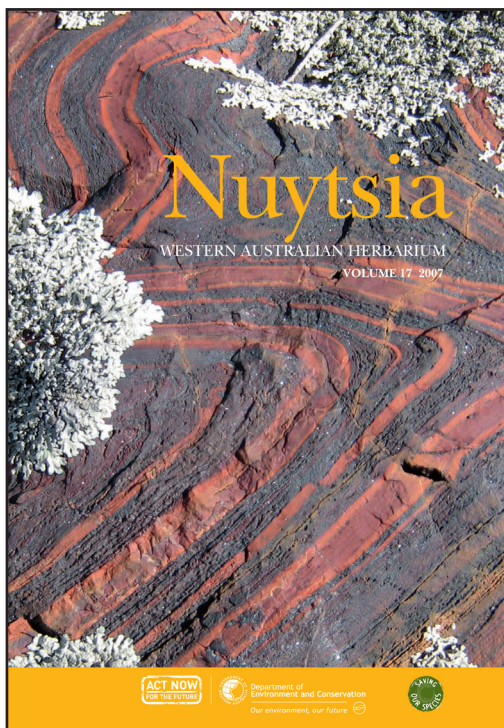


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## ***Tetratheca pilata* (Elaeocarpaceae), a new and apparently rare species from the Ongerup area of south-west Western Australia**

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### **Abstract**

Butcher, R. *Tetratheca pilata* (Elaeocarpaceae), a new and apparently rare species from the Ongerup area of south-west Western Australia. *Nuytsia* 17: 127–134 (2007). *Tetratheca pilata* R. Butcher is described here as a new species and differentiated from similar taxa based on the prominent apical seta on its linear leaves and its more or less opposite-decussate phyllotaxis. *Tetratheca pilata* is an apparently rare, granite endemic from the Ongerup area and is listed as Priority One under the Department of Environment and Conservation's Conservation Codes for Western Australian Flora. Images of this taxon and a distribution map are provided.

### **Introduction**

*Tetratheca* Sm. is an endemic Australian genus of 48 current, formally named species; 30 of which occur in Western Australia (Thompson 1976; Western Australian Herbarium 1998–; Australian Plant Names Index 2007; Bull 2007, this issue; Butcher 2007a, this issue; and described herein). Recent systematic work has seen Tremandraceae synonymised under Elaeocarpaceae (Angiosperm Phylogeny Group 2003; Crayn *et al.* 2006) and its members (*Tetratheca*, *Tremandra* DC. and *Platythea* Steetz) recognised as a rapidly evolving, dry-adapted lineage within a family primarily characterised by rainforest trees (Crayn *et al.* 2006). Ongoing generic level systematic work (McPherson 2006; Butcher *et al.* 2007; T. Downing pers. comm.; D. Crayn pers. comm.) is illuminating relationships between the species and recent taxonomic investigations (Alford 1995; Butcher & Sage 2005; Bull 2007, this issue; Butcher 2007a, this issue; Butcher 2007b) have seen a number of new Western Australian taxa recognised, a high proportion of which are geographically restricted and of high conservation value.

In this paper I describe a new species, *Tetratheca pilata* R. Butcher, an apparently rare, granite endemic restricted to the Ongerup area of south-west Western Australia; a region that has been extensively cleared for agriculture since the 1950s (Beard 1976). This distinctive new species was identified during study of the *Tetratheca* collection at the Western Australian Herbarium (PERTH) from two separated sheets of *K.R. Newbey* 4505: one labelled as *T. aff. harperi* F. Muell., although bearing no resemblance to this species; the second labelled as *Tetratheca* sp. This taxon was given the phrase name *Tetratheca* sp. Ongerup (*K.R. Newbey* 4505) and was placed on the census of Western Australian plant names in 2002.

Until very recently, *T. pilata* was known only from Newbey's collection, made in 1974, and it was feared that this species might be extinct in the wild. As the type locality and surrounds had not been specifically surveyed, Lynda Strachan and Sue Osborne of the Ongerup Regional Herbarium were contacted, notified of the existence of *T. pilata* and its habitat preferences, and requested to assist in its relocation. *Tetralochea pilata* was subsequently rediscovered in late 2006 during a flora survey of private bushland south of Ongerup. That *T. pilata* has been collected only twice in 32 years, from a highly localised area, highlights the apparent rarity of this species.

### Methods

All of the *Tetralochea* specimens at PERTH, as well as material on loan from the National Herbarium of Victoria (MEL) and the Royal Botanic Gardens, Sydney (NSW) have been examined. Herbarium specimens of *K.R. Newbey* 4505 and *S. Osborne* 97 were used for observation and measurement of stem and foliage characters, with *K.R. Newbey* 4505 used to assess floral characters (*S. Osborne* 97 is sterile). Colour notes and some measurements of the pedicels, bracts and calyx segments were taken from pressed material, with all other floral measurements made from reconstituted flowers.

The distribution map was produced using DIVA-GIS freeware Version 5.2.0.2 (<http://www.diva-gis.org/>) and includes the Interim Biogeographic Regionalisation for Australia (IBRA) Version 6.1 boundaries (Department of the Environment and Water Resources 2007) applicable to south-west Western Australia. Due to the conservation status of this species, locality information has been withheld from cited specimens.

### Taxonomy

***Tetralochea pilata*** R. Butcher, *sp. nov.*

A speciebus similibus foliis plus minusve oppositis decussatis linearibus, ad apicem seta longissima instructa statim dignoscenda.

*Typus*: south-south-east of Ongerup, Western Australia [precise locality withheld for conservation purposes], 12 October 1974, *K.R. Newbey* 4505 (*holo*: PERTH 03137511!; *iso*: CANB *n.v.*, MEL!).

*Tetralochea* sp. Ongerup (*K.R. Newbey* 4505), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au> [accessed 13 June 2007].

*Sub-shrub*, 0.2–0.3 m in height. *Stems* numerous, branches mostly opposite, occasionally alternate or three of different ages arising from the same node, slender, leafy, terete, straight, apices indeterminate, terminal branchlets 55–135 mm long, 0.45–0.6 mm wide in flowering region, pale orange to light golden-brown when young, orange/red-brown, rarely light greyish-olive green, when mature, not glaucous, very finely longitudinally rugulose, evenly covered with small (to 0.05 mm long), papillose tubercules, these positioned on the subtly raised ridges of the stem, as well as sparse to openly spaced, long (0.95–2 mm long), stiff, orange to red-brown, strongly antrorse to adpressed, setae, these arising from small, rounded, cream tubercules, setae becoming grey and degrading with age, often leaving small tufts of fibres at apices of tubercules after they fall away (observed on older stems). *Leaves* mostly opposite-decussate, sometimes sub-opposite, persistent to tardily deciduous leaving lowest stems bare, moderately dense,

sparser at base of stems, spreading to strongly ascending, curved along length in the dried state, younger leaves tending adpressed to stem, usually with 2 strongly antrorse setae at base in a stipular position; petiole flattened but fleshy, 0.15–0.4 mm long, orange-red to pink-red, colour continuing into base of mid-vein; blade linear, 2.2–10.7 mm long, 0.55–1.2 mm wide, including a prominent, stiff, apical seta (0.65–1.4 mm long), this orange to red-brown, becoming grey and degrading with age to leave a small tuft of fibres on older leaves; apex sometimes slightly recurved, obtuse, prominently setose; margins strongly revolute, touching edges of midvein, often obscuring midvein in upper 1/2, entire, sometimes with 2 or 3 pairs of orange to red-brown, antrorse setae matching the apical seta; adaxial surface mid-green to olive green, sparingly to moderately strigillose, not glaucous; abaxial surface light olive-green, glabrous, midvein prominent. *Flowers* single in leaf axils. *Bracts* paired, linear to elliptic, 0.3–0.9 mm long, 0.15–0.35 mm wide, pink to red, often paler at apex, mostly glabrous, few simple hairs at apex and along margins. *Pedicels* straight from base, strongly hooked towards apex, 11.5–19.6 mm long, 0.3–0.4 mm wide, golden-brown becoming pink below receptacle, glabrous, very finely striate, expanding gradually above hooked region, then suddenly into a receptacle 1–1.3 mm wide; receptacle thickened, especially between or under calyx segments, appearing circular to lobed when viewed from below, margin slightly undulate, with small, rounded tubercles often present along edge and at junction with calyx segments. *Calyx* segments (3)4 or 5, inserted just inside top of receptacle, with a thickened area just above base resting on and slightly overhanging receptacle margin, deciduous,  $\pm$  triangular to ovate, 1.8–1.9 mm long, 0.95–1.25 mm wide, strongly concave, slightly folded along mid-line; apex acute, incurved; margins thickened and inrolled; outer surface mauve to dark pink, glabrous with sparse shining spots, some small, warty tubercles at base near junction with receptacle and along midline; inner surface with straight, simple hairs along margins and near apex of thickened mid-vein. *Petals* (3)4 or 5, deciduous, broadly spatulate to obovate, 6.2–7.2 mm long, 4.3–4.4 mm wide with the widest point in the distal 3/4, apex truncate with a small triangular fold from centre, pale pink. *Stamens* (6)8 or 10, sometimes not double the number of petals and calyx segments, 2.25–2.35 mm long, free; *filaments* flattened, angled inwards, 0.1–0.15 mm long, orange-red, smooth; *body* somewhat compressed,  $\pm$  straight to slightly curved on inner edge, broadly and shallowly curved on outer edge, especially at base through transition into filament, tapering into tube smoothly on both edges, 1.3–1.5 mm long, red, lower cells paler, becoming orange-red towards filament, smooth; *tube* gently tapering from base to apex on both edges, angled inwards to gently incurved, 0.75–0.85 mm long, orifice relatively broad with longer lower lip, orange-red to red, smooth. *Ovary*  $\pm$  circular to ovate, compressed, with a slightly thicker rim at base and thicker region along midline near base, passing quickly into style at apex, 1.35–1.7 mm long, 1–1.3 mm wide, pink to dark red glabrous; *style* straight or slightly kinked in mid-region, 0.85–1.1 mm long, pink, glabrous; *stigma* papillose; *ovules* 2, 1 in each locule, attached near the apex of septum with slightly enlarged placenta, smooth, yellow with thick elaiosome at distal end, this broad at attachment with ovule, tapering and thinning then strongly kinked at *c.* 3/4 length. *Mature fruit* not seen. *Seed* not seen. (Figure 1)

*Other specimen examined.* WESTERN AUSTRALIA: [locality withheld] 1 Dec. 2006, S. Osborne 97 (PERTH 07537107).

*Distribution.* *Tetratheca pilata* has only been collected from a small area to the south of Ongerup, in the Esperance Sandplains region of Western Australia (Figure 2).

*Habitat.* Label details for K.R. Newbey 4505 record only that this species occurs in granitic loam or on outcropping granite. Associated species can be deduced as including *Pleurosorus rutifolius*, *Aphelia cyperoides*, *Isolepis stellata* and *Pterostylis sargentii* as Newbey collected specimens of these at the same locality, on the same day (Western Australian Herbarium 1998–). S. Osborne 97 was also collected from near a rocky outcrop, with associated species recorded as *Eucalyptus lehmannii*, *Beaufortia schaueri*, *Xanthorrhoea* sp. [*X. platyphylla* by deduction based on location] and *Hakea* sp.

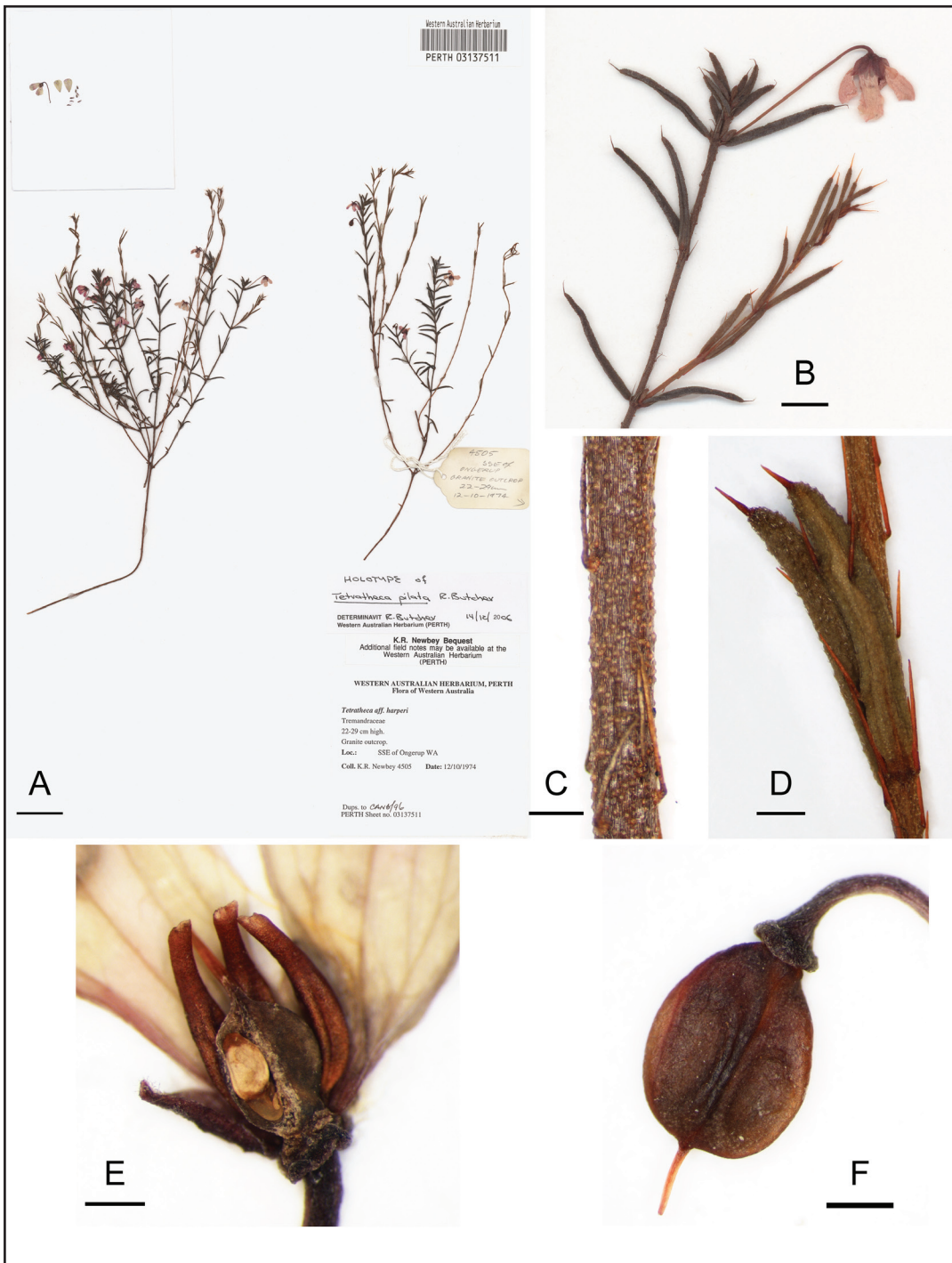


Figure 1. *Tetratheca pilata* (K.R. Newbey 4505). A – holotype; B – portion of upper branch showing opposite-decussate phyllotaxis, linear leaves and curvature of pedicel; C – mature stem with blunt tubercles and strongly antrorse setae; D – younger stem and leaves showing strongly revolute margins, setae in a  $\pm$  stipular position, strongly antrorse marginal setae and prominent apical seta; E – dissected flower showing glabrous ovary, single ovule per locule and stamen morphology; F – juvenile fruit showing receptacle shape. Scale bars = 2 cm (A); 5 mm (B); 0.5 mm (C); 1 mm (D–F).

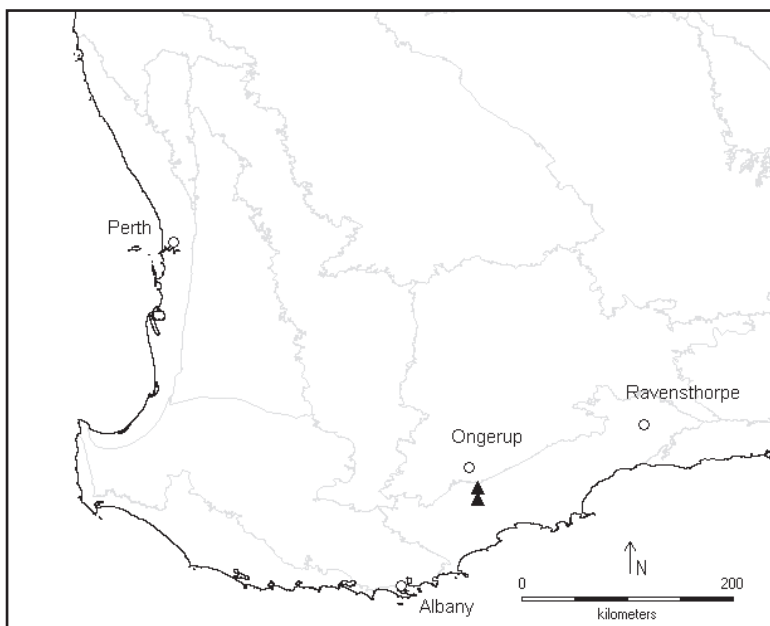


Figure 2. Distribution of *Tetralthea pilata* in south-west Western Australia.

*Phenology.* Collected in flower in early October with a few very young fruits evident. No fruits are present on the specimen collected in December.

*Conservation status.* Listed in Atkins (2006) under *T.* sp. Ongerup (K.R. Newbey 4505) as Priority One (Department of Environment and Conservation's Conservation Codes for Western Australian Flora).

*Etymology.* The specific epithet is derived from the Latin word *pilatus*, meaning "armed with a javelin", in reference to the long, stiff seta at the apex of each leaf.

*Affinities.* *Tetralthea pilata* appears to have close affinity to *T. parvifolia* Joy Thomps., a taxon which Thompson (1976: 176) noted was "very small in all its parts" and which "does not seem to bear a close relationship to any other species". Similarities between *T. pilata* and *T. parvifolia* include the combination of dense, small, blunt tubercles and sparser, tubercle-based, antrorse setae on the stems, hispid vestiture on the adaxial surface of the leaves and their floral morphology. In particular, each has flowers with long, slender pedicels which are strongly curved to hooked at the apex just below the abrupt transition into the receptacle, which is rounded to lobed in outline. The flowers of both species are small, with the petals broadest in the upper quarter, and have similarly shaped and proportioned stamens, as well as a glabrous to glabrescent ovary with one ovule per locule. *Tetralthea parvifolia* differs distinctly from *T. pilata*, however, in also having short, curled, white hairs covering the stems, and leaves that are spirally arranged, more densely pubescent on the abaxial surface and which lack a prominent apiculus. Two specimens of *T. parvifolia* collected from just west of Collie (*T.R. Lally & B. Fuhrer* TRL 1497; TRL 1499) have larger leaves than usual, but pubescence and floral characters are typical. These specimens are evidently post-fire resprouts, with larger leaves on primary stems and noticeably smaller leaves on new season's growth.

*Tetralochea deltoidea* Joy Thomps. is also similar to *T. pilata* in having slender stems (0.35–0.75 mm wide in the flowering region), more or less opposite-decussate leaves, long, glabrous pedicels (10.5–22 mm long), small flowers (calyx segments 1.7–2.2 mm long; petals 3.8–9.7 mm long) and a glabrous receptacle, calyx and ovary. *Tetralochea deltoidea* can be distinguished from *T. pilata* by its deltoid leaves that lack a prominent apical process; the strongly retrorse orientation of the slender setae on the stems, which lack tubercles; the apex of the pedicel expanding smoothly into the receptacle; and distinctly different stamens, which have a very short, broad anther tube, similar to those of *T. pilifera* Lindl.

There is some overlap in pedicel length and floral size between *T. pilata* and *T. confertifolia* Steetz, but this latter taxon can be easily distinguished by the absence of small, blunt tubercles on the stems, narrower, more densely arranged leaves with longer, stiffer simple hairs, and a number of floral characters. In particular, the pedicels and flowers of *T. confertifolia* are generally longer (pedicels 17–36 mm long; petals 6–13 mm long), the petals have a dark spot and fine hairs at the base internally, the ovary is densely pubescent and glandular hairy, and the stamens are larger throughout (filament *c.* 0.5 mm; body 1.5–2.7 mm; tube 1.3–2.9 mm), with hairs on the filaments and the lower edge of the body and a distinctly longer inner edge to the tube orifice.

*Notes.* The leaves of *T. pilata* are linear and bear between one and seven stiff, orange to orange-brown setae: an erect apical seta that is *c.* 1/6–1/5 total leaf length, and up to three pairs of openly-spaced, prominently antrorse, marginal setae. The terminal seta is markedly different from the range of apical projections seen on the leaves of other species and is regarded here as a highly significant diagnostic character. *Tetralochea hirsuta* Lindl., *T. hispidissima* Steetz and *T. setigera* Endl. may have a seta at the leaf apex, but this is usually red to red-brown, glandular and more slender than in *T. pilata*. These species, as well as *T. deltoidea*, *T. parvifolia*, *T. pilifera*, *T. pubescens* Turcz. and *T. similis* Joy Thomps., also have marginal setae, which may be restricted to the apices of small or large dentae. Of these taxa, the setae of *T. pilata* most resemble those of *T. deltoidea* and *T. parvifolia*. An apical point is evident on the leaves of many species of *Tetralochea* and this is often the remnant base of a fallen, terminal, glandular or eglandular hair (e.g. *T. bauerifolia* F.Muell., *T. chapmanii* Alford, *T. confertifolia*, *T. filiformis* Benth., *T. gunnii* Hook.f., *T. nuda* Lindl., *T. paucifolia* Joy Thoms., *T. paynterae* Alford, *T. rupicola* Joy Thomps., *T. subaphylla* Benth.) or seta. In *T. pilata* the terminal seta is prominent on young to mature leaves and new growth, but has the tendency to degrade on older leaves and fall away. Specimens therefore display a mix of setose and non-setose leaves but the prior existence of the terminal seta is clearly indicated by an obvious scar or a short tuft of fibres at the leaf apex.

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