in the two species would overlap should they co-occur in nature. Data from observation of plants in horticulture, however, suggest that in fact the two species are isolated reproductively by differences in flowering time. Both species have been cultivated by R. Elliot at Montrose, Melbourne, for 20 years. In this garden *R. notiale* flowers from late December until the end of February and *R. lochiae* from March until May (R. Elliot, pers. comm.).

The differences in gross floral morphology between *R. lochiae* and *R. notiale* are presumably an indication that the two species could have different pollinators. Stevens (1976) assigned 147 species of sect. *Vireya* to floral groups utilizing criteria such as corolla colour, corolla shape, corolla size, anther position, style position, and scent. The red, straight-tubed corollas of *R. lochiae* with the anthers ± in a circle around the throat have features of Stevens' groups 1C and 1D and this species is probably bird-pollinated. However, the lax pedicels position the flowers among the leaves and it might be difficult for perching birds to access the flowers for nectar. *Rhododendron notiale* has red, curved-tubed corollas with the anthers clustered in the upper part of the throat; this corresponds to Stevens' group 1A and the species almost certainly is bird-pollinated. The often more erect pedicels present the flowers such that they would be reasonably accessed by birds. Although the two species do not occur in biotic sympatry, the differences between them in stamen and stigma position promote their reproductive isolation. Nectar-feeding birds visiting flowers of *R. notiale* will receive pollen from the anthers on their forehead and crown and transfer it to the receptive stigma of another flower, the stigma in this species being positioned in the upper part of the corolla throat as are the anthers. In the case of *R. lochiae*, birds will receive pollen mainly on their throat and transfer it to the stigma which is positioned in the lower part of the corolla throat. Should the two species co-occur, it is possible that pollen from those few anthers that rarely occur in the upper part of the throat of *R. lochiae* could be transferred by birds to *R. notiale* flowers but this would be dependent upon both species being in flower and, given the observations on flowering time discussed above, it is not certain that synchronous flowering would occur.

The investigations into the reproductive biology of *Rhododendron* sect. *Vireya* that have been conducted by R. B. Knox, E. G. Williams and J. L. Rouse have demonstrated that the barriers to hybridization between species of the section generally do not involve zygotic or postzygotic mechanisms (Williams & Rouse, 1988, 1990; Rouse et al., 1993). In this group of plants the major factors involved in the maintenance of species integrity apparently relate to adaptation for pollinator specialization through variation in gross floral morphology (corolla colour, size and shape; style length; relative positions of anthers and stigma, etc.), and pollen tube behaviour.

RELATED SPECIES

The most closely related extra-Australian species is *R. comparabile* Sleum. (*fide* Sleumer (1960, 1966)); material of this species, which occurs on Sudest Island in the

southeast Papuan islands, has not been seen. Further investigation of the wider relationships of the two Australian plants is beyond the scope of this study. It is considered that phylogenetic analysis based upon a dataset drawn from morphological data only would be inadequate to reflect the true relationships of the Papuasian-Australian species, and the opportunities afforded by molecular systematics for generating phylogenetic hypotheses based upon different character sets should be taken up in an effort to elucidate the relationships of these morphologically very diverse, but genetically undoubtedly closely related, species.

NOMENCLATURE

One nomenclatural difficulty exists. *Rhododendron lochiae* is holotypified by a collection from Mt Bellenden Ker: *Sayer* 135 [cited in the protologue as *Sayer & Davidson*, without number] (MEL). This material represents the species described below as *R. notiale*. Under the International Code of Botanical Nomenclature (ICBN), as its general provisions require, the Bellenden Ker Range plant should be called *R. lochiae*. This would mean that the taxon known as *R. lochiae* to horticulturists throughout the world, and the best-known genotype of the two currently called *R. lochiae* by botanists, requires a new name. To implement this course of action would result in needless disruption and confusion, contrary to the objective of the ICBN to promote stability in plant nomenclature. A proposal for the conservation of *R. lochiae* with a different type is being made in *Taxon* (Craven, 1996) so as to preserve current majority usage of the name.

Rhododendron lochiae F. Muell., Victorian Nat. 3: 157 (1887 as '*R. Lochae*'), nom. cons. prop. *Azalea lochae* (F. Muell.) Kuntze, Rev. Gen. Pl. 387 (1891). **Fig. 1.**
Type (*cons. prop.*): Australia, Australian Capital Territory, cultivated in the Australian National Botanic Gardens at Canberra, 22 ii 1994, *Craven* 9354 (holo. CANB; iso. A, B, BRI, E, L, MEL, QRS). (Provenance: Queensland, Mount Windsor Tableland, 27 v 1989, *Jones & Clements* 4420 (CBG)).

Terrestrial, lithophytic or epiphytic shrub to 3m tall (once recorded as scandent). *Branchlets* 2–4mm in diameter, terete to subterete, moderately to laxly stellate-lepidote, sometimes glabrescent; internodes 1–10(–19)cm long. *Leaves* in 2–6-merous pseudowhorls at the distal 1–3 nodes; lamina elliptic to broadly elliptic to obovate, coriaceous (sometimes thinly so), moderately and persistently stellate-lepidote abaxially and glabrescent adaxially (the scales minute, sessile, the marginal zone irregularly lobed or dented or subentire to entire, the centre ± flat to prominulous), the apex acuminate (often bluntly so) to obtuse, the ultimate apex entire, the base obtuse to attenuate, the margin revolute (sometimes slightly so), 2.5–11 × 1–7cm, the midrib prominent abaxially and impressed adaxially, the primary veins 4–7 on each side of the midrib and prominent to prominulous abaxially and impressed to prominulous adaxially, the lower order venation obscure; petiole 0.5–2cm long. *Umbel* 2–7-flowered. *Pedicel* subpendulous in flower and erect to suberect in fruit,

FIG. 1. *Rhododendron lochiae* F. Muell., ×0.8. Drawn from living material of the Mt Finnigan provenance by K. R. Thiele.

moderately stellate-lepidote (subdensely so distally) and usually pubescent (rarely these hairs wanting), 1.8–3.5cm long. *Calyx* wanting or rarely up to 5mm long and 5-lobed. *Corolla* straight funnel-shaped, with the limb ± at a right angle to the tube, red to reddish pink, 3.5–5cm long in all, moderately stellate-lepidote and sparsely pubescent outside, pubescent on the tube inside; tube 6–10mm wide proximally and widening to 12–20mm at the throat; lobes suberect to spreading and very broadly obovate to subcircular, emarginate, 12–20mm long. *Stamens* 10, alternately long and short, not or only slightly exserted, presenting the anthers around the throat (±in a circle, absent or rarely present in the upper part of the throat); filaments pubescent, the longer 23–30mm long, the shorter 21–28mm long; anthers very dark red, suboblong, 3mm long. Disk scarcely or slightly prominent, pubescent. *Ovary* subcylindric to subellipsoid and tapering to the style, 3–6mm long, densely stellate-lepidote and densely pubescent; style stellate-lepidote and pubescent in the proximal

c.⅔ to ¾, produced to or slightly past the level of the anthers and positioned in the lower (abaxial) part of the tube, at maturity 14–23mm long; stigma capitate. *Capsule* subcylindric to narrowly ellipsoid, 1.5–3cm long. *Seeds* narrow, 3–4mm long, tailed at each end.

Additional specimens examined. QUEENSLAND. Mt Finnigan [all from summit region], 21 ix 1948, *Brass* 20340 (BRI), 25 viii 1972, *Webb & Tracey* 10844 (CANB), 25 xii 1991, *McDonald* s.n. (BRI). Thornton Peak [apparently all from summit region], 14 iii 1932, *Brass* 2284 (BRI), 12 xi 1973, *Hartley* 14036 (CANB), 12 xi 1973, *Stocker* 1087 (QRS), 1 x 1979, *Teese & Loyn* s.n. (BRI), 24 ix 1984, *Clarkson* 5559 (BRI), 26 ix 1984, *Clarkson* 5613 (BRI, QRS), 16 ix 1991, *Christophel* 91/106 (QRS). State Forest Reserve 144, Bower Bird Logging Area, 3 ii 1988, *Hyland* 13513 (QRS). Pinnacle Rock Track, 4.5km W of Karnak, 22 vi 1992, *Forster, Sankowsky & Tucker* 10717 (BRI). Roots Creek, 5 ii 1933, *Carr* 11/340 (QRS), 5 i 1936, *Robbins* 1252 (QRS), Upper Roots Creek, 12km WSW of Mossman, 1 i 1989, *Baird* 1748 (BRI). Mt Spurgeon, ii 1923, *Merrotsy* s.n. (BRI), 12 viii 1971, *Stocker* 772 (QRS). Platypus Creek at head of Mossman River, ix 1972, *Tracey* 14896 (BRI), head of Mossman River, 11 i 1935, *McLean* s.n. (BRI). Mt Lewis road, 28km from Mt Molloy-Mossman road, 31 i 1981, *Jessup & Clarkson* 279 (BRI, CANB). State Forest Reserve 143, Riflemead, North Mary Logging Area, 2 ii 1977, *Dockrill* 1363 (QRS), 21 x 1991, *Gray* 5341 (QRS). Several collections made from cultivated materials have been seen; these are not listed here.

Distribution. The species occurs in four main regions within its overall range: Mt Finnigan, Thornton Peak, Mount Windsor Tableland, and Main Coast Range (Fig. 2). Within the last two regions, it has been collected from several locations in each but the degree of geographic discontinuity is not known.

Habitat. Recorded as growing as a lithophytic, epiphytic or terrestrial shrub in rainforest, in low *Borya* herbfield on boulder outcrop, in moss forest, in windswept mossy thickets amongst bare rock exposures, and in simple notophyll vineforest with *Agathis* emergents on granite soils. Altitude 910–1330m.

The collection cited above as the conserved type of *R. lochiae* was made from asexually propagated plants derived from wild-collected material. The specific epithet was chosen by Mueller to honour Lady Loch, a patron of Victorian horticulture.

Rhododendron notiale Craven, **sp. nov. Fig. 3.**
Species ad *R.* sect. *Vireyam* ser. *Javanicam* Sleum. pertinens, et affinis *R. lochiae* F. Muell. a qua pedicellis florentibus suberectis usque erectis, corolla curvatinfundibuliforme et limbo obliquo, tubo corollae intra glabro, filamentis glabris, antheris confertis supra faucis et flavidis, et stylo basali ⅓ ad ½ stellatilepidoto differt.
Type: Australia, Victoria: Cultivated in garden at Montrose, Melbourne, 21 i 1993, *Craven & Elliot* 9105 (holo. CANB; iso. A, BRI, E, MEL). (Provenance: Mt Bartle Frere, Queensland, 1975, *leg. D.L. Jones* [unvouchered]).

Terrestrial or lithophytic shrub to 1.5m tall (occasionally a small tree to c.6.5m tall). *Branchlets* 2–4mm in diameter, terete to subterete, moderately to laxly stellate-lepidote and often soon glabrescent; internodes 1–7(–10)cm long. *Leaves* in 3–5-merous pseudowhorls at the distal 1–3 nodes; lamina elliptic to broadly elliptic

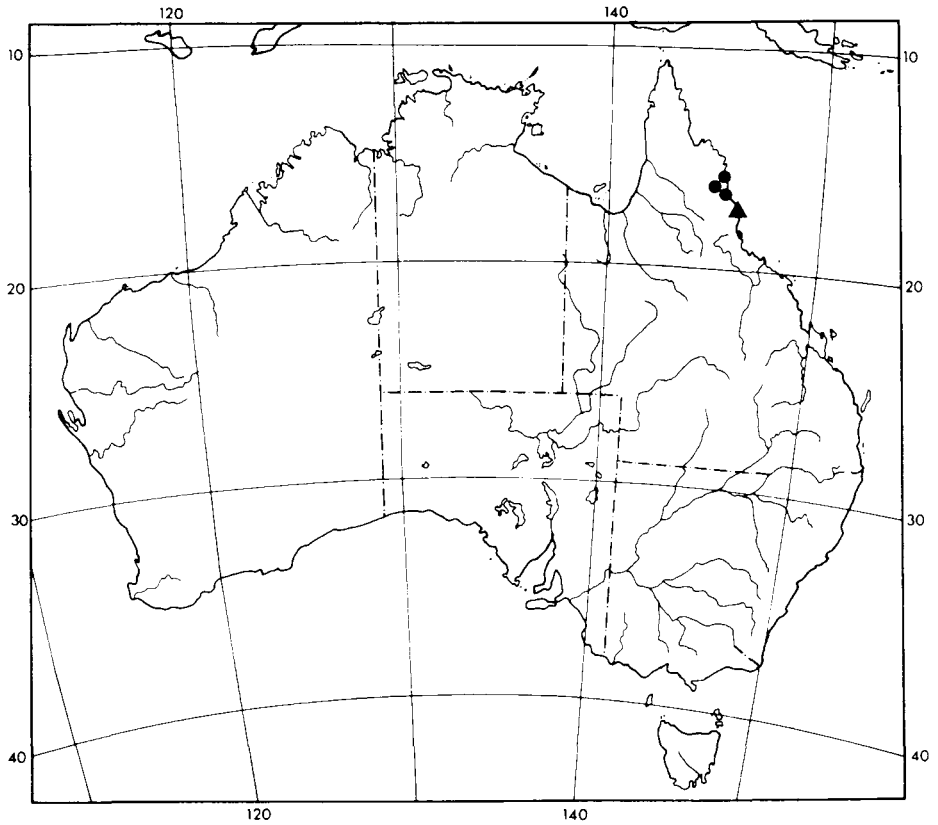

FIG. 2. Distribution of *Rhododendron lochiae* (●) and *R. notiale* (▲).

to obovate, coriaceous (sometimes thinly so), moderately and persistently stellate-lepidote abaxially and glabrescent adaxially (the scales minute, sessile, the marginal zone irregularly lobed or dented or subentire, the centre ± flat to prominulous), the apex acute to obtuse to bluntly acuminate, at the ultimate apex often retuse or sometimes entire, the base cuneate to attenuate, the margin revolute (slightly but distinctly so, rarely flat), 4–12 × 2–7cm, the midrib prominent abaxially and impressed adaxially, the primary veins 5–9 on each side of the midrib and prominulous abaxially and impressed to flat adaxially, the lower order venation subobscure; petiole 1–2.5cm long. *Umbel* 2–6-flowered. *Pedicel* subpendulous to erect in flower and erect in fruit, moderately stellate-lepidote (subdensely so distally), 1–4cm long. *Calyx* wanting or up to 8mm long and 5-lobed. *Corolla* curved funnel-shaped, with the limb at an oblique angle to the tube, red to reddish pink, 2.5–5.5cm long in all, moderately stellate-lepidote outside, glabrous inside; tube 4–10mm wide and widening to 7–20mm at the throat; lobes spreading and broadly elliptic to broadly obovate, emarginate, 10–20mm long. *Stamens* 10, appearing subequal but alternately long and short, scarcely exserted, presenting the anthers in a cluster in the upper part of

FIG. 3. *Rhododendron notiale* Craven, ×0.8. Drawn from living material of the type population (Mt Bartle Frere provenance) by K. R. Thiele.

the throat; filaments glabrous, the longer 22–31mm long, the shorter 21–30mm long; anthers yellowish, suboblong, 2mm long. Disk scarcely prominent, glabrous or sometimes pubescent. *Ovary* subcylindric and tapering to the style, 3.5–5mm long, densely stellate-lepidote and sometimes also pubescent; style stellate-lepidote (and pubescent if the ovary is also) in the proximal c. ⅓ to ½, produced to or almost to the level of the anthers and positioned in the upper (adaxial) part of the tube, at maturity 21–22mm long; stigma capitate. *Capsule* cylindric-ovoid to narrowly ellipsoid, 2–2.5cm long. *Seeds* narrow, 2.5–3mm long, tailed at each end.

Additional specimens examined. QUEENSLAND. Bellenden Ker Range: Mt Bellenden Ker, 1887 (late 1886 *fide* J.H. Willis *in sched.*), *Sayer* 135 (MEL, this specimen being Mueller's type of *R. lochiae*, cited by Mueller as *Sayer & Davidson* and without number); Mt Bartle Frere, 1888, *Palmerston* s.n. (MEL), xi 1891, *Johnson* s.n. (MEL), 24 x 1929, *Kajewski* 1278 (BRI), x 1967, *Scarth-Johnson* s.n. (BRI), 24 i 1970, *leg. ign.* [*Wilkie*?] s.n. (QRS), 20 ix 1970, *Lock* s.n. (QRS), 4 v 1991, *Telford & Rudd* 11419 (BRI, CBG).

Distribution. Known with certainty only from the Bellenden Ker Range (Fig. 2). Apparently also occurs on Bell Peak in the adjacent Malbon Thompson Range (photograph only seen of flowering material).

Habitat. Recorded as occurring as a terrestrial or lithophytic shrub to tree in stunted montane forest, in montane heath amongst rocks, and on mossy granite boulders. Altitude 1200–1520m.

The type collection was made from asexually propagated plants derived from wild-collected material. The specific epithet is a reference to this species being the most southerly of the genus (Latin, *notialis*, southern).

KEY TO THE AUSTRALIAN SPECIES OF *RHODODENDRON*

Corolla tube straight; staminal filaments pubescent; anthers dark red, presented around the throat with most being in the lower half; style in the lower part of the corolla tube ——— **R. lochiae**

Corolla tube curved; staminal filaments glabrous; anthers yellowish, presented in a cluster at the top of the throat; style in the upper part of the corolla tube ——— **R. notiale**

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