TETRATHECA GUNNII HOOK. F. ON SERPENTINE SOILS NEAR BEACONSFIELD, TASMANIA

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(with one table and two text-figures)

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The rediscovery of *Tetratheca gunnii* Hook. f., a species last collected in 1843 and presumed extinct, is reported. The morphological variability among plants (including previously undescribed fruit) is given to facilitate comparison with descriptions of the type material. The habitat of the species is described and options for management to conserve viable populations are discussed.

Key Words: *Tetratheca gunnii*, serpentine, Tasmania, conservation.

INTRODUCTION

This paper reports the rediscovery of *Tetratheca gunnii* Hook. f., a species previously known only from the type and one duplicate collection made by R. C. Gunn in 1843 (Hooker 1855, in Thompson 1976). In their census of extinct and endangered Australian plants, Leigh *et al.* (1984) categorised *T. gunnii* as "presumed extinct". Leigh *et al.* (loc. cit.) and Thompson (loc. cit.) have emphasized the need to relocate the species, so that its specific status can be verified and appropriate conservation measures can be undertaken.

THE STUDY AREA

The holotype of *T. gunnii* was collected from the foothills of the Asbestos Range on serpentine rocks. The Asbestos Range and associated Dazzler Range form a dissected upland between the Tamar River (Port Dalrymple) and Port Sorell, reaching an altitude of 520 m. The ranges are located in the moist subhumid and humid warm climatic zones respectively (Gentilli 1972). The area is geologically and topographically complex (Gee & Legge 1971) and supports a range of vegetation types from rainforest through eucalypt forest to heath (Brown & Buckney 1983, Kirkpatrick & Dickinson 1984).

The search for *Tetratheca gunnii* was concentrated on the Cambrian serpentinite, peridotite and associated ultramafic rocks which crop out locally in undulating terrain in the eastern foothills of the Dazzler Range, about 3 km west of Beaconsfield (fig. 1). The range of altitudes of these rocks is 20 to 220 m. The vegetation mainly comprises dry

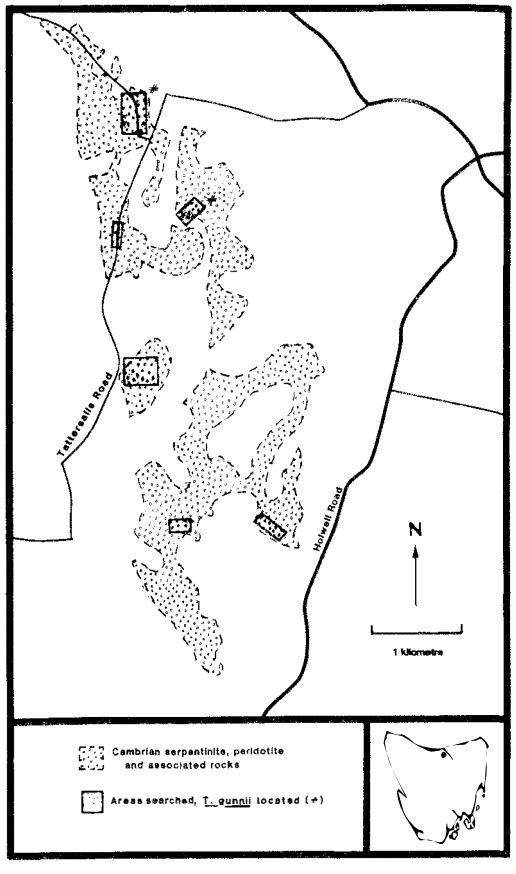

FIG.1 — Map showing distribution of serpentine soils, areas searched and locations of T. gunnii.

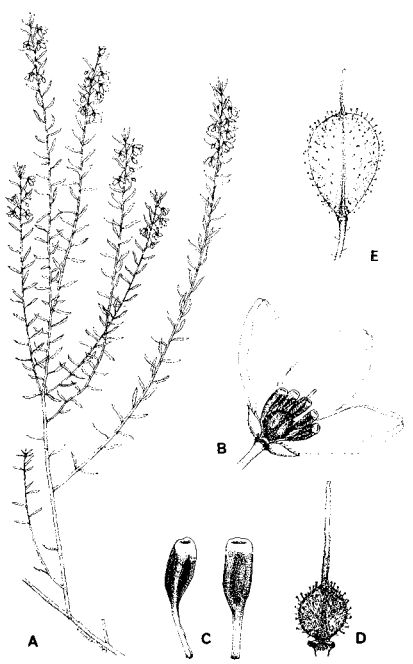

FIG.2 — Tetratheca gunnii: *(a) habit of flowering specimen, x0.75; (b) flower with one sepal, one petal and three stamens removed, x7.5; (c) stamens, x15; (d) ovary and style, x15; (e) fruit, x7.5.*

sclerophyll forest with a heathy or shrubby understorey. Shafts, scrapes and spoil heaps are common in the serpentinite area, which was worked previously for asbestos and more recently for chromite. Other land uses in the immediate area are logging for pulp, sawlogs and firewood, grazing, clearing, gravel extraction and protection of water quality (water reserve).

The area was searched by the authors on 3 October 1985 when the initial findings were made. The area was revisited on 19 December 1985 to obtain fruiting material for description and seed for propagation by the Royal Tasmanian Botanical Gardens. Specimens are lodged with the Tasmanian Herbarium (HO).

RESULTS AND DISCUSSION

Occurrence and Habitat

Plants were found growing on shallow soils at four distinct locations in two of the six areas searched (fig. 1). All of the sites were underlain by serpentine rocks (Gee & Legge 1971). A total of 24 individuals were found with 20 in one population, two in another and the remaining two plants occurring as solitary individuals. In each case, the plants were found growing on gently sloping hillsides of east to southeast aspect in heathy *Eucalyptus amygdalina* woodland (Duncan & Brown 1985). *Eucalyptus amygdalina* is the overstorey dominant, with *E. ovata* present as a minor species. *Casuarina littoralis* and *Banksia marginata* form a small tree-tall shrub stratum over a dense heath dominated by *Epacris virgata, Correa reflexa* and *Hibbertia riparia*. Cutting grass (*Gahnia* spp.), grasses, saggs and procumbent shrubs are also widespread. Species lists for each site are given in appendix 1.

At each location, *T. gunnii* is closely associated with two other endemic species, also largely restricted to serpentine rocks, viz. *Epacris virgata* and *Spyridium obcordatum* (Kirkpatrick & Brown 1984). However, the latter two species are much more abundant. Serpentine rocks worldwide are noted for their high local endemicity (e.g. Whittaker 1954, Kruckeberg 1954) and those near Beaconsfield appear to be no exception.

Kruckeberg (1954) presented evidence that serpentine endemics are unable to compete with non-serpentine species in comparatively dense closed communities. The very pronounced boundaries of the *Epacris virgata* population indicate that this species is a serpentine endemic. *Spyridium obcordatum* is strongly associated with serpentine rocks, but does occur albeit rarely, on other rock types (Brown *et al.* 1983) and may represent an example of biotype depletion (Stebbins 1942). *Tetratheca gunnii* has only been found on serpentine rocks and may be a serpentine endemic. It exhibits "serpentomorphic" characteristics (Whittaker 1954) as compared with its close congener *T. pilosa*. The latter species occurs with *T. gunnii* on this rock type but is found more widely in other edaphic situations. The ecological and genecological status of *T. gunnii* can only be confirmed by further investigations.

Description

In most respects, the plants found in the present study fit closely to the description of *T. gunnii* given by Thompson (1976). The absence of an anther tube is particularly distinctive (fig. 2) and immediately separates the species from *T. pilosa* and from the morphologically similar *T. procumbens* Gunn ex Hook. f. (which is included in *T. pilosa* by Thompson *loc. cit.*).

TABLE 1

Morphometric Data for *Tetratheca gunnii*. Mean Value (and ranges) in mm.

	Site	Site 2	Sites 3 and 4				
			P1	P2	P3	P4	Mean
Leaf length (blade)	5.4 (5.2-5.8)	3.5 (3.0-3.8)	5.1 (4.2-5.8)	4.1 (3.8-4.5)	5.2 (4.8-5.8)	4.6 (3.6-5.5)	4.65
Leaf width (max)	1.0 (0.9-1.0)	0.9 (0.7-1.2)	1.1 (0.9-1.2)	1.1 (0.9-1.4)	1.0 (0.9-1.1)	0.9 (0.6-1.1)	1.0
Petal length	3.4 (3.0-4.2)	2.6 (2.2-3.2)	5.2 (4.6-5.7)	4.5 (4.0-5.2)	4.5 (4.0-4.8)	3.5 (3.3-3.9)	4.0
Sepal length	1.0 (1.0-1.0)	0.9 (0.9-1.0)	1.3 (1.2-1.3)	1.0 (1.0-1.1)	1.0 (1.0)	1.1 (1.0-1.1)	1.05
Stamen length	2.1 (2.0-2.2)	1.4 (1.2-1.6)	2.6 (2.5-2.7)	2.4 (2.3-2.4)	2.3 (2.1-2.4)	1.9 (1.8-2.2)	2.1
Peduncle length	3.6 (3.2-4.3)	2.4 (2.1-2.6)	2.3 (1.5-2.7)	2.4 (1.9-2.7)	2.7 (2.4-3.1)	2.3 (2.3)	2.6
Style length	1.6 (1.4-1.8)	1.3 (1.2-1.5)	2.1 (2.0-2.1)	1.9 (1.8-2.0)	2.0 (2.0)	2.0 (1.9-2.0)	1.8
Stem width (internodal in flowering section)	0.6 (0.6)	0.7 (0.7)	0.7 (0.7)	0.6 (0.6)	0.7 (0.7)	0.7 (0.7)	0.7

Plants are generally lax and less than 0.3 m tall, but one individual was erect to 0.8 m. The plants are smaller in all their parts than *T. pilosa* especially in comparison with the robust forms of the latter which grow in the same area. Table 1 gives some morphometric data from six plants of *T. gunnii* to indicate variability between plants.

The petals vary in colour from pale lilac to deep pink-purple. Thompson (*loc. cit.*) suggests that the petals are usually white, but no white flowered specimens were seen. However, flowers on some specimens did fade within a few days of collection.

The fruit is a compressed 2(-3) locular capsule, obovate to cuneate, turgid 4.0 mm long, 2.5-3.0 mm wide, with uniform cover of sparsely scattered gland-tipped hairs. Slightly channelled along septum, style not persistent, opening along margin.

Seeds are pale, 3.0 mm long, almost oblong, covered with fine, appressed to spreading hairs, appendage pale covered with finer hairs. Similar to *T. pilosa* but base not scarred.

Conservation and Management

It seems likely that the serpentine provides the only suitable habitat for *T. gunnii*, and its distribution is very restricted even on this geological type. The serpentine rocks in the area occupy 530 ha, of which 270 ha (51%) is State Forest, 220 ha (41%) is privately owned and 40 ha (8%) is Crown Water Reserve. All of the *T. gunnii* plants found were in State Forest.

The main risks to survival for the species appear to be land clearing, adverse firing and grazing regimes and overcollecting. Some of the private land in the area has been cleared to rough pasture, to the detriment of *Epacris virgata* and *Spyridium obcordatum*, and further clearing for agriculture and for gravel extraction are potential threats. There is good evidence that grazing by introduced stock and frequent firing on State Forest in the area were also detrimental to the above species in the past. There has been a dramatic increase in the abundance and vigour of *E. virgata* on some previously grazed sites following recent cessation of grazing. Duncan (1981) has shown that *Tetratheca glandulosa* (= *T. labillardieri* Thompson) is dependent on seed for regeneration following a hot fire. If the same applies to *T. gunnii*, then fire regimes suitable for the maintenance of the populations will have to be determined.

The serpentine areas on State Forest generally support poor stands of timber, and are unlikely to

be clearfelled. Clearing of tracks for timber, mining or gravel extraction may not pose a direct threat to the species. However there remains the problem of possible introduced pathogens. The effects of *Phytophthora cinnamomi* on serpentine soils in general and *T. gunnii* in particular are unknown. Other species of *Tetratheca* are very susceptible to attack, but no symptoms consistent with *P. cinnamomi* infection were evident in the area. Soils in the area have been tested previously, but no *P. cinnamomi* was recovered.

The occurrence of *T. gunnii* in such close association with other restricted endemic species, confers on the area a very high significance for biological conservation. It is essential that a monitoring programme be established to continually review the status of *T. gunnii*, which has now been confirmed as an extant but endangered species.

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APPENDIX 1

List of Vascular Species Associated with *Tetratheca gunnii* Hook. F. Near Beaconsfield.

A comprehensive list of species is given below for each *T. gunnii* site. Species were recorded from a circular plot of a nominal 15 m radius, which was centred on each population of *T. gunnii*. Except where indicated, species authorities are those given by Brown *et al.* (1983) for endemics, Curtis (1963, 1967) and Curtis and Morris (1975) for other dicotyledons, and Willis (1970) for other monocotyledons and pteridophytes. Endemic species are prefixed by an 'e', introduced species by an 'i', and poorly reserved species (Brown *et al.* 1983) by an 's'. Abundance of each species on each site is indicated by: + = uncommon; o = occasional; a = abundant and/or dense. The numbers of *T. gunnii* recorded from each site are: site 1 one plant; site 2 — one plant, site 3 — two plants, site 4 — twenty plants.

			SITE			
			1	2	3	4
PTERIDOPHYTES						
Aspleniaceae		*Asplenium flabellifolium*	+			
Dennstaedtiaceae		*Pteridium esculentum*	+	o	+	o
Lindsaeaceae		*Lindsaea linearis*	+			+
Sinopteridaceae		*Cheilanthes tenuifolia*	+			
DICOTYLEDONS						
Asteraceae		*Craspedia glauca*	+			
		Gnaphalium sp.	+			
		Helichrysum dendroideum	+	+		
		Helichrysum scorpioides	+	+	+	+
	i	*Hypochaeris radicata*		+		
		Olearia erubescens			+	
		Olearia lirata	+			
		Olearia ramulosa		+		
Campanulaceae		*Wahlenbergia* sp.	+			+
Casuarinaceae		*Casuarina littoralis*	a	a	a	a
Dilleniaceae		*Hibbertia riparia*	a	a	a	a
Droseraceae		*Drosera auriculata*	+		+	
Epacridaceae		*Acrotriche serrulata*	o	+	+	o
		Astroloma humifusum	a	o	o	o
		Epacris impressa	o	+	o	o
	e,s	*Epacris virgata*	a	a	a	a
		Styphelia adscendens		+	+	
Fabaceae		*Bossiaea prostrata*	o	+	+	
		Hovea heterophylla	+	+		
		Pultenaea stricta				o
Goodeniaceae		*Goodenia lanata*	o	+	+	+
Haloragaceae		*Gonocarpus tetragynus*	o	o	+	o
		Gonocarpus teucrioides		+		
Lauraceae		*Cassytha glabella*	+	+		
		Cassytha pubescens				+
Mimosaceae		*Acacia dealbata*		o		
		Acacia melanoxylon	+			
		Acacia mucronata			+	
		Acacia verticillata		o		
Myrtaceae		*Baeckea ramosissima*			o	o
	e	*Eucalyptus amygdalina*	a	a	a	a
		Eucalyptus ovata	o	o	o	o
		Leptospermum scoparium		+		
Oleaceae		*Notelaea ligustrina*		+		
Oxalidaceae		*Oxalis corniculata*			+	
Pittosporaceae		*Bursaria spinosa*			o	+
Polygalaceae		*Comesperma volubile*	o	+	+	+
Proteaceae		*Banksia marginata*	a	a	a	a
	e	*Hakea epiglottis*				+
	e	*Lomatia tinctoria*	o	o	+	o
Rhamnaceae	e	*Pomaderris elliptica*			a	
		Pomaderris pilifera				+
	e,s	*Spyridium obcordatum*	a	+	o	a

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			SITE			
			1	2	3	4
Rubiaceae		Galium australe			+	
Rutaceae		Correa reflexa	a	a	a	a
		Zieria arborescens				+
Santalaceae		Exocarpos cupressiformis	+	+	o	a
Stackhousiaceae		Stackhousia monogyna			+	
Stylidiaceae		Stylidium graminifolium	+			
Tremandraceae	e,s	Tetratheca gunnii	+	+	+	o
		Tetratheca pilosa	+			o
Thymelaeaceae		Pimelea humilis	o	+		
		Pimelea nivea			+	o
Violaceae		Viola hederacea	+	o	+	+
MONOCOTYLEDONS						
Cyperaceae		Gahnia grandis	+	+	o	a
		Gahnia radula		o	+	+
		Lepidosperma elatius		o		
		Lepidosperma laterale	+	+	o	+
	e	Lepidosperma lineare var.inops	o		+	+
		Schoenus apogon			+	+
Liliaceae		Arthropodium milleflorum		+		
		Dianella revoluta			+	
Orchidaceae		Acianthus exsertus			+	
		Chiloglottis sp.	+		+	+
		Glossodia major			+	
		Pterostylis longifolia			+	
		Pterostylis nutans	+	+	+	+
		Thelymitra sp.		+		
Poaceae		*Deyeuxia quadriseta*	+	+		
		Microlaena stipoides	+	o	+	
		Poa sieberana Spreng.	o	o	+	+
	e	*Stipa aphylla*	o	o	o	+
		Tetrarrhena distichophylla	+	+	+	
		Themeda australis	+	o		
Xanthorrhoeaceae		*Lomandra longifolia*	o	o	o	o