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A revision of the *Thelymitra pauciflora* R.Br. (Orchidaceae) complex in Australia.

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Abstract

The *Thelymitra pauciflora* R.Br. complex is defined as a group and the Australian members are revised. Fifteen new species, *Thelymitra albiflora* Jeanes, *Thelymitra basaltica* Jeanes, *Thelymitra batesii* Jeanes, *Thelymitra bracteata* J.Z.Weber ex Jeanes, *Thelymitra brevifolia* Jeanes, *Thelymitra cyanapicata* Jeanes, *Thelymitra exigua* Jeanes, *Thelymitra frenchii* Jeanes, *Thelymitra inflata* Jeanes, *Thelymitra lucida* Jeanes, *Thelymitra pallidiflora* Jeanes, *Thelymitra peniculata* Jeanes, *Thelymitra viridis* Jeanes, *Thelymitra vulgaris* Jeanes and *Thelymitra xanthotricha* Jeanes, are described and illustrated. The key diagnostic features relating to the morphology of the post-anther lobe of the column (its size, shape, degree of inflation and degree of apical notching), the lateral lobes (their length, thickness and curvature), the trichomes on the lateral lobes of the column (their distribution, length, number, coarseness and colour), the leaf (its length, width, texture and shape) and the sterile bracts (their number and degree of divergence from the scape) are discussed where relevant. Information on distribution, habitat, flowering time, pollination biology and conservation status is given for all taxa. The relationships between *T. pauciflora* and the other taxa in the complex are discussed. Detailed notes are given on the typification and characterisation of the poorly known species *Thelymitra angustifolia* R.Br., *Thelymitra arenaria* Lindl., *Thelymitra holmesii* Nicholls, *Thelymitra mucida* Fitzg. and *T. pauciflora*. A dichotomous key is provided.

Introduction

Thelymitra J.R.Forst. & G.Forst. is a complex genus of orchids consisting of about 80 described species, several described natural hybrids and at least 30 undescribed taxa. It is concentrated in higher rainfall areas of temperate Australia, but a few species occur in tropical northeastern Australia, about 20 species occur in New Zealand (15 endemic) and a few species occur in Indonesia, New Caledonia, New Guinea and the Philippines.

The complex of taxa surrounding *Thelymitra longifolia* J.R.Forst. & G.Forst. (the type species of *Thelymitra*) is vast, and probably includes about half the total number of species in the genus (Bates 1999). The first botanist to study the genus in any detail was Robert Brown (1810), who described three new species in the *T. longifolia* complex—*Thelymitra angustifolia* R.Br., *Thelymitra nuda* R.Br. and *Thelymitra pauciflora* R.Br. from eastern Australia. Lindley (1840a & 1840b) described a further four new species—*Thelymitra arenaria* Lindl., *Thelymitra graminea* Lindl., *Thelymitra macrophylla* Lindl. and *Thelymitra versicolor* Lindl. (the latter I regard as a synonym of *T. nuda*), two of these species from the eastern States and two from Western Australia. Bentham (1873) took an extraordinarily conservative approach by recognising only *T. longifolia* as a valid species, while relegating *T. arenaria*, *T. graminea*, *T. nuda*, *T. pauciflora* and *T. versicolor* to synonymy under that species, *T. angustifolia* to synonymy under the unrelated *Thelymitra aristata* Lindl. and *T. macrophylla* as a taxon linking *T. aristata* to *T. longifolia*. Most botanists and authors that have dealt with the genus since Bentham, acknowledged that there are several to many distinct species involved (e.g. Fitzgerald 1875–95, Nicholls 1969, Jones 1988, Clements 1989, Bernhardt 1993, Backhouse & Jeanes 1995 and Jones & Clements 1998b). In recent times a steady stream of new taxa has been described in the complex—*Thelymitra fragrans* D.L.Jones & M.A.Clem. (Jones & Clements 1988), *Thelymitra malvina* M.A.Clem., D.L.Jones & Molloy (Clements

1989), *Thelymitra granitora* D.L.Jones & M.A.Clem. (Jones & Clements 1998a), *Thelymitra gregaria* D.L.Jones & M.A.Clem. (Jones & Clements 1998a), *Thelymitra imbricata* D.L.Jones & M.A.Clem. (Jones & Clements 1998b), *Thelymitra atronitida* Jeanes and *Thelymitra planicola* Jeanes (Jeanes 2000).

Taxa in the *T. longifolia* complex generally have unspotted blue flowers (less often white or pink) varying in size from about 10 mm to 50 mm in diameter when fully open. The post-anther lobe of the column is tubular, variously inflated, smooth on the dorsal surface, variously open on the ventral side and entire, emarginate or deeply bifid at the apex. The auxiliary lobes are at most rudimentary, consisting of a pair of tiny incurved spurs on the lower apical margin of the post-anther lobe, or more often completely absent. The two finger-like lateral lobes extend forward from the column wing, one on each side of the anther and just below the post-anther lobe. These may be more or less straight, curved gently or bent upwards at right angles near the middle. Each lateral lobe has a tuft of white trichomes (less often yellow or mauve) that may be elongate resembling a toothbrush or short and more or less terminal resembling a mop.

Thelymitra longifolia appears to be endemic to New Zealand as I have seen no specimens collected outside that country that are a good match for the type material. Australian members of the *T. longifolia* complex are often divided conveniently, but rather arbitrarily, into two smaller complexes on the basis of flower size and pollination biology. Members of the so-called *T. pauciflora* complex have small flowers (perianth segments usually to 10 mm long, sometimes as long as 12 mm and rarely reaching or exceeding 15 mm) that are usually unscented, generally autogamous and often also cleistogamous. Members of the so-called *T. nuda* complex generally have larger flowers (perianth segments on mature plants are usually more than 15 mm long and sometimes as long as 25 mm) that open more readily, are often scented and are pollinated by native bees (melittophilous). This latter group will be dealt with elsewhere.

The two complexes are probably artificial as several taxa could be placed in either group based on flower size and *T. malvina* appears to produce both insect-pollinated and autogamous clones. Also, initial phylogenetic studies based on molecular analyses do not support either of these complexes as being natural groups (M.A.Clements pers. comm.).

At the outset of this study, eight species were recognised in the *T. pauciflora* complex in Australia—*T. angustifolia*, *T. arenaria*, *T. atronitida*, *Thelymitra holmesii* Nicholls, *T. malvina*, *Thelymitra mucida* Fitzg., *T. pauciflora* and *T. planicola*. It became evident during this study that there are many more than just these eight species present. The differences between the species are often subtle and may only become evident after close scrutiny of fresh flowers with a hand lens or a microscope.

Traditionally, the column has provided the main suite of characters used to distinguish between the species in *Thelymitra*. To a large degree this remains true for this study, but vegetative characters are often also useful and must be taken into account. For example, *Thelymitra brevifolia* Jeanes can be identified with a high degree of confidence from mature leaves alone. The number of sterile bracts can also sometimes be a useful guide to help distinguish species such as *T. angustifolia* or *T. planicola*. Other features that can help distinguish the species relate to the colour of the flowers, the colour of the various parts of the column, habitat preference and flowering time.

The various members of the *T. pauciflora* complex have a propensity to hybridise with other *Thelymitra* species, both inside and outside the group, making positive identification of some plants extremely difficult.

Explanation of the terminology used

The genus *Thelymitra* is unusual in the Orchidaceae in that the six perianth segments generally differ very little from each other in terms of size, shape and ornamentation. The labellum does not bear any hairs, calli, glands, ridges, lobes, teeth or fringes and is

apparently not involved in pollination. Since the perianth is virtually actinomorphic and generally lacks characters by which to distinguish the species, traditionally the structure of the column has supplied most of these distinguishing characters. Over the years a terminology has evolved to describe the column structure in *Thelymitra*, but some of these terms are poorly understood and some have never been defined adequately. Below is an explanation of some of the terms commonly used in this paper; most have a traditional usage although this has often not been well understood while others are used for the first time.

Column (gynostemium): The column is exposed in the centre of the flower, it lacks a free filament and style, is short and thick and broadly winged from below the stigma to the level of the anther or beyond. The apex is usually 3–5-lobed and is often ornamented with trichomes, fringes, teeth, calli, glands, tubercles or lobes. In members of the *T. pauciflora* complex the apex of the column is more or less tri-lobed with trichomes adorning the two lateral lobes.

Post-anther lobe (mid-lobe): This structure lies beyond the point of insertion of the anther and of the lateral lobes, and it is usually of a different colour to the rest of the column. It has a complex vascular supply always associated with that of the functional anther and may be regarded as an outgrowth of the filament. In some species it is represented only by a short flap or a band of small calli crowded across the back of the anther. In most species it extends well beyond the anther with a free margin that may be plain, undulate, toothed, notched or variously ornamented with tubercles. At its maximum development (such as in the *T. pauciflora* complex) it forms a fleshy, tubular hood that is variously open on the ventral side and overhangs and obscures the anther. The apex of this tube is usually bright yellow and is often variously cleft into two distinct lobes that have shallowly toothed and often thickened margins.

Inflation of the post-anther lobe: In the literature the post-anther lobe has often been described as 'inflated', particularly in reference to some members of the *T. pauciflora* and *T. nuda* complexes. In this account the term inflated is used in relation to those taxa in which the shape of the post-anther lobe is noticeably bulbous and is discontinuous with the shape of the column lower down. This is often obvious when viewing the column in profile, but is usually more evident when viewing it from above and behind.

Post-anther lobe extension: This term is used in this account for the distance that the post-anther lobe extends beyond the point of insertion of the lateral lobes. This measurement varies considerably from taxon to taxon and is sometimes useful in helping to define the species.

Post-anther lobe orifice: In the *T. pauciflora* complex the orifice at the apex of the post-anther lobe varies considerably in size and shape. It may be more or less circular, narrow-elliptic or just a slit depending upon the degree of notching and dorsal compression of the post-anther lobe. In most species the orifice is rather large, indicating that the post-anther lobe does not contract greatly towards the apex. In a few species (e.g. *T. malvina*) the orifice is quite small, indicating a significant contraction in the post-anther lobe towards the apex.

Lateral lobes (column-arms or lateral staminodes): These two structures lie one each side of the post-anther lobe and of the anther and extend forward or upward and often converge. They are each supplied by a single unbranched vascular bundle and are thought to represent staminodes. They may be flat and ribbon-like, terete and finger-like, straight, curved, twisted spirally or bent sharply, and are usually ornamented with lobes, teeth, tubercles or trichomes. The lateral lobes are finger-like and trichomic in members of the *T. pauciflora* complex, but may be straight, curved gently, bent sharply, parallel or convergent.

Trichomes: These are the hair-like structures present on the lateral lobes of many *Thelymitra* species, including those in the *T. pauciflora* complex. They are each 1–2 cells wide throughout their length and may be thickened and glandular at the apex. They may extend along nearly the entire length of the lateral lobe in a toothbrush-like arrangement, or be concentrated mainly in the distal half in a more mop-like arrangement. In some species adjacent trichomes may be partially connate at the base. The trichomes are usually white, but may be mauve, pink, cream or yellow in some species.

Auxiliary lobes (accessory lobes or side lobules): Several species of *Thelymitra* have a pair of distinct lobes between the post-anther lobe and the lateral lobes. These have no vascular strand and are most accurately described as being part of a tripartite post-anther lobe. They tend to be fleshy with irregularly jagged margins and sometimes have small surface tubercles. In the *T. pauciflora* complex the auxiliary lobes are often completely absent or they may be reduced to a pair of small incurved spurs or bumps on the distal margin of the post-anther lobe.

Anther: In *Thelymitra*, the anther is usually small, ovoid, and situated entirely between the column wings. The connective extends beyond the pollinia into an apical beak-like projection of varying size. The anther may be entirely above the stigma or variously obscured behind it. In the *T. pauciflora* complex the anther is usually inserted about half way along the column and is most often entirely above the stigma.

Pollinia: Members of the genus *Thelymitra* contain four pollinia in two groups of two. In the *T. pauciflora* complex the pollinia are loosely bound and friable, with the monad pollen grains often scattered about the column even on flowers that have not yet opened naturally.

Stigma: The stigma in *Thelymitra* is more or less bi-lobed at the apex, usually quadrate or transverse-elliptic in shape and located at the base of the column on a thick stalk.

Materials and methods

This paper is the result of a qualitative and quantitative study of the pertinent type material (or photographic reproductions thereof), many hundreds of herbarium specimens (both dry and spirit-preserved) from AD, BM, BRI, CANB, E, HO, MEL, NSW, P, PERTH, QRS, SUNIV and WELT, and numerous freshly collected specimens, all of which were vouchered and deposited at the relevant herbaria. Orchid taxa in general, and *Thelymitra* taxa in particular, are much more readily identified from fresh living material where characters of the perianth, the column, flower colour and fragrance are still intact. Familiarity with the taxa gained from field study and the study of freshly collected specimens sent to me by field operatives has made the identification of dried and spirit-preserved herbarium material (including type specimens) much easier. In fact, several distinct taxa were discovered during field work and during the examination of fresh material that, although represented in the preserved collections, would probably have been overlooked due to the loss or degradation of important diagnostic information on drying or spirit preservation.

When collecting *Thelymitra* for study it is essential that the entire above ground parts of the plant are taken, with the majority of the material being preserved in spirit. Plants preserved in the pressed state are often difficult to identify to species level in the absence of additional information. Spirit preserved specimens on the other hand, are generally much more easily identified to species level. The observation of plants growing *in-situ* is the ideal method of study for *Thelymitra* in general, and often it is only by this method that cryptic new species can be identified. For this reason the importance of field work in the study of species complexes within *Thelymitra* cannot be overstated and should form an integral part of any future studies of the group. It is likely that other taxa worthy of

recognition exist within this large and diverse complex, but adequate information and collections of these are lacking at present.

Taxonomy

Key to the known members of the *T. pauciflora* complex in Australia.

1. Post-anther lobe covered with a glaucous or glistening bloom 2
1. Post-anther lobe lacking bloom 4
2. Post-anther lobe narrow at the base and widest towards the apex; trichomes on the lateral lobes usually 1.2–2.2 mm long, sparse, often connate at the base, 0.05–0.1 mm thick, usually bright yellow, strongly embracing the apex of the post-anther lobe; southern Australia.....**19. *T. mucida***
2. Post-anther lobe widest near the middle and narrowing only slightly above and below; trichomes on the lateral lobes usually 1–1.6 mm long, congested, not connate at the base, <0.05 mm thick, white or creamy yellow, not strongly embracing the apex of the post-anther lobe; southeastern Australia.....3
3. Post-anther lobe somewhat inflated, mostly black with a yellow apex, covered with a thin sparkling bloom, bilobed, the lobes 1.2–1.6 mm long; trichomes on the lateral lobes 1–1.2 mm long, usually white, sometimes cream; plants from swampy habitats, often in standing water at anthesis; flowering season mid-November to mid-December .....**20. *T. lucida***
3. Post-anther lobe very inflated, mostly pinkish or brown grading into yellow at the apex, covered with a thick, waxy bloom, deeply bilobed, the lobes 1.5–2.5 mm long; trichomes on the lateral lobes 1.2–1.6 mm long, usually cream or yellow; plants from dry to moist woodland habitats, rarely in standing water at anthesis; flowering season late September to mid-November.....**21. *T. inflata***
4. Trichomes on the lateral lobes usually cream or yellow, proximal trichomes often pinkish, at least basally 5
4. Trichomes on the lateral lobes usually entirely white, rarely mauve 7
5. Post-anther lobe very inflated, mostly pinkish or brown grading into yellow at the apex, deeply bilobed, the lobes more or less parallel, 1.5–2.5 mm long **21. *T. inflata***
5. Post-anther lobe somewhat inflated, mostly dark brown or black with a distinct yellow apex, bilobed, the lobes usually diverging, 0.8–1.5 mm long 6
6. Perianth segments usually 8–11 mm long; trichomes on the lateral lobes 1.2–1.8 mm long, rather sparse and of an untidy appearance; flowering season mostly November and December; southeastern Australia only .....**22. *T. holmesii***
6. Perianth segments usually 12–15 mm long; trichomes on the lateral lobes 1–1.5 mm long, very dense and of a neat appearance; flowering season mostly late September and October; southwestern Australia only .....**23. *T. xanthotricha***
7. Post-anther lobe more or less erect, not curved forward; plant to 14 cm tall; flowers 1–3; lower sterile bract entire or deeply bifid; rock outcrops in Western Australia .....**18. *T. frenchii***
7. Post-anther lobe curved forward through c. 90°; plant usually >14 cm tall; flowers often more than 3; lower sterile bract entire 8
8. Post-anther lobe semi-cylindric, widely open on the ventral side; sterile bracts up to 4, lower ones often leaf-like .....**14. *T. planicola***
8. Post-anther lobe not as above; sterile bracts usually 1, 2 or 3, none of them leaf-like 9
9. Leaf lanceolate (at least on mature plants), usually less than half the height of the inflorescence and often much shorter, blade more or less flat and thin-textured, frequently with dark reddish margins, veins and suffusions; post-anther lobe often deeply and irregularly slit at the apex into 2 parallel lobes, usually orange-brown or bright reddish orange .....**3. *T. brevifolia***

9. Leaf linear to linear-lanceolate, usually fleshy and canaliculate (except in *T. angustifolia*), mostly more than half the height of the inflorescence; post-anther lobe sometimes v-notched but not irregularly slit at the apex, usually brown to black with a yellow tip, rarely all blue 10
10. Post-anther lobe strongly compressed dorsally in the distal half, apical orifice small; trichomes white or mauve 11
10. Post-anther lobe not as above; trichomes white 12
11 Post-anther lobe mostly glossy black; trichomes white; sterile bracts usually 2; flowers pale blue .....**10. *T. atronitida***
11. Post-anther lobe dark reddish brown; trichomes usually pink or mauve, rarely white; sterile bracts usually 3; flowers slate blue to purplish .....**11. *T. malvina***
12. Lateral lobes not glabrous at the base, with trichomes extending more or less along their entire length in a toothbrush-like arrangement 13
12. Lateral lobes glabrous in at least the basal $^{1}/_{4}$ to $^{1}/_{2}$, with trichomes in a more or less terminal mop-like arrangement 20
13. Perianth segments often more than 12 mm long; mature plants tall and stout; flowers more than 8 on at least some mature plants 14
13. Perianth segments rarely more than 12 mm long; mature plants rather small and slender; flowers rarely more than 8 even on mature plants 16
14. Post-anther lobe deeply v-notched, black with a yellow apex; flowers white or very pale blue; sterile bract usually solitary; near coastal Victoria only ...**9. *T. pallidiflora***
14. Post-anther lobe emarginate, brown with a yellow apex; flowers usually blue or purplish; sterile bracts usually two 15
15. Lower pedicels often partially decurrent on rachis; sepals mostly green on external surface; base of upper sterile bract often only half encircling the scape; sterile bracts to 15 cm long; fertile bracts to 35 mm long .....**8. *T. bracteata***
15. Pedicels never decurrent on rachis; sepals mostly purplish on external surface; base of upper sterile bract usually scape-encircling; sterile bracts to 8.5 cm long; fertile bracts to 22 mm long .....**16. *T. arenaria***
16. Post-anther lobe narrowest at the base and broadest towards the apex, deeply v-notched; southwest Western Australia .....**15. *T. vulgaris***
16. Post-anther lobe usually broadest near the middle, narrowing only slightly above and below, emarginate to shallowly v-notched; southeastern Australia 17
17. Plants short and stout, often forming clumps apparently by vegetative reproduction; leaf nearly as long as, or longer than, inflorescence; lowest fertile bract often with proximal margins connate 18
17. Plants slender, not clumping; leaf much shorter than the inflorescence; fertile bracts with margins entirely free; South Australia 19
18. Leaf very thick, fleshy and brittle, as long as or longer than inflorescence ....**4. *T. basaltica***
18. Leaf moderately fleshy, flexible, shorter than inflorescence .....**2. *T. exigua***
19. Flowers 1–10, usually white; post-anther lobe reddish brown with a yellow apex; trichomes on lateral lobes in elongate tufts .....**6. *T. albiflora***
19. Flowers 1–3, usually blue; post-anther lobe entirely dark blue; trichomes on lateral lobes in subglobose tufts .....**7. *T. cyanapicata***
20. Leaf 75% of the height of the inflorescence or longer 21
20. Leaf less than 75% of the height of the inflorescence 22
21. Plant with an overall pale greenish appearance; leaf fleshy; sterile bracts usually 2; post-anther lobe shallowly v-notched at the apex; flowers late October to early December; near-coastal Tasmania only .....**5. *T. viridis***
21. Plant without an overall pale greenish appearance; leaf thin-textured; sterile bracts usually 3; post-anther lobe usually deeply bilobed at the apex; flowers June to October; Queensland and northern New South Wales .....**13. *T. angustifolia***

22. Flowers usually 1–3, most often pale blue; lateral lobes 0.5–1 mm long, bent sharply upwards at c. 90° near the middle; post-anther lobe entire or emarginate ....**1. *T. pauciflora***
22. Flowers usually 4–10, most often mauve or deep purplish blue; lateral lobes 1.2–1.5 mm long, curved gently upwards; post-anther lobe often deeply bilobed at the apex 23
23. Exterior of sepals pink with darker longitudinal striations; mature flower buds inflated, subacute at apex; leaf usually less than 10 mm wide; hill country of South Australia .....**17. *T. batesii***
23. Exterior of sepals not as above; mature flower buds not inflated, acute at apex; leaf often more than 10 mm wide; widespread in southeastern Australia ....**12. *T. peniculata***

1. *Thelymitra pauciflora* R.Br., *Prodr*. 314 (1810).

Type: Between Sydney and Parramatta, moist meadows, Port Jackson, ix.–x. 1803, *R. Brown s.n.* (lectotype α BM!, *fide* Clements 1989; isolectotypes BM!, E!); *Syntypes*: Port Jackson between Sydney and Parramatta, ix., *R. Brown s.n*. (BM!, E!); Sydney, x.–xi. 1803, *R. Brown s.n.* (BM!).

Illustrations: Fitzgerald (1880) 1: 6; Nicholls (1969) Plate 23, fig. a; .Jeanes & Backhouse (2001) page 170 fig. A.

Glabrous terrestrial *herb*. *Tubers* ovoid, 1–2 cm long, 5–10 mm wide, fleshy. *Leaf* linear, (8–)15–30 cm long, 3–6 mm wide, erect, fleshy, canaliculate, dark or light green with a purplish base, ribbed abaxially, sheathing at base, apex acute to acuminate. *Inflorescence* 15–50 cm tall, 1–1.5 mm diam., slender, straight, green to purplish. *Sterile bracts* usually 1 or 2, rarely 3, linear to linear-lanceolate, 1.5–5 cm long, 3–5 mm wide, closely sheathing, acute to acuminate, green to purplish. *Fertile bracts* ovate-acuminate to obovate-acuminate, 4–15 mm long, 2–5 mm wide, sheathing the pedicels, green to purplish. *Pedicels* 1–10 mm long, slender. *Ovary* narrow-obovoid, 5–12 mm long, 2–4 mm wide. *Flowers* 1–3(–5), 15–20 mm diameter, usually pale blue, less often pink or white, opening tardily on warm to hot days. *Perianth segments* 6–10 mm long, 3–5 mm wide, concave, often shortly apiculate; *dorsal sepal* lanceolate to ovate, obtuse to subacute; *lateral sepals* lanceolate to ovate, often asymmetric, acute; *petals* ovate to obovate, obtuse to subacute; *labellum* elliptic to lanceolate, acute, often smaller than other segments. *Column* erect from the end of ovary, 4–5 mm long, 2–2.5 mm wide, white to pale blue or pale pink; *post-anther lobe* hooding the anther, 1.8–2.5 mm long, 1–1.5 mm wide, tubular, gently curved, usually brown or reddish brown, apex entire to emarginate, yellow; *post-anther lobe extension* 0.4–0.7 mm; *auxiliary lobes* absent or sometimes present as 2 tiny incurved spurs on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 0.5–1 mm long, digitiform, porrect at base, bent sharply upwards near the middle at c. 90°, each with a sub-terminal mop-like tuft of white trichomes that touch the ventral side of the apex of post-anther lobe, the individual trichomes 0.5–1.1 mm long. *Anther* inserted above centre of column, ovoid, 2–2.5 mm long, 1–1.5 mm wide, the connective produced into an apical beak 0.4–0.6 mm long; *pollinarium* 1.4–2 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* mealy, friable, white. *Stigma* situated at base of column, ovate-quadrate, 1.5–2 mm long, 1.5–2 mm wide, margins irregular. *Capsules* obovoid, 8–15 mm long, 3–6 mm wide, erect, ribbed. (Fig. 1 a–c; Plate 1. Fig. 9)

Selected specimens examined: **South Australia**: Northern Lofty Region: Hughes Park, via Sevenhill, x. 2000, *R.J. Bates 57679* (MEL *2100135*); Kangaroo Island Region: Penneshaw–Kingscote Road, c. 8 km S of American River turnoff, 12 viii. 1993, *D.L. Jones 11885 & B.E. Jones* (CANB *9706994*); Southeast Region: c. 20 km NE of Naracoorte, 20 x. 1997, *K.*

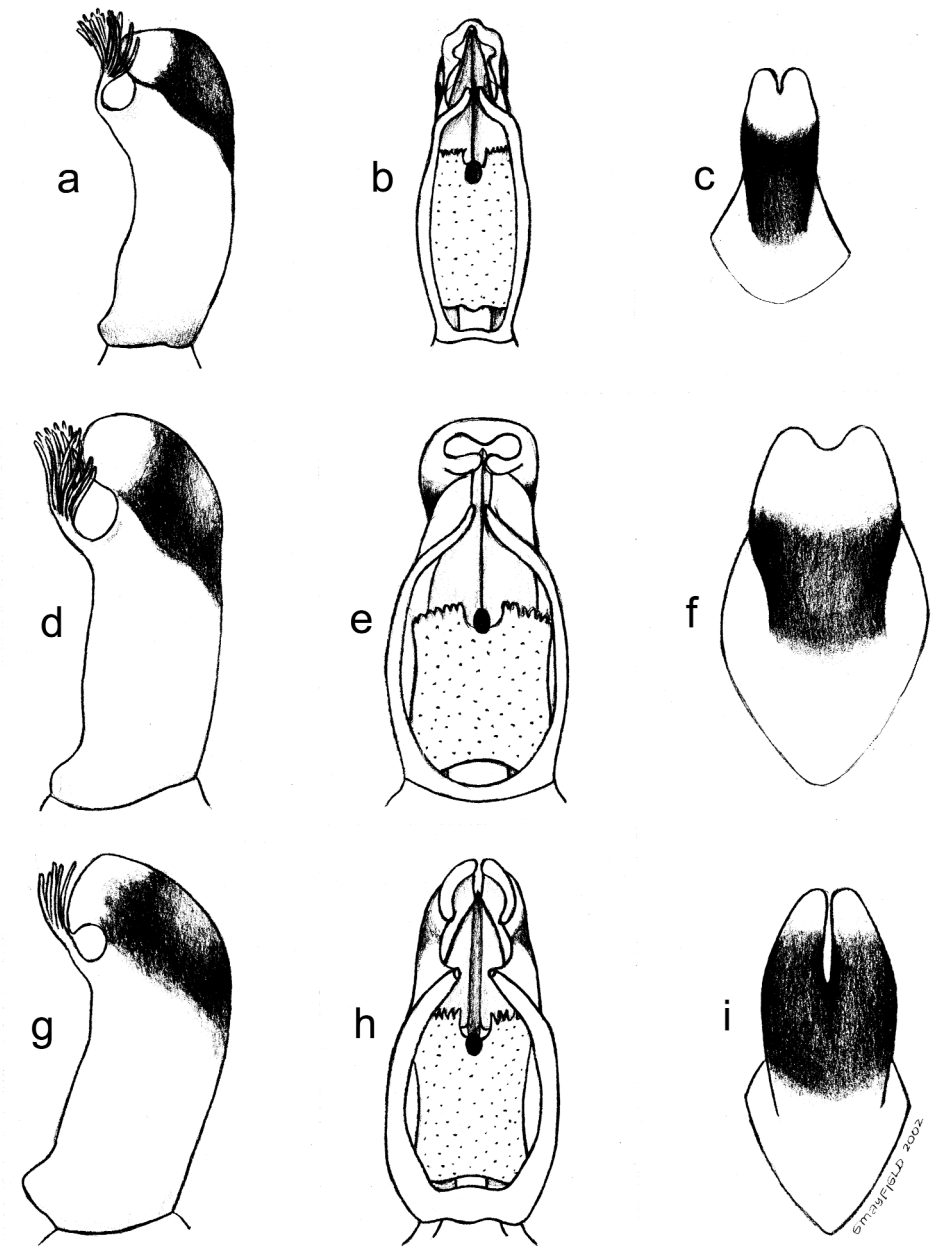

Figure 1.
Thelymitra pauciflora: **a** column from side x 10; **b** column from front x 10; **c** post-anther lobe from rear x 10
Thelymitra exigua: **d** column from side x 10; **e** column from front x 10; **f** post-anther lobe from rear x 10;
Thelymitra brevifolia: **g** column from side x 10; **h** column from front x 10; **i** post-anther lobe from rear x 10

Alcock DLJ15636 (CANB *9908934*); Southern Lofty Region: Blackwood district, x. 1953, *R. Nash s.n.* (CANB *8104526*); Eyre Peninsula Region: Warilla, 27 ix. 1986, *M.A. Clements 4265* (CANB *8605411*); 97 Cove Avenue, Bridgewater, 9 xi. 1989, *J.Z. Weber 10201* (MEL *289488*); Southern Lofty Region: Forest Range, 20 x. 1968, *M.R. Pocock 132* (AD *MRP132*); Southern Lofty Region: Littlehampton, 24 x. 1907, *R.S. Rogers s.n.* (AD *97721136*);); Southern Lofty Region: Myponga, 25 x. 1931, *Dr & Mrs Rogers s.n.* (AD *97721142*); Fleurieu Peninsula: c. 1 km N of Normanville Township, 16 x. 1967, *T. Smith 855* (AD *96938072*). **Queensland**: Girraween National Park, 17 x. 1996, *R. Crane 1721* (BRI *656629*); Stanthorpe, 15 x. 1987, *R.J. Bates 11066* (AD *98746541*). **New South Wales**: Southwest Slopes: Nailcan Range, Albury, 17 x. 1998, *P.G. Branwhite ORG1643* (CANB *609311*); Within 100 m to the S of Leuna Ave, Fox Valley, 23 ix. 1988, *P.H. Weston 1243 & A.D. Bishop* (NSW *209969*); Beecroft Peninsula, near Kinghorn Point, 28 ix. 1987, *K. Egerod 87347* (NSW *462474*); Central-west Slopes: Top Creek Property, c. 27.5 km NNW of Boorowa, 30 x. 1985, *P. Beesley 504, I. Gleadhill & B. Rimes* (CANB *8504324*); Central Coast: Western Yeramba Lagoon, near Picnic Point, 22 x. 1990, *R. Miller DLJ6780* (CANB *9016251*); North Coast: Yuraygir National Park turnoff, c. 1 km from Pacific Highway, 31 viii. 1989, *D.L. Jones 4901 & M.A. Clements* (CANB *8913433*). **Australian Capital Territory**: Brindabella Ranges, c. 6.3 km W of junction of Mt Franklin and Brindabella Valley Roads, 24 xi. 1991, *D.L. Jones 8552 & B.E. Jones* (CANB *9803943*); Black Mountain on NW slope, 7 xi. 1975, *B. Hain 78* (CANB *61930*). **Victoria**: Mt Morton, 14 x. 1967, *D.L. Jones s.n.* (CANB *8104540*); Warby Range. 3.2 miles from Wangaratta Cemetery turnoff, Hume Highway, 25 x. 1967, *E.M. Canning EMC113* (CANB *33722*); Wattle Glen. Moonlight Road, 1.1 km from its junction with Flat Rock Road, 8 x. 1973, *T.B. Muir 5175* (CANB *8309406*); 'Jindalee', Greta West, 8 x. 1999, *J.R. Hosking 1771* (MEL *294410*); 3.4 km W of Mackillop's Bridge, Snowy River region, 14 xi. 1993, *S.M. Prober s.n.* (CANB *492578*); Gippsland Highlands: Darlimurla area, c. 500 m W of Darlimurla Railway Station beside old rail line, 8 xi. 2000, *J.A. Jeanes 936* (MEL *2087448* & MEL *2089312*); Enfield Forest Park, Berringa–Misery Creek Road area, c. 27 km SSW of Ballarat, 25 x. 1978, *A.C. Beauglehole 61079* (MEL *1530882*); Wannon: Mt Richmond, West Spring Track, N end, 1 xi. 1991, *T.J. Entwisle 2101* (MEL *2018756*). **Tasmania**: Near Naracoopa tip, King Island, 5 xi. 1991, *D.L. Jones 8468* (CANB *9803868*); Old Waterhouse Rd, 8 xi. 1992, *J. Campbell 92176* (CANB *612478*); Clarkes Island, Robin Hill, 7 xi. 1979, *J.S. Whinray 2260* (MEL *594272*); Sandspit River at base of Blue Gum Spur, 22 xi. 1984, *M.J. Brown 474* (HO *412448*); Close to the Tasman Highway S of Elephant Pass and a few km N of Piccaninny Creek, 6 xi. 1985, *L. Rubenach s.n.* (HO *95782*); N of Coles Bay, 6 xi. 1985, *L. Rubenach s.n.* (HO *96781*); Banana Ridge, 20 km NNW of Lady Barron, Flinders Island, 26 x. 1990, *P. Collier 4864* (HO *127022*); Lime Bay Nature Reserve, Tasman Peninsula, 3 xi. 1984, *P. Collier 11/12* (HO *99516*).

Distribution and habitat: South Australia, Queensland, New South Wales, Australian Capital Territory, Victoria, Tasmania (Fig. 11) and New Zealand. Grows in a wide variety of habitats including open forest, woodland, heathy woodland, heathland, grassland and coastal scrublands usually on well-drained sand and clay loams. Altitude: 0–1000 m.

Conservation status: Widespread, often locally common and well conserved.

Flowering period: September to November.

Pollination biology: This species is facultatively autogamous and often also cleistogamous.

Typification: The type sheet contains nine specimens and two labels showing different origins and dates, which is why Clements (1989) selected specimen 'a' as the lectotype. All the plants are, however, of fairly consistent appearance and apparently represent a single taxon.

Brown's Latin description (Brown 1810): *T. pauciflora*, cucullo perianthio patulo dimidio breviore: laciniis extimis penicillatis: intermediâ dorso nudo emarginatâ lobulis rotundatis integris, spicâ pauciflorâ. (hood shorter than half the widely spread perianth: side lobes penicillate: post-anther lobe naked, emarginate, lobules rounded, entire, spike few-flowered.)

Notes: Plants consistent with Brown's description of *T. pauciflora* and with the specimens on the type sheet still occur near Sydney and have been collected recently and

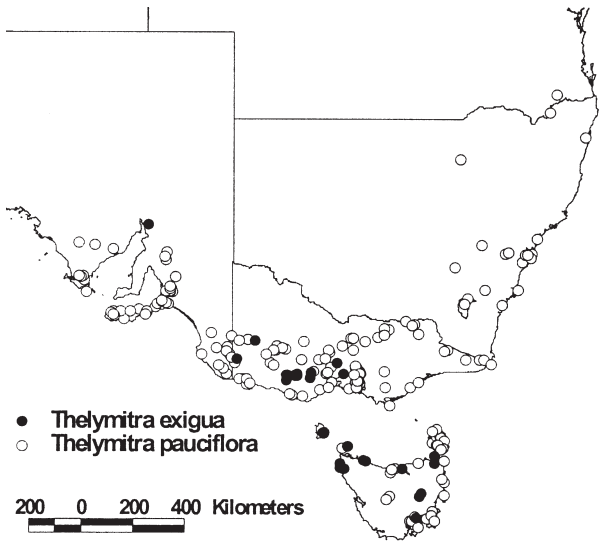

Figure 11. Distribution of *Thelymitra exigua* and *Thelymitra pauciflora*.

studied. This taxon appears to be relatively common and widespread throughout much of southeastern Australia. However, *T. pauciflora* remains poorly known today due to the presence of many taxa that bear several features in common with the type, but may also differ from it in subtle ways. Several characters can be used in combination to define *T. pauciflora sensu stricto*. At lower elevation it flowers primarily in October and usually prefers to grow in open forests on drier clay or sandy loam soils. The leaf is long, narrow and fleshy, rarely exceeding 6 mm wide and the scape is slender and up to 50 cm tall, usually with two sterile bracts. There are usually only one to three (but sometimes as many as five) flowers that are autogamous (sometimes also cleistogamous) and will open tardily only on very warm to hot days. The perianth segments are usually up to 10 mm long, and about half as wide, pale blue or, less often, pink or white in colour. The post-anther lobe is more or less tubular (widely open on the ventral side), not inflated, and the apex is entire or emarginate. The lateral lobes are usually up to 1 mm long and bend upwards sharply (at c. 90°) near their middle. The trichomes on the lateral lobes are usually up to c. 1 mm long and are arranged in very dense sub-terminal mop-like bundles that touch the underside of the tip of the post-anther lobe.

It is interesting to note that several collections seen by me from New Zealand (on loan from WELT) are a good match for the type material of *T. pauciflora*.

2. *Thelymitra exigua* Jeanes *sp. nov.*

T. pauciflorae R.Br. affinis sed plantis brevioribus crassioribus caespitiformantibus generatum, folii latiore saepe scapo aequante, bractea sterili plerumquo solitaria, et inflorescentia densiore floridiore differt.

Type: Victoria. Volcanic Plain Region: N side of Chatsworth Rd c. 2 km E of Woorndoo, 8 x. 1999, *J.A. Jeanes 567, C. & M. Trigg* (holotype MEL; isotype CANB).

Illustration: Jeanes & Backhouse (2001) page 170 figs B (top) & E. (as *T. pauciflora*).

Glabrous, clumping, terrestrial *herb*. *Tubers* not seen. *Leaf* linear to linear-lanceolate, (5–)10–22 cm long, 2.5–10 mm wide, erect, fleshy, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute to shortly acuminate.

Inflorescence (7–)15–25(–35) cm tall, 1–2.5 mm diam., straight, usually purplish, sometimes green. *Sterile bract* usually 1, occasionally 2, linear to linear-lanceolate, 2–5.5 cm long, 3.5–6 mm wide, green and purplish or entirely purple, closely sheathing, apex acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 4–20 mm long, 3–7 mm wide, closely sheathing the pedicels, usually purplish, occasionally the proximal margins of lowest bract connate. *Pedicels* 0–10 mm long, slender. *Ovary* narrow-obovoid, 5–14 mm long, 2–4 mm wide. *Flowers* 1–8, 13–21 mm diameter, usually pale blue or pale purplish blue, rarely pink or white, opening tardily on warm to hot days. *Perianth segments* 5–11 mm long, 3–6 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate-lanceolate to ovate, acute to subacute, slightly larger than other segments; *lateral sepals* lanceolate to ovate-lanceolate, slightly asymmetric, acute; *petals* ovate to ovate-lanceolate, obtuse to subacute; *labellum* lanceolate to ovate-lanceolate, acute, slightly smaller than other segments. *Column* erect from the end of ovary, 4–6 mm long, 2–3 mm wide, pale pink to pale purplish; *post-anther lobe* hooding the anther, 2–3 mm long, 1.5–2 mm wide, tubular, slightly inflated, open on the ventral side, gently curved, dark brown to black, apex thickened, almost entire to shallowly v-notched, yellow; *post-anther lobe extension* 0.4–0.6 mm; *auxiliary lobes* absent, or sometimes present as 2 tiny incurved spurs on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 0.8–1 mm long, digitiform, porrect at base, curved sharply upwards near the middle at c. 90°, each with a toothbrush-like arrangement of white trichomes along virtually their entire length, the individual trichomes 0.6–1 mm long, embracing the apex of the post-anther lobe. *Anther* inserted about mid-way along column, ovoid, 2–2.6 mm long, 1.3–2 mm wide, connective produced into an apical beak 0.5–0.9 mm long; *pollinarium* 1.3–2 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.5–2.5 mm long, 1.5–2 mm wide, margins irregular. *Capsules* obovoid, 10–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 1 d–f; Plate 1. Fig. 10).

Selected specimens examined: **South Australia**: Flinders Range district: Alligator Gorge, top of the gorge on road to Battery Track, 30 ix. 1986, *M.A. Clements 4325* (CANB *8605470*); Spring Gully Conservation Park, 130 km N of Adelaide, 28 x. 2001, *R.J. Bates 60133* (MEL *2136725*). **Victoria**: 10.5 km NW of Rokewood on the Skipton Road, 17 x. 2001, *J.A. Jeanes 1169* (MEL *2114717*, MEL *2114719* & CANB); Gisborne, 25 x. 1935, ?*G. Lyell s.n.* (MEL *573910*); Glenelg Shire, 4.75 miles W of Dergholm Post Office, 23 xi. 1971, *A.C. Beauglehole 37935* (MEL *652629* & MEL *2039748*); 14 km ENE of Mortlake, 18 x. 1991, *A.D. Bishop J175/27-29* (NSW *429778*); Beside Chatsworth Rd, c. 5 km W of Derrinallum, 15 x. 1991, *J.A. Jeanes 559* (MEL *2136716*); Township of Cressy on land adjacent to Hamilton Highway, 8 x. 1999, *J.A. Jeanes 572, C. & M. Trigg* (MEL *2136708*). **Tasmania**: Black Bull Scrub, c. 8.2 km S of Marrawah, 2 xi. 1998, *D.L. Jones 16065* (CANB *605698*); Mt Cameron, 19 xi. 1983, *A. Moscal 4218* (HO *110129*); Knocklofty, xi. 1840, *R.C. Gunn s.n.* (HO *00320737*); 11.2 km S of Arthur River, towards Temma, 4 xi. 1998, *D.L. Jones 16150* (CANB *605792*); King Island: Rocky cliffs N of Barrier Creek near top of ridge, 28 x. 1998, *D.L. Jones 15955 & M. Garratt* (CANB *605588*); Couta Rocks, scrub and rocky hills E of shacks, 3 xi. 1998, *D.L. Jones 16126* (CANB *605768*); Sisters Beach, near store, 31 x. 1998, *D.L. Jones 16020 & M. Garratt* (CANB *605653*); Flinders Island. Big River Rd, 16 x. 2000, *H. Wapstra JAJ881 & A. Wapstra* (MEL *2136710*).

Distribution and habitat: South Australia, Victoria and Tasmania (Fig. 11). Grows in basaltic grasslands, grassy woodlands, heathy woodland, heathland and dense shrubland, generally on heavy brown or black loam soils or occasionally on grey sandy loam. Altitude: 50–300 m.

Conservation status: Widespread, moderately abundant and well conserved.

Flowering period: September to November.

Pollination biology: This species is facultatively autogamous and sometimes also cleistogamous.

Notes: *Thelymitra exigua* is a cryptic species that has been overlooked in the past. There are a number of features that can be used in combination to define this species and distinguish it from all related taxa. Plants often grow in tight clumps, apparently from vegetative reproduction. The leaf is relatively broad and fleshy and is often nearly as tall as the inflorescence. The inflorescence is short and stout, rarely more than 25 cm tall, and usually has a solitary sterile bract. The lowest fertile bract sometimes (but not always) has the lower margins fused so that its base completely surrounds the rachis and pedicel. There are generally from one to four flowers (but sometimes as many as eight) that are autogamous (sometimes also cleistogamous) and will open tardily only on very warm to hot days. The perianth segments are up to 11 mm long, pale blue or pale purple, less often pink or white in colour. The post-anther lobe is slightly inflated and usually shallowly bilobed at the apex. The lateral lobes are up to 1 mm long and bend sharply upwards (at c. 90°) near their middle. The trichomes are up to 1 mm long and are in a toothbrush-like arrangement along virtually the entire length of the lateral lobes.

Thelymitra exigua is probably most closely related to *Thelymitra basaltica* Jeanes with which it sometimes grows. Both species share a clumping habit, but the latter generally flowers a little earlier, is a stockier plant, has larger ovaries and a longer, fleshier, more brittle leaf. The two species are readily distinguishable *in situ*, but less so in the preserved state as specimens are often incomplete or poorly pressed.

Thelymitra pauciflora is a taller, more slender, solitary species with a relatively shorter, narrower leaf and mop-like tufts of trichomes on the lateral lobes of the column.

Thelymitra exigua sometimes grows with *Thelymitra gregaria* D.L.Jones & M.A.Clem. and apparent hybrids between the two are common at these sites.

Etymology: Latin *exigua*, small, short: an allusion to the short, stout nature of the plants.

3. *Thelymitra brevifolia* Jeanes, *sp. nov.*

T. pauciflorae R.Br. affinis sed plantis robustioribus generatim, folio latiore et breviore proportione, inflorescentia plerumque floridiore, lobo post-antheram profunde irregulariter dissecto in duos lobos parallelos plus minusve, croceo-vivido saepe differt.

Type: Victoria. St Andrews, Dodd Street Reserve, 28 x. 2000, *J.A. Jeanes 896, S.A. Jeanes & C.M. Beardsell* (holotype MEL; isotypes MEL, CANB).

Thelymitra pauciflora R.Br. var. *pallida Nicholls, Orchidol. Zeylanica* 2: 159 (1935), *nom. inval. Type:* near Bell in the Blue Mountains, x. 1929, x. 1930 & x. 1933, *E. Nubling s.n.* (syntype MEL!) *syn. nov.*

Illustrations: Bates & Weber (1990) fig. 222 (as *T. pauciflora*); Bates (1999) page 69 fig. 3 (as *Thelymitra* sp. aff. *pauciflora*); Jeanes & Backhouse (2001) page 170 figs A–C (lower) (as *T.* sp. aff. *pauciflora* 1).

Glabrous terrestrial *herb*. *Tubers* ovoid, 1–2 cm long, 5–10 mm wide, fleshy. *Leaf* linear-lanceolate to lanceolate, (5–)10–26 cm long, (3–)7–20 mm wide, erect, thin-textured or leathery, more or less flat, ribbed abaxially, scabrous, dark green, often suffused with reddish purple, margins and mid-vein often purplish, base purplish, sheathing at base, apex acute to shortly acuminate. *Inflorescence* (12–)25–60 cm tall, 1–3.5 mm diam., straight, green to purplish. *Sterile bracts* usually 2, rarely 1 or 3, linear to linear-lanceolate, 2–9 cm long, 3.5–10 mm wide, closely sheathing, green or purplish, apex acute to acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 4–22 mm long, 3–7 mm wide, closely sheathing the pedicels, green or purplish. *Pedicels* 1–16 mm long, stout or slender. *Ovary* narrow-obovoid, 5–12 mm long, 2–4 mm wide. *Flowers* 2–10(–20), 12–22 mm diameter, usually purplish blue to purplish, rarely pink or white, opening only on warm to hot days. *Perianth segments* 6–10(–12) mm long, 3–6 mm wide,

concave, often shortly apiculate; *dorsal sepal* ovate-lanceolate to ovate, subacute; *lateral sepals* lanceolate to ovate-lanceolate, slightly asymmetric, acute; *petals* ovate, subacute; *labellum* lanceolate to ovate-lanceolate, acute, slightly smaller than other segments. *Column* erect from the end of ovary, 4–5.5 mm long, 2–3 mm wide, pale blue or pale pink; *post-anther lobe* hooding the anther, 2.5–3 mm long, 1.5–2.2 mm wide, tubular, not inflated, open on the ventral side, gently curved, dark brown, bright reddish orange, yellow or rarely black, apex thickened, almost entire, emarginate or deeply and irregularly slit producing 2 more or less parallel lobes, inner margin of lobes often erose, a small spur or bump often present at base of slit; *post-anther lobe extension* 0.4–0.8 mm; *auxiliary lobes* often present as 2 tiny bumps on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 0.7–1 mm long, digitiform, porrect at base, curving gently upwards, each with a small, sub-terminal, mop-like tuft of white trichomes embracing the apex of the post-anther lobe, the individual trichomes 0.6–1 mm long. *Anther* inserted about midway along column, ovoid, 1.8–2.6 mm long, 1.2–2 mm wide, connective produced into an apical beak 0.3–0.6 mm long; *pollinarium* 1.2–2.2 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, c. 2 mm long, c. 2 mm wide, margins irregular. *Capsules* obovoid, 10–15 mm long, 4–7 mm wide, erect, ribbed. (Fig. 1 g–i; Plate 1. Fig. 12)

Selected specimens examined: **South Australia**: Southern Lofty Region: Scott Creek Conservation Park, 11 x. 1998, *R.J. Bates 51253* (CANB *612490*); Mt Bold, 28 x. 1994, *R.J. Bates 39546* (CANB *612492*); Southern Lofty Region: Cleland Conservation Park, 24 x. 1983, *R.J. Bates 25* (MEL *683700*); Mt Bold Rd, 28 x. 1994, *R.J. Bates 39547* (AD *RJB39547*); Southern Flinders Region: Alligator Gorge, 30 x. 1988, *R.J. Bates 15899* (AD *98848211*); Normanville, 16 x. 1967, *T. Smith 855* (AD *TS855*); Northern Lofty Region: Hughes Park, woodland S of Clove, x. 2000, *R.J. Bates 57675* (MEL *2100150*); Southern Lofty Region: Adelaide Gully Rd, Millbrook, 21 x. 2000, *R.J. Bates 57620* (MEL *2100142*). **New South Wales**: Southwest Slopes: Albury, 17 x. 1998, *P.G. Branwhite ORG2138* (CANB *611770*); Tinderry Mountains, 8.4 miles from Michelago towards Little Tinderry Homestead, 18 xii. 1972, *E.N. Canning 3422A* (CANB *51946*); Boyd River Trail, c. 3.5 km from Kanangra Walls Rd, 17 xi. 1991, *A.D. Bishop 180/0-3* (NSW *430010*); Newnes State Forest. Bungleboori picnic area, across road from cleared, grassy area, 24 i. 1996, *P.H. Weston 1951 & D.C. Godden* (NSW *394737*); Southern Tablelands. Top of the Great Dividing Range on road between Bungendore and Braidwood, 3 xi. 1996, *M.A. Clements 9121* (CANB *611776*); c. 9 km E of Captains Flat, at junction of Rocky Pic Forest Rd and Braidwood–Captains Flat Rd., 29 xi. 2000, *D.L. Jones 17734* (MEL *2136733* & CANB). **Australian Capital Territory**: Black Mountain, 16 x. 1998, *M.A. Clements 9754* (CANB *613157*); Brindabella Ranges, c. 4.6 km along Bendora Dam Road from Bulls Head, 24 xi. 1991, *D.L. Jones 8566 & B.E. Jones* (CANB *9803957*); Brindabella Ranges, corner of Warks Rd and Bendora Dam Road, 24 xi. 1991, *D.L. Jones 8560 & B.E. Jones* (CANB *9803951*). **Victoria**: 4 km S of St Arnaud P.O., 26 x. 1979, *A.C. Beauglehole 65614* (MEL *1530884*); Cardinia Reservoir. Bush adjoining E side of Aura Vale Lake, just S of Aura Vale Rd, 20 x. 1977, *T.B. Muir 5605* (MEL *1509600* & MEL *2039532*); Mt Eliza, between Balcome Creek and Emil Madsen Reserve, 30 x. 2000, *S.H. Lewis 755* (MEL *2089308*); Casterton–Penola Rd, c. 15 km W of Casterton, 2 xi. 1991, *T.J. Entwisle 2118* (MEL *2018774* & MEL *2018773*); Warrandyte State Park, Warrandyte, 'Fourth Hill' section, 6 xi. 1992, *D.J. Van Bockel 187* (MEL *2016932* & MEL *2046966*); Grampians area. Private Property adjoining Wartook State Forest and close to McKenzie River, 2 xi. 1988, *M.G. Corrick 10429* (MEL *1559753* & MEL *2039528*); Mt Richmond, West Spring Track, N end, 1 xi. 1991, *T.J. Entwisle 2098* (MEL *2018753*); Northern Plains region: Mount Pilot, 6 xi. 1998, *P.G. Branwhite ORG2121* (CANB *612469*); Beside Stony Point Railway line c 300 m NW of Stony Point Station, 15 x. 1999, *J.A. Jeanes 588* (MEL *2136707*). **Tasmania**: Near Gladstone, 1 xi. 1987, *R.J. Bates 11892* (BRI *652282*); Turnoff to Primrose Sands, north side of Arthur Highway, 20 xi. 1992, *J.E. Wapstra DLJ10924 & A. Wapstra* (CANB *611783*); Somerset, hills behind town in the private property of Albert Rettke, 6 xi. 1984, *M.A. Clements 3575d* (CANB *611793*); Quarry Hill between Boat Harbour and Sisters Beach, 3 xi. 1990, *D.L. Jones 6932 & C.H. Broers* (CANB *9016402*); Tam O'Shanter road turnoff Lulworth road, 8 xi. 1990, *D.L. Jones 7118 & C.H. Broers* (CANB *9614215*); 8.7 km S of Arthur River Bridge, towards Temma, 4 xi. 1998, *D.L. Jones 16131* (CANB *605773*); North Bruny Island, Dennes Point Rd, 5 xi. 2001, *J.A. Jeanes 1203, L. Rubenach, H. & A. Wapstra* (MEL *2136717*).

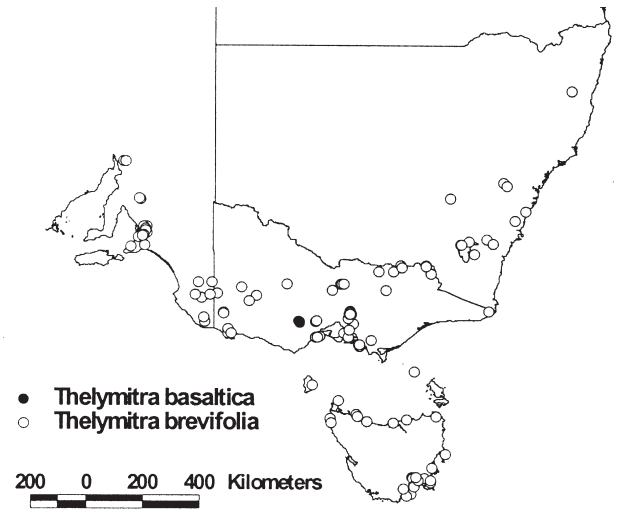

Figure 14. Distribution of *Thelymitra basaltica* and *Thelymitra brevifolia*.

Distribution and habitat: South Australia, New South Wales, Australian Capital Territory, Victoria and Tasmania (Fig. 14). Grows in a wide variety of habitats including open forest, woodland, heathland and heathy woodland, often in disturbed sites, sometimes on dry north or west facing slopes in skeletal soils or more usually in winter-wet areas on sand and clay loams. Altitude: 5–1000 m.

Conservation status: Very widespread and well conserved.

Flowering period: Late September to November.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra brevifolia* is a widespread species that has been confused with *T. pauciflora*. It can be distinguished from all other members of the *T. pauciflora* complex by a combination of characters. The leaf is relatively short, usually less than half the height of the inflorescence, and often as little as a quarter the height of the inflorescence. It is also usually rather broad and flat, ribbed on the back and suffused with purplish markings, often most obvious on the margins and base. There are usually 3 to 10 flowers (but sometimes as many as 20) that open tardily and are autogamous. The perianth segments are usually up to 10 mm long, often prominently apiculate, purplish in colour, rarely blue, pink or white. The post-anther lobe is not inflated and its apex has a rather rectangular appearance when viewed from the side and is bilobed to varying degrees ranging from shallowly emarginate to deeply and irregularly slit producing two more or less parallel lobes. It is often a distinctive reddish-orange to reddish-brown in colour. The lateral lobes are up to 1 mm long and project forward and upward in a gentle curve. The trichomes on the lateral lobes are white, usually up to 1 mm long and are arranged in small, neat, dense, sub-terminal bundles that embrace the tip of the post-anther lobe.

Thelymitra pauciflora has a relatively longer, narrower leaf, fewer flowers and an entire to emarginate post-anther lobe on the column.

This is apparently the taxon that Nicholls (1935) invalidly described (no Latin diagnosis) as *T. pauciflora* R.Br. var. *pallida* Nicholls. The type for this taxon is an unusual yellowish white flowered variant from near Bell in the Blue Mountains. Because the epithet ‘pallida’ is hardly appropriate for the taxon as a whole, I have chosen a new name for it at species rank.

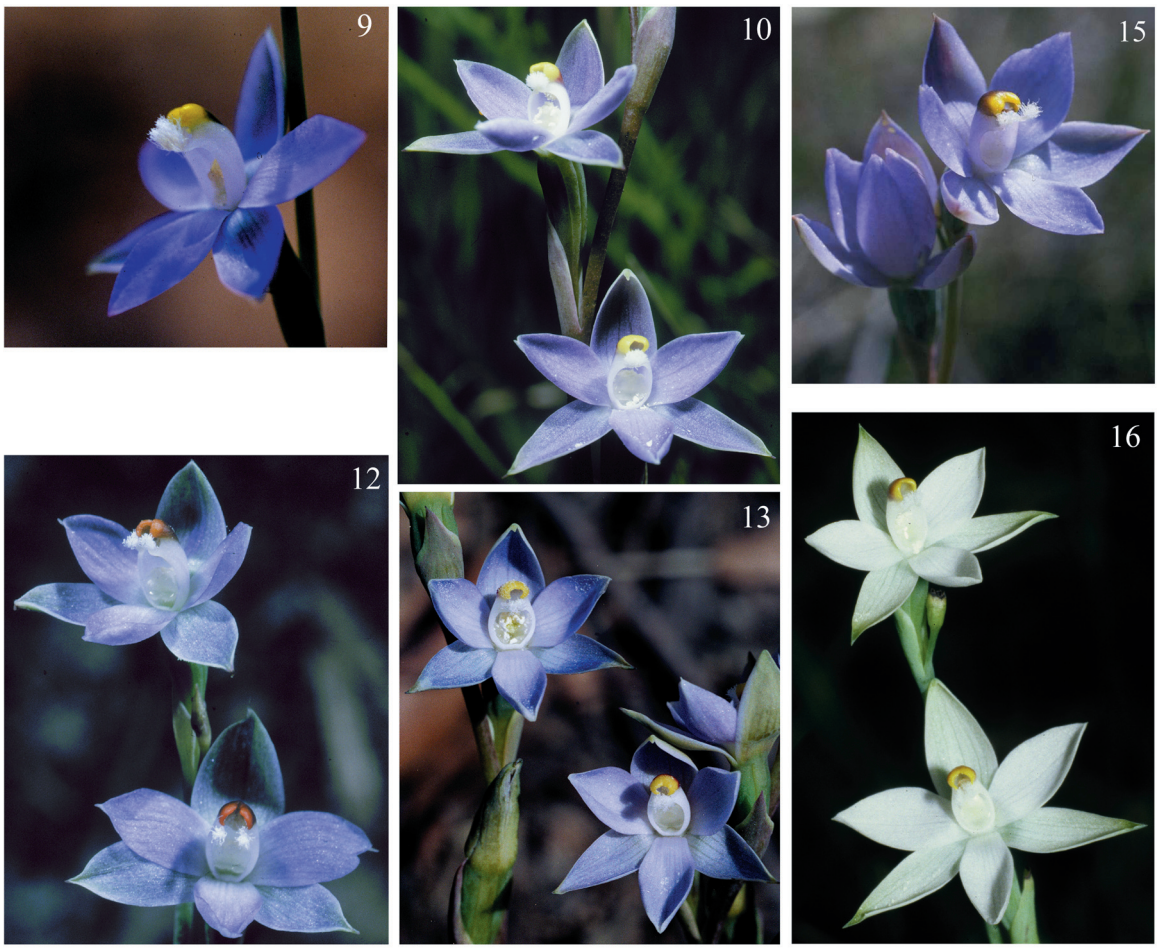

Plate 1. Figure 9. *Thelymitra pauciflora* Sydney area, New South Wales (photograph by T.J.Entwisle); **Figure 10**. *Thelymitra exigua* Woorndoo area, Victoria (photograph by J.A.Jeanes); **Figure 12**. *Thelymitra brevifolia* Christmas Hills area, Victoria (photograph by J.A.Jeanes); **Figure 13**. *Thelymitra basaltica* Rokewood, Victoria (photograph by J.A.Jeanes); **Figure 15**. *Thelymitra viridis* Blackmans Bay area, Tasmania (photograph by L.Rubenach); **Figure 16**. *Thelymitra albiflora* Adelaide Hills, South Australia (photograph by M.Houston).

Plate 2. Figure 18. *Thelymitra cyanapicata* Adelaide Hills, South Australia (photograph by R.J.Bates); **Figure 19**. *Thelymitra bracteata* Adelaide Hills, South Australia (photograph by R.J.Bates); **Figure 21**. *Thelymitra pallidiflora* Anglesea area, Victoria (photograph by J.A.Jeanes); **Figure 22**. *Thelymitra atronitida* Mallacoota area, Victoria (photograph by J.A.Jeanes); **Figure 24**. *Thelymitra malvina* Mallacoota area, Victoria (photograph by J.A.Jeanes); **Figure 25**. *Thelymitra peniculata* Crib Point area, Victoria (photograph by J.A.Jeanes)

Thelymitra brevifolia often grows sympatrically with other members of the *T. pauciflora* complex and apparent hybrids are sometimes observed.

The vernacular 'Peppertop Sun-orchid' has been associated with this species for many years, particularly in South Australia.

Etymology: Greek *brevis*, short; *folium*, leaf; the leaf is proportionately very short compared to the height of the inflorescence.

4. *Thelymitra basaltica* Jeanes *sp. nov*.

T. pauciflorae R.Br. affinis sed plantis brevioribus crassioribus caespitiformantibus generatim, folio latiori succulentiori inflorescentiam aequanti, bractea sterili solitaria ad apicem scapo divergentem et inflorescentia floribundiore generatim differt.

Type: Victoria. 10.5 km W of Rokewood towards Skipton, 8 x. 1998, *D.L. Jones 15818 & M. Garratt* (holotype CANB; isotypes MEL, CANB).

Glabrous, clumping, terrestrial *herb*. *Tubers* ovoid, 1–2.5 cm long, 5–15 mm wide, fleshy. *Leaf* linear to linear-lanceolate, 12–30 cm long, 5–15 mm wide, erect, very fleshy, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute to acuminate. *Inflorescence* 10–30 cm tall, 1.5–3.3 mm diam., straight, usually shorter than leaf, most often purplish, sometimes green. *Sterile bract* usually 1, rarely 2, linear to linear-lanceolate, 2.5–6 cm long, 5–9 mm wide, green and purplish or entirely purple, closely sheathing in lower part, apex often diverging from scape, acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 4–23 mm long, 3–8 mm wide, closely sheathing the pedicels, usually purplish, occasionally the proximal margins of lowest bract connate. *Pedicels* 0–7 mm long, moderately stout. *Ovary* narrow-obovoid, 2–10 mm long, 1.5–4 mm wide. *Flowers* 2–8, 15–22 mm diameter, usually pale blue or pale purplish blue, opening tardily on warm to hot days. *Perianth segments* 6–11 mm long, 3–7 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate-lanceolate to ovate, obtuse to subacute, slightly larger than other segments; *lateral sepals* lanceolate to ovate-lanceolate, slightly asymmetric, acute; *petals* ovate to ovate-lanceolate, obtuse to subacute; *labellum* lanceolate to ovate-lanceolate, acute, slightly smaller than other segments. *Column* erect from the end of ovary, 4–6.5 mm long, 2.5–3.5 mm wide, pale blue; *post-anther lobe* hooding the anther, 2.5–3.5 mm long, 1.5–2.5 mm wide, tubular, somewhat inflated, open on the ventral side, gently curved, dark purplish to reddish brown, apex thickened, almost entire to shallowly bilobed, yellow; *post-anther lobe extension* 0.3–1.1 mm; *auxiliary lobes* absent or sometimes present as 2 tiny incurved spurs on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 0.8–1.3 mm long, digitiform, porrect at base, curved sharply upwards near the middle at c. 90°, each with a toothbrush-like arrangement of white trichomes virtually along their entire length, the individual trichomes 0.5–1 mm long, embracing the apex of the post-anther lobe. *Anther* inserted about mid-way along column, ovoid, 2.3–2.8 mm long, 1.3–2 mm wide, connective produced into an apical beak 0.5–0.7 mm long; *pollinarium* 1.6–2.3 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 2–2.5 mm long, 2–2.5 mm wide, margins irregular. *Capsules* obovoid, 10–15 mm long, 4–8 mm wide, erect, ribbed. (Fig. 2 a–c; Plate 1. Fig. 13)

Specimens examined: **Victoria**: 12.8 km W of Rokewood towards Skipton, 8 x. 1998, *D.L. Jones 15820 & M. Garratt* (CANB *617385*); Volcanic Plain: 11.6 km W of Rokewood beside the Skipton road, 11 x. 2002, *J.A. Jeanes 1228* (MEL *2172999*); 3.5 km W of Rokewood on the road to Skipton, 11 x. 2002, *J.A. Jeanes 1226* (MEL *2172950* & MEL *2172951*).

Distribution and habitat: Apparently endemic to Victoria where currently known with certainty only from the Rokewood area in the Victorian Volcanic Plain Natural Region (Conn 1993) (Fig. 14). Grows in remnant basaltic grasslands on sandy, brown volcanic loam soils. Altitude: 180–220 m.

Conservation status: Known only from a few roadside remnants and probably critically endangered. Suggest 2E by criteria of Briggs & Leigh (1996).

Flowering period: Late September and October.

Pollination biology: This species is facultatively autogamous and sometimes also cleistogamous.

Notes: *Thelymitra basaltica* is a cryptic species that has been overlooked in the past. There are a number of features that can be used in combination to define this species and distinguish it from all related taxa. Plants often grow in tight clumps, apparently from vegetative reproduction. The leaf is relatively broad, very fleshy, rather brittle and easily broken when bent and is usually as tall as the inflorescence and often exceeds it. The inflorescence is short and stout, rarely more than 20 cm tall, and usually has a solitary sterile bract whose tip diverges somewhat from the scape. The lowest fertile bract sometimes (but not always) has the lower margins fused so that its base completely surrounds the rachis and pedicel. There are generally one to six flowers (but sometimes as many as eight) arranged in a dense inflorescence. The flowers are autogamous (sometimes also cleistogamous) and will open only on very warm to hot days. The perianth segments are up to 11 mm long, pale blue or pale purple. The post-anther lobe is slightly inflated and the apex is almost entire to shallowly bilobed. The lateral lobes are up to 1 mm long and bend upwards sharply (at c. 90°) near their middle. The trichomes are up to 1 mm long and are arranged in toothbrush-like fashion along virtually the entire length of the lateral lobes.

Thelymitra basaltica is probably most closely related to *T. exigua* with which it usually grows in the field, but can be distinguished by its generally earlier flowering time, its broader, fleshier, more brittle leaf that equals or exceeds the inflorescence and the sterile bract whose tip diverges more from the scape.

Thelymitra pauciflora is a taller, more slender, solitary species with a relatively shorter, narrower leaf and mop-like tufts of trichomes on the lateral lobes of the column.

Most herbarium collections of *T. basaltica* are difficult to identify with any confidence as they do not usually reflect its clumping habit and are often incomplete or poorly preserved.

Etymology: An allusion to the apparent preference of the species for rich brown soils derived from basalt rock.

5. *Thelymitra viridis* Jeanes *sp. nov.*

Thelymitra pauciflorae R.Br. affinis sed plantis crassioribus generatim, pallidiore ubique, folio latiore, inflorescentia floribundiore generatim et columna grandiore, lobo post-antheram inflatiore differt.

Type: Tasmania. Wet Cave Beach, near eastern end of Rocky Cape National Park, 12 xi. 2001, *J.A. Jeanes 1214, H. & A. Wapstra & R. Hay* (holotype HO; isotypes MEL, CANB).

Illustration: Jones *et. al*. (1999) page 260 (as *T. arenaria*).

Glabrous, solitary or clumping, terrestrial *herb*. *Tubers* not seen. *Leaf* linear to linear-lanceolate, 10–25 cm long, 5–12 mm wide, erect, fleshy, canaliculate, ribbed abaxially, often mid-green throughout or sometimes with a purplish base, sheathing at base, apex acuminate. *Inflorescence* 15–30 cm tall, 1–2(–4) mm diam., straight, pale green. *Sterile bracts* usually 2, sometimes 1, linear to linear-lanceolate, 2–7.5 cm long, 4–8 mm wide, closely sheathing, pale green, acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 5–20(–25) mm long, 3–8 mm wide, sheathing the pedicels, pale green. *Pedicels* 0–10(–15) mm long, stout too slender. *Ovary* narrow-obovoid, 5–10 mm long, 1.5–4 mm wide. *Flowers* 2–7, 13–22 mm diameter, pale green outside, usually pale blue to pale purplish inside, opening tardily even on the hottest days. *Perianth segments* 5–11 mm long,

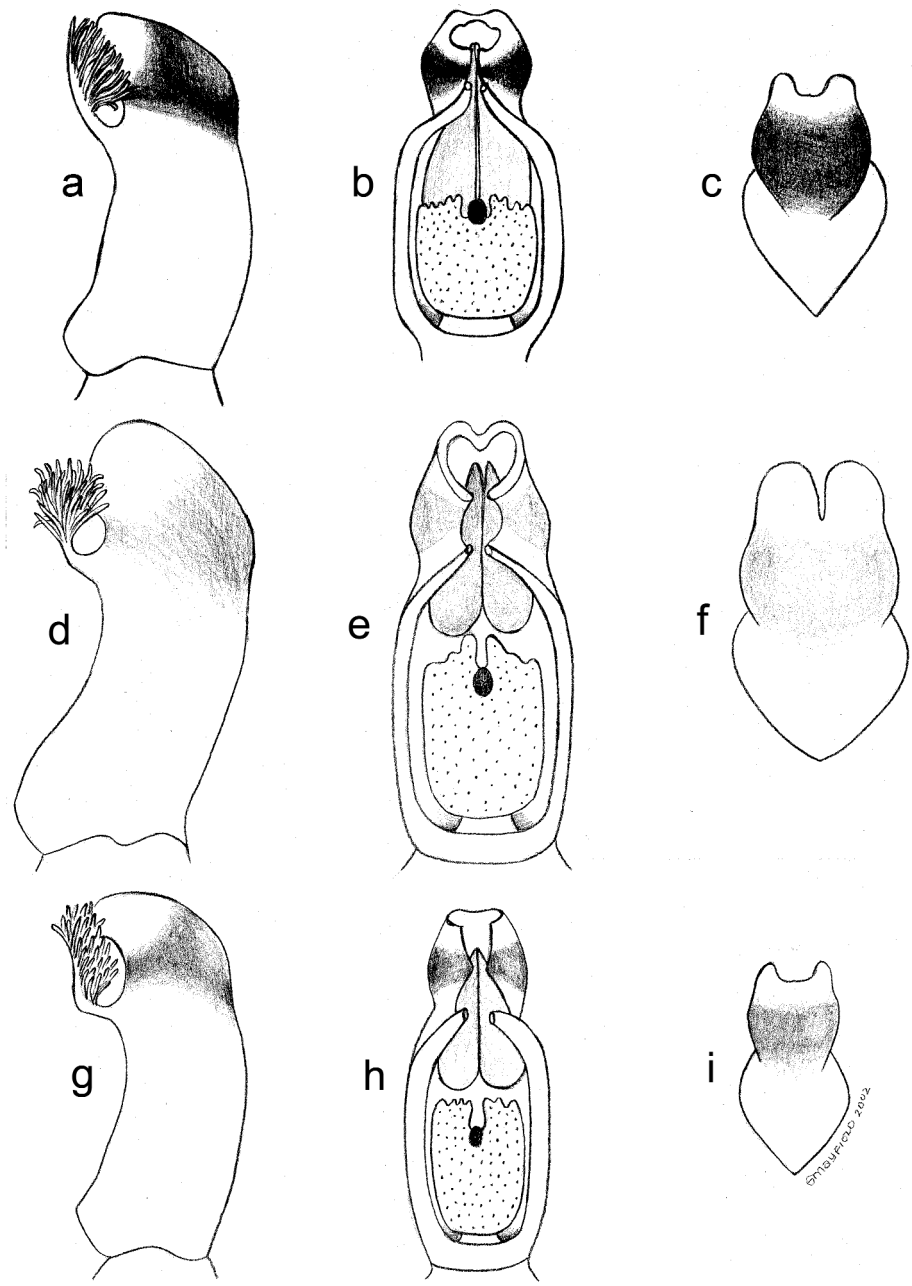

Figure 2.
Thelymitra basaltica: **a** column from side x 10; **b** column from front x 10; **c** post-anther lobe from rear x 10
Thelymitra viridis: **d** column from side x 10; **e** column from front x 10; **f** post-anther lobe from rear x 10
Thelymitra albiflora: **g** column from side x 10; **h** column from front x 10; **i** post-anther lobe from rear x 10

3.5–7 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate, obtuse to subacute; *lateral sepals* ovate-lanceolate, acute; *petals* ovate, obtuse to subacute; *labellum* ovate-lanceolate, acute, only slightly smaller than other segments. *Column* erect from the end of ovary, 4.5–6 mm long, 2.2–3.7 mm wide, white; *post-anther lobe* hooding the anther, 2–3 mm long, 1.5–2.7 mm wide, tubular, widely open on ventral side, gently curved, mostly yellowish or sometimes brownish with a thin purplish collar, apex shallowly v-notched, yellow, distal margin not thickened; *post-anther lobe extension* 0.5–0.7 mm; *auxiliary lobes* often present as 2 tiny incurved spurs on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 1–1.5 mm long, digitiform, porrect at base, curving gently upwards, each with a mop-like arrangement of white trichomes along the distal half, the individual trichomes 0.8–1.2 mm long. *Anther* inserted near centre of column, ovoid, 2–2.5 mm long, 1.5–2.2 mm wide, the connective produced into an apical beak 0.3–0.5 mm long; *pollinarium* 1.8–2.2 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* mealy, friable, white. *Stigma* situated at base of column, ovate-quadrate, 1.5–2.5 mm long, 1.7–2.5 mm wide, margins irregular. *Capsules* obovoid, 8–18 mm long, 4–6 mm wide, erect, ribbed. (Fig. 2 d–f; Plate 1. Fig. 15)

Selected specimens examined: **Tasmania**: Bridport, 31 x. 1987, *R.J. Bates 11409* (AD *98746496*); Blackmans Bay, Gate Track, 31 x. 1993, *J.E. Wapstra DLJ12540* (CANB *9614900*); Peters Swamp, Ford Road, Squeaking Point, 18 xi. 1998, *J.E. Wapstra ORG1831, A. Wapstra & P. Tonelli* (CANB *609365*); Three Hummock Island, edge of Telecom Airstrip, 7 xi. 1999, *P. Tonelli ORG2832* (CANB *610399*); Rebecca Ck, Arthur River Protected Area, 13 xi. 2001, *J.A. Jeanes 1218, R. Hay, H. & A. Wapstra* (MEL *2136749*, MEL *2136750*, HO & CANB); Maranoa Heights, Kingston, 2 xi. 2001, *J.A. Jeanes 1189, L. Rubenach, H. & A. Wapstra* (MEL *2136719*); Opposite Lake Llewellyn, Table Cape, 19 xi. 2000, *R. Hay JAJ774* (MEL *2136721*); Burwood Drive, Blackmans Bay adjacent to Peter Murrell Reserve, 2 xi. 2001, *J.A. Jeanes 1186, L. Rubenach, H. & A. Wapstra* (MEL *2136715* & HO).

Distribution and habitat: Apparently endemic to Tasmania where widespread (Fig. 17), but uncommon. Grows in near-coastal low heathland on seasonally wet sandy loam or around swamp margins. Altitude: 0–100 m.

Conservation status: Widespread and conserved, but poorly known and rarely collected. Suggest 3KC by criteria of Briggs & Leigh (1996).

Flowering period: Late October to late November.

Pollination biology: This species is facultatively autogamous and often also cleistogamous.

Notes: *Thelymitra viridis* is a cryptic species that has been confused with other members of the *T. pauciflora* complex. In the fresh state the overall pale green colour of the scape, bracts and the exterior of the sepals immediately distinguish it. The leaf is a slightly darker shade of green and often completely lacks any purplish colouration at the base. In the preserved state specimens are difficult to identify with confidence. It is most easily confused with *Thelymitra peniculata* Jeanes, but is a generally more stocky plant with a proportionately longer leaf, paler blue to purplish flowers, a paler column that is not as deeply notched at the apex and has generally shorter lateral lobes.

Thelymitra pauciflora is a more slender species with an overall darker green appearance, a relatively shorter, narrower leaf, and generally fewer flowers.

Etymology: From the Latin *viridis*, green; the plants have an overall pale greenish appearance.

6. *Thelymitra albiflora* Jeanes *sp. nov.*

T. pauciflorae R.Br. affinis sed plantis robustioribus generatim, bractea sterili solitaria, inflorescentia floribus usque ad decimum composita, floribus albis generatim, columna lobo post-antheram inflatiore leviter, lobis lateralibus per totam longitudem fere trichomatibus instructis differt.

Type: South Australia. Spring Gully Conservation Park near Clare, 24 x. 2001, *D.L. Jones 18012 & B.E. Jones* (holotype AD; isotypes MEL, CANB).

Illustration: Bates & Weber (1990) Plate 221 (as *T. pauciflora*).

Glabrous, terrestrial *herb*. *Tubers* ovoid, 1–2 cm long, 5–10 mm wide, fleshy. *Leaf* linear to linear-lanceolate, 10–30 cm long, 3–11 mm wide, erect, fleshy, canaliculate, ribbed abaxially, green with a purplish base, sheathing at base, apex acute to shortly acuminate. *Inflorescence* 15–50 cm tall, 0.8–3 mm diam., straight, usually pale green. *Sterile bract* usually 1, rarely 2, linear to linear-lanceolate, 2–6(–10) cm long, 3–8 mm wide, closely sheathing, usually pale green, apex acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 5–25(–40) mm long, 3–8 mm wide, closely sheathing the pedicels, usually pale green. *Pedicels* 1–13(–22) mm long, slender. *Ovary* narrow-obovoid, 4–14 mm long, 2–4 mm wide. *Flowers* 1–6(–10), 15–20 mm diameter, usually white, opening tardily on warm to hot days. *Perianth segments* 6–10 mm long, 3–6 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate-lanceolate to ovate, obtuse to subacute, slightly larger than other segments; *lateral sepals* lanceolate to ovate-lanceolate, slightly asymmetric, acute; *petals* ovate to ovate-lanceolate, obtuse to subacute; *labellum* lanceolate to ovate-lanceolate, acute, slightly smaller than other segments. *Column* erect from the end of ovary, 4–5.5 mm long, 2–2.5 mm wide, white or pale blue; *post-anther lobe* hooding the anther, 2–3 mm long, 1.2–1.7 mm wide, tubular, slightly inflated, open on the ventral side, gently curved, reddish brown with a thin purplish collar, apex thickened, almost entire to emarginate, yellow; *post-anther lobe extension* 0.5–1.1 mm; *auxiliary lobes* absent or rarely present as 2 tiny incurved spurs on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 0.8–1.5 mm long, digitiform, porrect at base, curved sharply upwards near the middle at c. 90°, each with a toothbrush-like arrangement of white trichomes along their entire length, the individual trichomes 0.5–0.8 mm long, embracing the apex of the post-anther lobe. *Anther* inserted about mid-way along column, ovoid, 2.2–2.7 mm long, 1.3–1.8 mm wide, connective produced into an apical beak 0.5–0.7 mm long; *pollinarium* 1.5–2.1 mm long; *viscidium* more or less circular, c. 0.4 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.7–2.5 mm long, 1.5–2 mm wide, margins irregular. *Capsules* obovoid, 12–18 mm long, 4–6.5 mm wide, erect, ribbed. (Fig. 2 g–i; Plate 1. Fig. 16)

Selected specimens examined: **South Australia**: Mount Lofty Range. Upper Waterfall Gully, c. 11 km ESE of Adelaide G.P.O., 14 x. 1966, *Hj. Eichler 18794* (AD *96650441*); Fleurieu Peninsula. At Blanchford Scrub, which is 11 km along Range Road to Waitpinga, 3 x. 1970, *D. Hunt 3294* (AD *97042059*); Southern Lofty Region: Cleland Conservation Park, 24 x. 1983, *P. Hornsby 21* (AD *98538258*); Southern Lofty: Myponga Conservation Park, 14 x. 1986, *D.E. Murfet 225* (AD *98650397*); Mt Lofty Range. Stonyfell, 8 x. 1973, *K. Preiss 263* (AD *97351303*); Southeast District: Hundred of Monbulla, 8 x. 1962, *D. Hunt 1204* (AD *96405384*); Southern Lofty Region: Mylor township, 30 x. 2001, *R.J. Bates 60156* (MEL *2136747* & MEL *2136748*); Southeast Region: Scott Creek Conservation Park, 11 x. 1998, *R.J. Bates 51252* (CANB *609397*); Mt Lofty Range: Mt Lofty Botanic Garden, SE section, 9 xi. 1966, *J.Z. Weber 273* (AD *96648183*).

Distribution and habitat: Apparently endemic to South Australia where distributed widely throughout the higher rainfall areas from near the coast to the ranges (Fig. 17). Grows in woodland, open forest, scrubland and heathland on well-drained gravely loam soils. Altitude: 0–500 m.

Conservation status: Widespread and conserved.

Flowering period: Late September to early November.

Pollination biology: This species is facultatively autogamous and often also cleistogamous.

Notes: *Thelymitra albiflora* is a slender species with up to 10 flowers that are usually white in colour. The post-anther lobe is slightly inflated, reddish brown with a yellow,

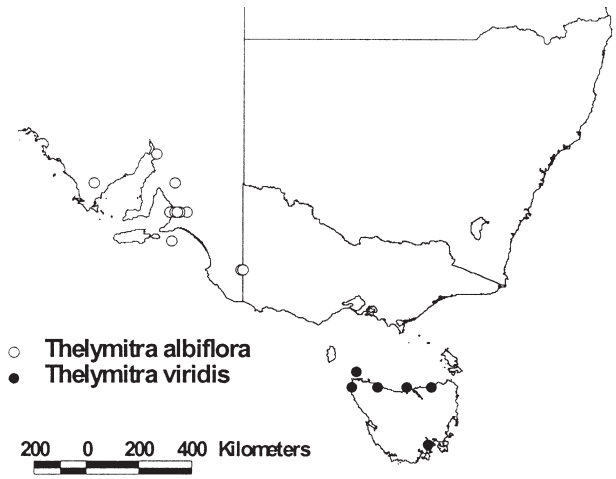

Figure 17. Distribution of *Thelymitra albiflora* and *Thelymitra viridis*.

entire to emarginate apex. The trichomes on the lateral lobes are arranged in long toothbrush-like tufts.

Thelymitra pauciflora generally has up to three flowers that are most often pale blue in colour, a less inflated post-anther lobe on the column and mop-like tufts of trichomes on the lateral lobes of the column.

Possible hybrids with *Thelymitra antennifera* (Lindl.) Hook.f. have been observed; the resulting progeny having pale yellow flowers and the basic column morphology of *Thelymitra* ×*macmillanii* F.Muell. (R.J. Bates pers. comm.).

Etymology: From the Latin *alba*, white, pale; *floris*, flower; the flowers of this species are usually white.

7. *Thelymitra cyanapicata* Jeanes *sp. nov.*

Thelymitra pauciflorae R.Br. affinis sed bractea sterili solitaria, lobo post-antheram caeruleo purpurascenti, lobis lateralibus uterque fasciculo subgloso pilis brevis fasciculatis albis glandiferis composito differt.

Type: South Australia. Southern Lofty Region: Kuitpo, 23 x. 1988, *R.J. Bates 15755* (holotype AD; isotypes AD).

Illustration: Bates (1999) fig. 4 (as *Thelymitra* sp. aff. *pauciflora* "Blue Column").

Glabrous, terrestrial *herb*. *Tubers* ovoid, 0.8–1.2 cm long, 4–6 mm wide, fleshy. *Leaf* linear, 12–22 cm long, 3–6 mm wide, erect, fleshy, canaliculate, green with a purplish base, sheathing at base, apex acuminate. *Inflorescence* 15–30 cm tall, 1–1.5 mm diam., straight, usually pale purplish to maroon. *Sterile bract* 1, linear to linear-lanceolate, 2–3 cm long, 3–5 mm wide, closely sheathing, green and purplish, apex acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 5–14 mm long, 3–5 mm wide, closely sheathing the pedicels, usually purplish. *Pedicels* 1–10 mm long, slender. *Ovary* narrow-obovoid, 6–12 mm long, 2–3.5 mm wide. *Flowers* 1–3, 12–18 mm diameter, blue, opening tardily on warm to hot days. *Perianth segments* 5–9 mm long, 2.5–5 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate-lanceolate to ovate, obtuse to subacute, slightly larger than other segments; *lateral sepals* lanceolate to ovate-lanceolate, slightly asymmetric, acute; *petals* ovate to ovate-lanceolate, obtuse to subacute; *labellum*

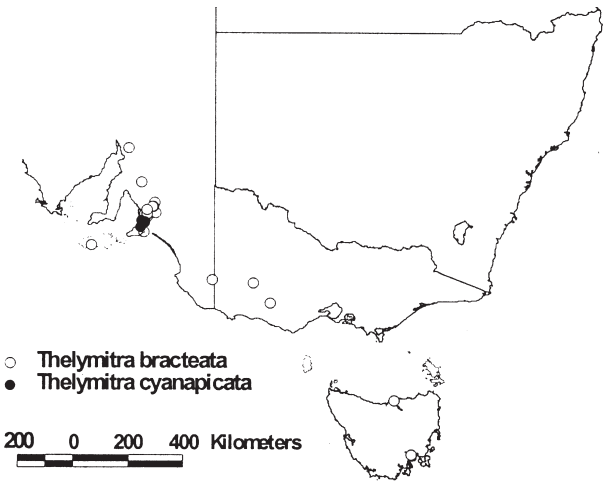

Figure 20. Distribution of *Thelymitra bracteata* and *Thelymitra cyanapicata*.

lanceolate to ovate-lanceolate, acute, slightly smaller than other segments. *Column* erect from the end of ovary, 4–5 mm long, 2–2.5 mm wide, same colour as perianth; *post-anther lobe* hooding the anther, 1.5–2 mm long, 1.2–1.6 mm wide, tubular, slightly inflated, open on the ventral side, gently curved, entirely dark blue, apex thickened, emarginate to shallowly v-notched; *post-anther lobe extension* 0.4–0.6 mm; *auxiliary lobes* present as 2 tiny spurs on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 0.7–0.9 mm long, digitiform, porrect at base, curved sharply upwards near the middle at c. 90°, each with a dense toothbrush-like arrangement of white trichomes along their entire length, the tufts subglobose, the individual trichomes 0.4–0.6 mm long, gland-tipped. *Anther* inserted about mid-way along column, ovoid, 2.3–2.7 mm long, 1.3–1.7 mm wide, connective produced into an apical beak 0.5–0.7 mm long; *pollinarium* 1.6–2.2 mm long; *viscidium* more or less circular, c. 0.4 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.2–1.5 mm long, 1.3–1.7 mm wide, margins irregular. *Capsules* not seen. (Fig. 3 a–c; Plate 2. Fig. 18)

Specimens examined: **South Australia**: Southern Lofty Region: Knott Hill, Kuitpo Forest, 25 x. 1991, *R.L. Taplin 567 & D.E. Murfet* (AD *99145052*).

Distribution and habitat: Apparently endemic to South Australia where known only from the Kuitpo, Peter Creek and Glenshera areas of the Southern Lofty Region (Fig. 20). Grows under *Leptospermum* scrub in *Eucalyptus viminalis* and *Eucalyptus obliqua* woodland, on sandy soil in flat swampy terrain. Altitude: 200–400 m.

Conservation status: Probably critically endangered and on the verge of extinction. Suggest 2E by criteria of Briggs & Leigh (1996).

Flowering period: October and early November.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra cyanapicata* can be distinguished by the distinctive dark purplish blue post-anther lobe. It is a small slender species with a narrow leaf and a single sterile bract. It has from one to three small, blue, tardily opening flowers. The lateral lobes are short, bend upward sharply at about the middle and each has a dense subglobose cluster of short, white, trichomes.

Thelymitra pauciflora is a taller, more slender species, usually with two sterile bracts and a post-anther lobe that is mostly brownish in colour with a yellow apex.

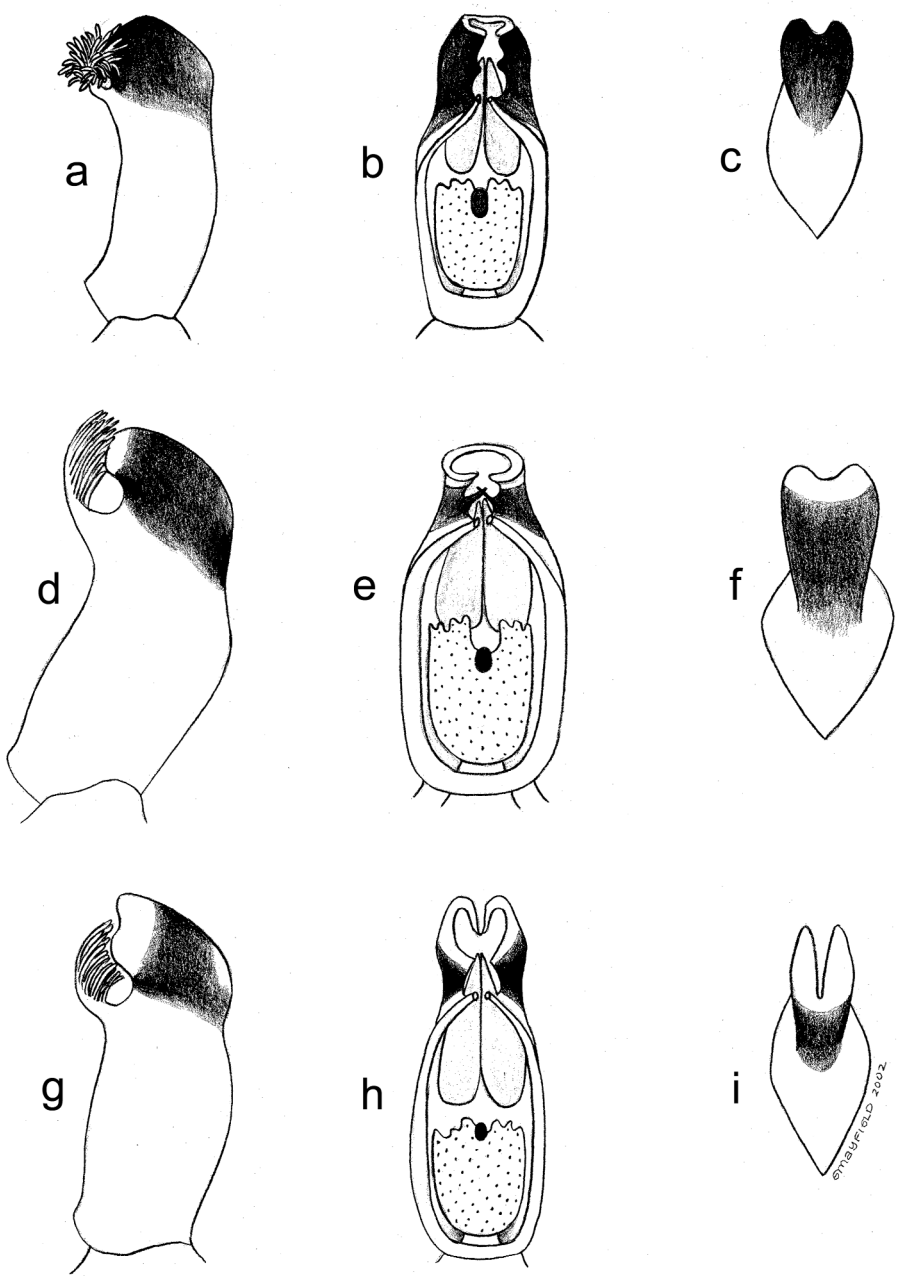

Figure 3.
Thelymitra cyanapicata: **a** column from side x 8; **b** column from front x 8; **c** post-anther lobe from rear x 8
Thelymitra bracteata: **d** column from side x 8; **e** column from front x 8; **f** post-anther lobe from rear x 8
Thelymitra pallidiflora: **g** column from side x 8; **h** column from front x 8; **i** post-anther lobe from rear x 8

Possible hybrids with *Thelymitra rubra* Fitzg. and *Thelymitra juncifolia* Lindl. have been observed (Bates 1999).

Etymology: From the Latin *cyan*, blue; *apica*, apex; the apex of the column (the post-anther lobe) is a distinctive dark purplish blue in colour, a feature unique for the genus.

8. *Thelymitra bracteata* J.Z.Weber ex Jeanes *sp. nov*.

T. arenariae Lindl. affinis sed plantis robustioribus generatim, folio longiore et latiore, bracteis sterilibus et fertilis grandioribus, inflorescentia elatiore floribus pluribus composita, saepe pedicellis florum inferorum decurrentibus in rachidi parte differt.

Type: South Australia. Southern Lofty Region: Mackereth Cottage, Scott Creek Conservation Park, 11 xi. 1989, *R.J. Bates 21500* (holotype AD; isotypes BRI, PERTH, HO).

Illustration: Bates (1999) page 70 fig. 5 (as *Thelymitra* sp. aff. *pauciflora*).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear-lanceolate, 20–45 cm long, 8–15 mm wide, erect, leathery, ribbed abaxially, dark green with a purplish base, sheathing at base, blade more or less flat, apex often somewhat lax, acute to acuminate. *Inflorescence* 30–70(–100) cm tall, 2–7 mm diam., rather stout, straight, straw-coloured to purplish. *Sterile bracts* usually 2, occasionally 1 or 3, linear to linear-lanceolate, 3–15 cm long, 3–15 mm wide, lower bract closely sheathing throughout, acute to acuminate, upper bract mostly free with base usually only half encircling the scape, acuminate, green to purplish. *Fertile bracts* lanceolate-acuminate to oblanceolate-acuminate, 4–35 mm long, 3–8 mm wide, sheathing the pedicels, green to purplish. *Pedicels* 2–25 mm long, slender, those of the lower flowers usually partially decurrent on rachis. *Ovary* narrow-obovoid, 5–15 mm long, 1–4 mm wide. *Flowers* 5–20(–30), 16–30 mm diameter, pale blue inside, sepals greenish outside, opening tardily on warm to hot days. *Perianth segments* 6–14(–17) mm long, 3–7 mm wide, thin-textured, concave, often shortly apiculate; *dorsal sepal* ovate, obtuse to subacute; *lateral sepals* lanceolate to ovate-lanceolate, often asymmetric, acute; *petals* ovate to ovate-lanceolate, obtuse to subacute; *labellum* lanceolate, acute, often slightly smaller than other segments. *Column* erect from the end of ovary, (4–)5–6.5 mm long, 2.5–3.5 mm wide, white or greenish; *post-anther lobe* hooding the anther, 2.5–3.5 mm long, 1.3–2 mm wide, tubular, not inflated, curving through c. 90°, reddish brown to brown, apex emarginate, yellow; *post-anther lobe extension* 0.5–1 mm; *auxiliary lobes* usually present as 2 tiny incurved spurs on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 1.2–1.7 mm long, digitiform, porrect at base, bent sharply upwards at about the middle, each with a dense toothbrush-like arrangement of trichomes that embrace the apex of post-anther lobe, the individual trichomes 0.8–1.2 mm long, white. *Anther* inserted at about the centre of column, ovoid, 2–3 mm long, 1.5–2 mm wide, the connective produced into a forward-pointing apical beak 0.4–0.6 mm long; *pollinarium* 1.4–2.6 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* mealy, friable, white. *Stigma* situated at base of column, ovate-quadrate, 2–2.5 mm long, 1.8–2.2 mm wide, margins irregular. *Capsules* obovoid, 15–25 mm long, 4–8 mm wide, erect, ribbed. (Fig. 3 d–f; Plate 2. Fig. 19)

Selected specimens examined: **South Australia**: Murray Region: Mt Beever (Downers Scrub), 20 x. 1994, *R.J. Bates 39547* (AD *99448151*); Southern Lofty Region: Mylor, 20 x. 1983, *R.J. Bates 3489* (AD *98410144*); Southern Lofty Region: On hillside above dam off Carey Gully Rd, 13 xii. 1997, *R.J. Bates 49269* (AD *99928011*); Murray Region: Kaiser Stuhl Conservation Park, 24 xi. 1992, *R.J. Bates 29990* (AD *99321324*, NSW *468554* & MEL *287503*); Southern Lofty Region: Clarendon, Adelaide Hills, 28 x. 1994, *R.J. Bates 39545* (CANB *9612491*); Southern Lofty Region: Mt Crawford, xi. 2000, *R.J. Bates 57727* (MEL *2100139*); Southern Lofty Region: Woodland at Windebanks turnoff opposite Scott Creek Conservation Park, 28 x. 1988, *R.J. Bates 15812* (AD *98848230*); Southern Lofty Region: Spring Gully Conservation Park, 9 x. 1999, *R.J. Bates 54363* (AD *111897*); Southern Lofty Region: Norton Summit, x. 1999, *R.J. Bates 54399* (AD

111894); Southern Lofty Region: Warren Conservation Park, 10 xi. 1988, *R.J. Bates 16033* (AD *98848228*); Southern Lofty Region: Nortons Summit, 13 xii. 1907, *R.S. Rogers 4979* (AD *97725217*); Kangaroo Island Region: 12 miles from Karalla towards Playford Highway, 29 ix. 1965, *E.J. Caroll s.n.* (CANB *39883*). **Victoria**: Glenisla. Corner Henty Highway and Billywing Road, 29 x. 2000, *A. Tindall 31* (MEL *2121332*); c. 2 km from Woorndoo towards Chatsworth, 16 xi. 2000, *D.L. Jones 17692 & K.J. Fitzgerald* (CANB *631087*). **Tasmania**: Georgetown, 31 x. 1987, *R.J. Bates 11560* (AD *98746519*, MEL *2116841*, AK & HO); Rosny Hill, Eastern Shore Hobart, 2 xi. 2001, *J.A. Jeanes 1185, L. Rubenach, H. & A. Wapstra* (MEL *2136396*, MEL *2136397* & HO).

Distribution and habitat: Known from South Australia, Victoria and Tasmania (Fig. 20). Reasonably widespread in South Australia where found in the Northern Lofty, Southern Lofty, Kangaroo Island, Murray and Southeast Regions; localised in Victoria, where known currently from two collections in the Grampians and the Victorian Volcanic Plain Natural Regions (Conn 1993) and localised in Tasmania in the vicinity of Georgetown and Hobart. Confined to grassland, woodland and open forest, often in disturbed areas such as forest clearings and tracks, usually in richer soils. Altitude: 5–600 m.

Conservation status: Of limited distribution and rare, but well conserved. Suggest 3RC by criteria of Briggs & Leigh (1996).

Flowering period: Late September to early December.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra bracteata* is the most robust member of the *T. pauciflora* complex, sometimes standing nearly one metre tall (Bates 1999). The leaf is long, moderately broad, leathery, has a rather flat blade and is ribbed on the outer surface. The sterile and fertile bracts are also very large and, in those cases where there are multiple sterile bracts, the base of the uppermost one generally does not completely encircle the scape leaving the blade free. The pedicels are very long and slender and the lower ones are often partially decurrent on the rachis. The inflorescence can have up to 30 flowers that are pale blue to pale purplish inside and the sepals are green outside. The post-anther lobe is rather narrow, not inflated and shallowly notched at the apex. The lateral lobes are bent upwards sharply at the middle and have a toothbrush-like arrangement of white trichomes along much of their length.

Thelymitra bracteata has been confused with *T. arenaria*, but the latter is generally less robust, has a smaller, more channelled leaf, smaller bracts, fewer flowers and the pedicels are never decurrent on the rachis.

Etymology: Latin *bracteatus,* provided with bracts; both the sterile and fertile bracts are very prominent in this species.

9. *Thelymitra pallidiflora* Jeanes *sp. nov.*

T. arenariae Lindl. affinis sed bractea sterili solitaria, floribus albis vel cyaneis dilutis, lobo post-antheram columnae atro ad apicem luteum incisum profunde differt.

Type: Victoria. Anglesea: Near the intersection of Jarosite track and Ironbark Basin Track, 21 x. 2001*, J.A. Jeanes 1054* (holotype MEL; isotypes MEL, CANB)

Illustration: Jeanes & Backhouse (2001) p. 168 fig. C (as *T. nuda*).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear to linear-lanceolate, 10–25 cm long, 5–12 mm wide, erect, thin-textured to fleshy, canaliculate, pale to dark green, sometimes with a purplish base, ribbed abaxially, sheathing at base, apex acuminate. *Inflorescence* 15–45 cm tall, 1.3–3 mm diam., straight, straw-coloured to purplish. *Sterile bract* usually 1, rarely 2, linear to linear-lanceolate, 1.5–8.5(–18) cm long, 4–9 mm wide, green or purplish, acute to acuminate. *Fertile bracts* ovate-acuminate to obovate-

acuminate, 5–30 mm long, 3–8 mm wide, green or purplish, sheathing the pedicels. *Pedicels* 2–15 mm long, slender, those of the lower flowers sometimes partially decurrent on rachis. *Ovary* narrow-obovoid, 4–10 mm long, 1.5–3.5 mm wide. *Flowers* 2–10, 20–30 mm diameter, white to very pale blue, opening only in hot weather. *Perianth segments* 9–15(–21) mm long, 3–8 mm wide, concave, usually acute, often shortly apiculate; *dorsal sepal* ovate to elliptic; *lateral sepals* narrow-ovate to lanceolate, slightly asymmetric; *petals* ovate; *labellum* elliptic to lanceolate, often narrower than other segments; *column* erect from the end of ovary, 5–6.5 mm long, 2.5–3.2 mm wide, same colour as perianth; *post-anther lobe* hooding the anther, 2.5–3.5 mm long, 1.8–2.2 mm wide, tubular, inflated, gently curved through c. 90°, mostly black or very dark brown, apex bilobed, yellow, lobes 0.7–1.5 mm long; *post-anther lobe extension* 0.3–0.9 mm; *auxiliary lobes* absent; *lateral lobes* converging, 1–1.7 mm long, digitiform, porrect at base then curving upwards, each with a toothbrush-like arrangement of white trichomes along most of their length, the individual trichomes 0.6–1.2 mm long. *Anther* inserted c. mid-way along column, ovoid, 2.4–3 mm long, 1.5–2 mm wide, the connective produced into a beak 0.4–0.7 mm long; *pollinarium* 1.8–2.6 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.7–2.2 mm long, 1.7–2.2 mm wide, margins irregular. *Capsules* obovoid, 10–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 3 g–i; Plate 2. Fig. 21)

Specimens examined: **Victoria**: Crib Point, near the intersection of Lorimer & Bay Rds, 31 x. 2000, *J.A. Jeanes 902* (MEL *2136722*); Anglesea, 19 xi. 1992, *J. Riley DLJ10741* (CANB *9702607*); Anglesea, 17 xi. 1992, *K. Morgan & M. McDonald s.n.* (MEL *2046973*); Anglesea area, x. 1992, *J.A. Jeanes 555* (MEL *2136726*); Corner of Forest Road and Gum Flat Road, c. 8 km N of Anglesea, x. 1993, *J.A. Jeanes 556* (MEL *2136729*).

Distribution and habitat: Apparently endemic to south-central Victoria where currently known only from the Anglesea and Crib Point areas in the Otway Plain and Gippsland Plain Natural Regions (Conn 1993) (Fig. 23). Grows in heathy and grassy woodland on sandy loams. Altitude: 5–100 m.

Conservation status: Probably endangered as it is known currently from only four sites with a total of less than 100 plants. Suggest 3EC by criteria of Briggs & Leigh (1996).

Flowering period: Late October and November.

Pollination biology: This species is facultatively autogamous

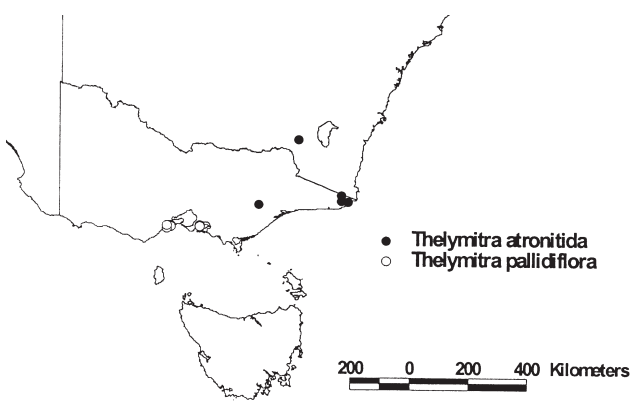

Figure 23. Distribution of *Thelymitra atronitida* and *Thelymitra pallidiflora*.

Notes: *Thelymitra pallidiflora* is a distinctive member of the *T. pauciflora* complex that is not likely to be confused with any other species, at least in the fresh state. It can be readily identified by its stocky habit, usually solitary sterile bract, white or very pale blue flowers that are up to 30 mm in diameter and the post-anther lobe that is inflated, usually black or very dark brown in colour with a deeply v-notched yellow apex. A high proportion of plants at the type locality have the lower pedicels partially decurrent on the rachis and the ovaries of many of the lower flowers misshapen.

Etymology: From the Latin *pallida*, pale; *floris*, flower; the flowers of this species are white or very pale blue.

10. *Thelymitra atronitida* Jeanes, *Muelleria* 14: 91 (2000).

Type: Victoria. Beside Genoa Creek Track, c. 4 km WSW of Genoa, 27 x. 1999, *J.A. Jeanes 613* (holotype MEL!; isotype CANB!).

Illustrations: Jeanes (2000) p. 92 fig. 1 a, b, c & d; p. 93 fig. 3; Jeanes (2001) p. 95 fig. 1 a, b, c & d; p. 96 fig. 3; Jeanes & Backhouse (2001) page 169.

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear to linear-lanceolate, 15–35 cm long, 5–12 mm wide, erect, leathery, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute. *Inflorescence* 30–50 cm tall, 1.5–3.5 mm diam., straight, straw-coloured to purplish. *Sterile bracts* usually 2, occasionally 3, linear to linear-lanceolate, 1.5–7 cm long, 3–10 mm wide, green or purplish, acute to acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 5–25 mm long, 3–8 mm wide, green or purplish, sheathing the pedicels. *Pedicels* 5–12 mm long, slender. *Ovary* cylindrical to narrow-obovoid, 5–12 mm long, 2–4 mm wide. *Flowers* 2–8(–16), (14–)20–26 mm diameter, moderately dark blue with darker longitudinal veins, opening readily only on hot days. *Perianth segments* (7–)10–13 mm long, 3–8 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate to elliptic, obtuse to subacute; *lateral sepals* elliptic to lanceolate, slightly asymmetric, acute; *petals* ovate to elliptic, obtuse to subacute; *labellum* elliptic to lanceolate, acute, often narrower than other segments; *column* erect from the end of ovary, 5.5–7 mm long, 2.5–3.5 mm wide, mostly pale blue; *post-anther lobe* hooding the anther, 3–4 mm long, 1.5–2.5 mm wide, tubular, inflated, dorsally compressed towards the apex, gently curved through c. 90°, mostly glossy black, apex shortly bilobed, yellow, lobes toothed, apical orifice small; *post-anther lobe extension* 1.1–1.7 mm; *auxiliary lobes* often present as 2 tiny incurved spurs on the lower apical margin of the post-anther lobe; *lateral lobes* converging, 1.3–1.5 mm long, digitiform, porrect at base then curved upwards at about the middle, each with a more or less terminal mop-like arrangement of white trichomes, the individual trichomes 1.2–1.6 mm long. *Anther* inserted towards apex of column, ovoid, 2.6–3.3 mm long, 1.2–2.2 mm wide, connective produced into an apical beak 0.5–0.8 mm long; *pollinarium* 2–2.5 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.7–2.5 mm long, 1.8–2.2 mm wide, margins irregular. *Capsules* obovoid, 12–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 5 a–c; Plate 2. Fig. 22)

Specimens examined: **New South Wales**: End of Cape Solander Drive, Cape Solander, Captain Cook's Landing Place National Park, 8 viii. 1988, *P.H. Weston 1228 & A. Bishop* (NSW *417826*); Bago State Forest, 3 xii. 1999, *P.G. Branwhite 127* (CANB *609392*). **Victoria**: Between Jones Creek Track and Private Property, W of Genoa River, 7 xi. 1970, *A.C. Beauglehole 34425* (MEL *652511*); Near the intersection of East Wingan Rd and Princes Hwy, 24 x. 1999, *J.A. Jeanes 643* (MEL *2069956*); Beside East Wingan Rd c. 500 m from Princes Hwy, 27 x. 1999, *J.A. Jeanes 728* (MEL *2096169*); Valencia Creek Road, Esteppy Yars area, c. 12.5 miles SE of Mt Wellington, 1 xi. 1973, *A.C. Beauglehole 43458* (MEL *652737*); Genoa, 6 xi. 1992, *A.D. Bishop J239/1-3* (NSW *429780*); Mallacoota. Near intersection of Karbethong Rd and Genoa–Mallacoota Rd, 15 xi.

1991, *J.A. Jeanes s.n.* (MEL *2046943*).

Distribution and habitat: Mostly eastern Victoria with two disjunct localities in southeastern New South Wales (Cape Solander and Bago State Forest) (Fig. 23). In Victoria apparently confined to the East Gippsland and the Eastern Highlands Natural Regions (Conn 1993). Currently known from a few sites between Cann River and Mallacoota in far East Gippsland, with an outlying, more westerly population near Valencia Creek. Grows in heathy open forest, usually around the margins of grasstree plains, on well-drained sand or clay loams. Altitude: 5–200 m.

Conservation status: Poorly known; suggest 3KC by criteria of Briggs & Leigh (1996).

Flowering period: Mostly late October to early November in Victoria, but as early as August and as late as December in New South Wales.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra atronitida* closely resembles *T. peniculata*, but the post-anther lobe of the latter species is not strongly compressed dorsally towards the apex, has a much larger apical orifice and is less obviously glossy black in colour and the trichomes on the lateral lobes are in a much more terminal mop-like tuft. *Thelymitra atronitida* also resembles *Thelymitra malvina* M.A.Clem., D.L.Jones & Molloy, but the latter usually has three sterile bracts, more, generally larger flowers that are often entomophilous, a post-anther lobe that is mostly brownish and mauve or pink trichomes on the lateral lobes.

11. *Thelymitra malvina* M.A.Clem., D.L.Jones & Molloy, *Cat. Austral. Orchid*. (Austral. Orchid Res. 1) 141 (1989).

Type: Wannon Region: Just south of Wilkin, c. 21 km NNW of Dartmoor, 28 x. 1985, *G.W. Carr 10423* (holotype MEL!, isotypes AD!).

Thelymitra nuda sensu R.D. Fitzgerald, *Aust. orch*. 1(5): [t. 2] (1879), *non* R.Br. (1810).

Illustrations: Fitzgerald (1879) 1: 5 (as *T. nuda*); Nicholls (1969) Plate 31 (as *T. nuda*); Backhouse & Jeanes (1995) page 347; Jones *et al*. (1999) pages 261 & 279.

Glabrous terrestrial *herb*. *Tubers* ovoid, 1–3 cm long, 5–12 mm wide, fleshy. *Leaf* linear to linear-lanceolate, 10–35 cm long, 5–20 mm wide, erect, canaliculate, fleshy, light to dark green with a purplish base, ribbed abaxially, sheathing at base, apex acute. *Inflorescence* 25–75 cm tall, 1.5–5 mm diam., slender to moderately stout, straight, green to purplish. *Sterile bracts* usually 3, occasionally 2, linear to linear-lanceolate, 2–10 cm long, 4–11 mm wide, closely sheathing, acute to acuminate, green or purplish, upper bract usually free with base usually only half encircling the scape. *Fertile bracts* ovate-acuminate to obovate-acuminate, 8–30 mm long, 3–6 mm wide, sheathing the pedicels, green or purplish. *Pedicels* 5–15 mm long, slender. *Ovary* cylindrical to narrow-obovoid, 5–12 mm long, 2–4 mm wide. *Flowers* 3–25, 18–32 mm diameter, slate blue to mauve inside, sepals greenish outside, opening freely in warm weather. *Perianth segments* 8–16 mm long, 3–7 mm wide, concave, acute, often shortly apiculate; *dorsal sepal* elliptic to lanceolate; *lateral sepals* elliptic to lanceolate, slightly asymmetric; *petals* ovate to lanceolate; *labellum* elliptic to linear-lanceolate, often narrow than other segments. *Column* erect from the end of ovary, 6–7.5 mm long, 2.5–3.7 mm wide, white to blue or mauve; *post-anther lobe* hooding the anther, 2–4 mm long, 1.5–2.5 mm wide, tubular, inflated, compressed dorsally, curved gently, dark reddish brown, apex shallowly bilobed, lobes toothed, orifice small, yellow; *post-anther lobe extension* 0.6–2 mm; *auxiliary lobes* absent; *lateral lobes* converging, 1–1.5 mm long, digitiform, obliquely erect, each with a more or less terminal, dense, erect, mop-like arrangement of pink or mauve (rarely white) trichomes, the individual trichomes 1–1.5 mm long. *Anther* inserted near middle of column, ovoid, 2.5–3.5 mm long, 1.2–2.2 mm wide, the connective produced into a

beak 0.5–1 mm long; *pollinarium* 1.5–2.5 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* mealy, friable or coherent, white. *Stigma* situated at base of column, ovate-quadrate, 1.8–2.6 mm long, 1.5–2.5 mm wide, margins irregular. *Capsules* obovoid, 12–20 mm long, 4–6 mm wide, erect, ribbed. (Fig. 4 g–i; Plate 2. Fig. 24)

Selected specimens examined: **South Australia**: Stony Point, c. 3 km S of Naracoorte Caves, 25 x. 1966, *M. Beek s.n.* (AD *98247005*); Southeast District: Honans Scrub Native Forest Reserve, 6 xi. 1989, *P. Penny s.n.* (AD *99237310*). **Queensland**: Moreton District: Jacobs Well, ix. 1997, *G. Leiper 6* (BRI *656098*); Wide Bay District: Fraser Island National Park, on side of Wanggoolba air strip, 9 ix. 1998, *R. Crane 2108* (CANB *612488*); Leichhardt District: Mt Moffatt National Park, Consuelo Tablelands, 6 x. 1998, *R. Crane 2241 & 2255* (CANB *612489* & CANB *612464*); Between Myora and Point Lookout, North Stradbroke Island, 30 viii. 1969, *R. Coveny 2035* (NSW *0303*). **New South Wales**: Burleigh Heads, x. 1945, *C.P. Ledward s.n.* (MEL *1532671*); Cape Solander, Kurnell, Botany Bay National Park, 23 ix. 1992, *A.D. Bishop J221/26-37* (NSW *429491*); Weston, Southern Maitland Coalfields, ix. 1930, *H.M.R. Rupp 865* (AD *7631485*); Tomago, Hunter River, ix. 1953, *R.W. Freney s.n.* (NSW *190474*); Belmont, ix. 1926, *Mrs. H.M.R. Rupp s.n.* (NSW *190468*); c. 4.8 km N of Evans Head on the Broadwater Road, 2 ix. 1973, *R. Coveny 5115* (NSW *1167*); South West Rocks, 29 km NE of Kempsey, 22 viii. 1973, *R. Coveny 4962* (NSW *1153*); Central Coast: Jamberoo Mt, 28 x. 1992, *R. Tunstall DLJ10499* (CANB *9702346*); North Coast: c. 3 km N of Lake Cathie, Lake Innes Reserve, 8 ix. 1990, *D.L. Jones 6449 & C.H. Broers* (CANB *9015914*). **Victoria**: About 2.5 km NW of Mallacoota by the Genoa to Mallacoota Road, 11 x. 1979, *J.G. Eichler s.n.* (MEL *105418*); East Gippsland, c. 5 miles direct SSW of Mallacoota P.O., 29 x. 1969, *A.C. Beauglehole 31352* (MEL *652671*); French Island. Pinnacles Rd, 1 km W of Clump Rd, 31 x. 1987, *C. Gordes 17* (MEL *1581014*); Near Dorodong, c. 10 miles WNW of Dergholm (on Glenelg River), far western Victoria, 28 x. 1962, *A.C. Alcock s.n.* (MEL *655234*); East Gippsland. Turn-off to Genoa Creek, 4.6 km W of Genoa on Princes Highway, 20 x. 1991, *A.B. Peisley 11* (MEL *2010780*); Providence Ponds Flora and Fauna Reserve, 22 x. 1984, *A.C. Beauglehole 78729* (MEL *670970*); East Gippsland. Cape Conran Rd between Marlo Plains Rd turn-off and Marlo–Cape Conran Rd., 12 xi. 1970, *A.C. Beauglehole 34508* (MEL *652508*); Gippsland Plain, Rosebud, vacant block on Old Cape Schanck Rd, c. 200 m SW from its junction with Jetty Rd, 17 x. 1993, *N.G. Walsh 3513* (MEL *2021667*). **Tasmania**: Banana Ridge, 20 km NNW of Lady Barron, Flinders Island, 26 x. 1990, *P. Collier 4867* (HO *127025*); Tasmans Arch, 18 xi. 1974, *P. Palmer s.n.* (HO *410818*); Hunter Island, xi. 1979, *P. Tonelly s.n.* (HO *500821*); Rocky Cape National Park, hills south of Burgess Cove (Cathedral Hill), 30 x. 1998, *D.L. Jones*

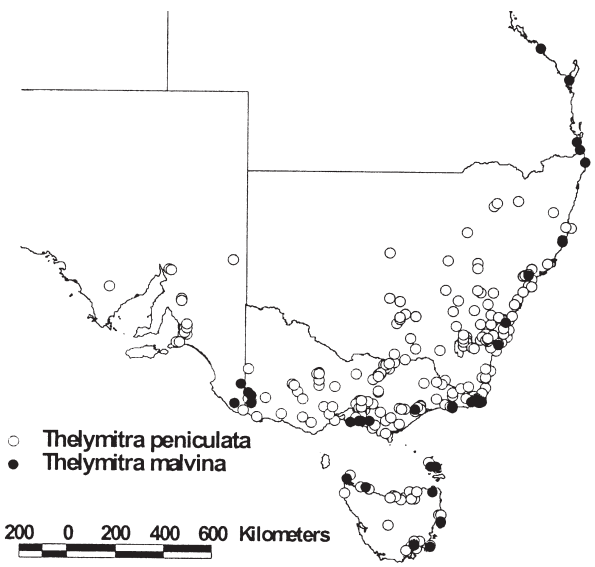

Figure 26. Distribution of *Thelymitra peniculata* and *Thelymitra malvina*.

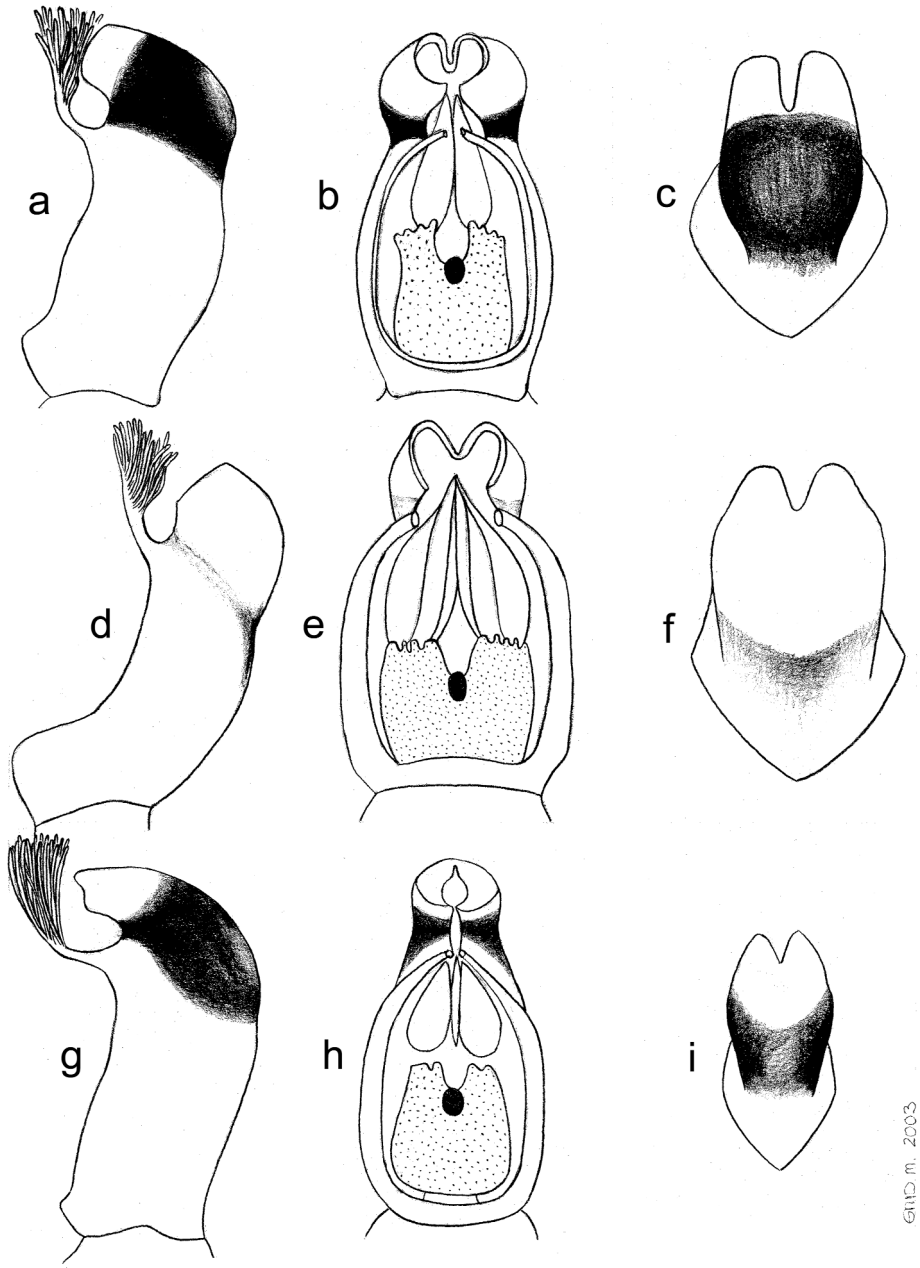

Figure 4.
Thelymitra batesii: **a** column from side x 10; **b** column from front x 10; **c** post-anther lobe from rear x 10
Thelymitra frenchii: **d** column from side x 10; **e** column from front x 10; **f** post-anther lobe from rear x 10
Thelymitra malvina: **g** column from side x 7; **h** column from front x 7; **i** post-anther lobe from rear x 7

15992 & M. Garratt (CANB *605625*); Coles Bay, around refuse tip, 11 xi. 1990, *D.L. Jones 7177 & C.H. Broers* (CANB *9016443*); Gladstone, 31 x. 1987, *R.J. Bates 11324* (AD *9874651*); Flinders Island: Reedy Lagoon Road, 2 km N near old scallop dump, 29 x. 1992, *C. Spry DLJ10557* (CANB *9702405*).

Distribution and habitat: South Australia, Queensland, New South Wales, Victoria, Tasmania and New Zealand (Fig. 26). Grows in tall open forest, heathy woodlands and coastal scrublands on well-drained sand and clay loams. Altitude: 10–200 m.

Conservation status: Widespread, sometimes locally common and reasonably well represented in reserves.

Flowering period: August to November.

Pollination biology: This species can apparently be either facultatively autogamous or entomophilous.

Notes: *Thelymitra malvina* is very variable in terms of flower size, with plants from some colonies having insect-pollinated flowers more than 30 mm in diameter, while plants from other colonies have self-pollinating flowers less than 20 mm in diameter. In spite of this variation in flower size, the species is well-defined, quite distinctive and easily identified in the field. Plants are generally tall and slender with a large fleshy leaf and usually three sterile bracts. The inflorescence can have up to 25 flowers that may be slate blue to mauve inside and have a greenish appearance on the outside. The post-anther lobe is very long, tubular, compressed dorsally, dark reddish brown in colour and has a very small apical orifice. The lateral lobes have large, terminal, mop-like tufts of pink or mauve (rarely white) trichomes. *Thelymitra malvina* is probably most closely related to *Thelymitra atronitida*, but the latter usually has only two sterile bracts, fewer, generally smaller flowers that are dark blue with darker longitudinal veins, a predominantly glossy black post-anther lobe and white trichomes on the lateral lobes.

12. *Thelymitra peniculata* Jeanes, *sp. nov.*

T. pauciflorae R.Br. affinis sed plantis robustioribus generatim, folio latioro, inflorescentia floribus pluribus generatim composita, lobo post-antheram columnae bilobo profunde saepe et lobis lateralibus ad apices trichomatibus longis albis in caespiti compositis differt.

Type: New South Wales. Southwest Slopes: Red Hill, c. 3 km N of Narrandera, 8 x. 1988, *D.L. Jones 2956 & M. Clements* (holotype CANB; isotypes CANB, MEL, AD, NSW).

Illustrations: Fitzgerald (1880) 1: 6 (as *T. longifolia*); Backhouse & Jeanes (1995) page 340 (as *T. holmesii*); Bates (1999) page 69 fig. 1 (right, as *Thelymitra* sp. aff. *holmesii*); Jeanes & Backhouse (2001) page 172 figs A–F. (as *Thelymitra* sp. aff. *holmesii* 2).

Glabrous terrestrial *herb*. *Tubers* ovoid, 1–3 cm long, 5–15 mm wide, fleshy. *Leaf* linear, 14–25(–44) cm long, 5–12(–20) mm wide, erect, canaliculate, fleshy, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute to acuminate. *Inflorescence* 20–50(–66) cm tall, 1–3.5 mm diam., slender to stout, straight, purplish. *Sterile bracts* usually 2, occasionally 1 or 3, linear to linear-lanceolate, 2–8(–12) cm long, 4–8(–11) mm wide, closely sheathing, acute to acuminate, green to purplish. *Fertile bracts* ovate-acuminate to obovate-acuminate, 5–27 mm long, 3–7 mm wide, sheathing the pedicels, green to purplish. *Pedicels* 0.5–15 mm long, slender. *Ovary* narrow-obovoid, 5–12 mm long, 2–3.5 mm wide. *Flowers* (1–)4–10(–18), 14–22 mm diameter, usually rich purple, opening tardily on warm to hot days. *Perianth segments* 6–10(–12) mm long, 3–6.5 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate, obtuse to subacute; *lateral sepals* lanceolate to ovate, often asymmetric, acute; *petals* ovate to obovate,

obtuse to subacute; *labellum* obovate to oblanceolate, acute, often slightly smaller than other segments. *Column* erect from the end of ovary, (4.5–)5–6.5 mm long, 2.5–4 mm wide, pink or purplish; *post-anther lobe* hooding the anther, 3–4 mm long, 2–3 mm wide, tubular, often somewhat compressed dorsally, open or closed on the ventral side, curving abruptly through c. 90°, dark brown to almost black, apex usually deeply bilobed, yellow, the lobes (0.5–)1–1.5 mm long, margins thickened and recurved; *post-anther lobe extension* 0.5–1.1 mm; *auxiliary lobes* often present as 2 triangular, incurved spurs to 0.5 mm long, on the lower apical margin of the post-anther lobe, sometimes touching near tip of anther beak; *lateral lobes* converging or more or less parallel, 1.2–1.5 mm long, digitiform, porrect at base, curving gently upwards, each with a sub-terminal, mop-like, moderately sparse, untidy tuft of trichomes that embrace the apex of post-anther lobe, the individual trichomes (0.8–)1–1.3 mm long, white, sometimes proximal ones pinkish at base. *Anther* inserted above centre of column, ovoid, 2–3 mm long, 1.8–2.2 mm wide, the connective produced into an apical beak 0.4–0.8 mm long; *pollinarium* 1.5–2.3 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* mealy, friable, white. *Stigma* situated at base of column, ovate-quadrate, 2–2.5 mm long, 2–2.5 mm wide, margins irregular. *Capsules* obovoid, 10–20 mm long, 4–8 mm wide, erect, ribbed. (Fig. 5 d–f; Plate 2. Fig. 25).

Selected specimens examined: **South Australia**: Southern Lofty Region: Myponga Conservation Park, 14 x. 1986, *D.E. Murfet 276* (AD *98702487*); Flinders Ranges Region: Alligator Gorge National Park, 27 ix. 1988, *R.J. Bates 15644* (AD *98844241*). **New South Wales**: Northwest Slopes: 2.5 km from entrance to Mt Kaputar National Park, hill on N side, 1 x. 1989, *D.L. Jones 5182* (CANB *8913714*); Near Bathurst, Wambool Nature Reserve, 1989, *S. Cardale s.n.* (NSW *433885*); Central Coast: Norah Head, 30 ix. 1997, *B. Branwhite ORG867* (CANB *609290* & CANB *609289*); Paterson, 14 ix. 1925, *H.M.R. Rupp s.n.* (MEL *625277* & MEL *625496*); Toronto, x. 1931, *A.N. Burns s.n.* (MEL *625360*); Southern Tablelands: Mount Jerrabomberra, lower western slopes, 14 x. 1985, *M.A. Clements 3872* (CANB *8504821*); Central-west Slopes: Kangarooby, 16 x. 1984, *M.A. Clements 3522* (CANB *8411210*); South Coast: Bella Vista Estate. South side of Snowy Mountains Hwy, 26 x. 1997, *D.L. Jones 15616 & B.E. Jones* (CANB *9908914*); Central-west Slopes: 20 km S of Dubbo on Newell Highway, 20 x. 1986, *R.G. Tunstall 158* (CANB *8605721*). **Australian Capital Territory**: Majura Field Firing Range, 20 x. 1999, *M. Garratt ORG2785, K.J. Fitzgerald & P.O. Downey* (CANB *613184*); Black Mountain, near summit road, SW of C.S.I.R.O., 22 x. 1963, *L.G. Adams 735* (CANB *152270* & NSW); Mt Ainslie, 29 x. 1991, *C.H. Broers 231 & D.L. Jones* (CANB *9109482*); Western slopes of Mt Taylor, 13 xi. 1991, *D.L. Jones 8508, B.E. Jones & S.R. Jones* (CANB *9803904*); c. 7 km S of Thawa on main road to Namadgi, 25 x. 1998, *M.A. Clements 9769* (CANB *611787*). **Victoria**: Mount Granya State Park, 31 x. 1987, *A.C. Beauglehole 90259 & A.D.J. Piesse* (MEL *238610*); Pine Mountain National Park, 19 x. 1987, *A.C. Beauglehole 88606 & L.W. Huebner* (MEL *238608*); Midlands: Deep Lead Flora Reserve, SE of Deep Lead, 14 x. 1991, *T.J. Entwisle 2046* (MEL *2018677*); East Gippsland: Reedy Creek on the Princes Highway 3 miles E of Cann River, 5 xi. 1969, *T.B. Muir 4760* (MEL *518810*); Wannon: Wootong Vale, c. 8 km NNE of Coleraine, 26 xi. 1993, *Y. Ingeme s.n.* (MEL *2018383*); Eildon Cemetery, 30 x. 1960, *T.B. Muir 1607* (MEL *221677*); c. 3 km from Boorhaman towards Peechelloa, 5 x. 2000, *D.L. Jones 17578 & B. Jones* (MEL *2087460*, MEL *2089299* & CANB *620830*); Brisbane Ranges National Park, near the intersection of Swamp Track and Lease Road, 18 xi. 2000, *J.A. Jeanes 966* (MEL *2087450* & MEL *2089310*); Royal Botanic Gardens, Cranbourne, edge of Arboretum Mallee area, 7 xi. 2000, *W. Worboys JAJ943* (MEL *2087454* & MEL *2089305*); Darlimurla area, c. 500 m W of the Darlimurla railway station beside old rail line, 8 xi. 2000, *J.A. Jeanes 934* (MEL *2087457* & MEL *2089302*). **Tasmania**: Flinders Island. Tanners Bay Tinfield, 27 x. 1967, *J.S. Whinray 64* (MEL *1532020*); Ford Road, Squeaking Point, 12 xi. 1998, *P. Tonelli ORG1796* (CANB *609308*); Myrtle Bank, 10 xii. 1995, *J. Campbell 95044* (CANB *611795*); Hollybank, 27 xi. 1994, *J. Campbell 94162* (CANB *612462*); Creekton Road, 1 xii. 1992, *J. Campbell 92375* (CANB *611796*); Scamander, 11 xi. 1995, *J. Campbell 95032* (CANB *611706*); Lulworth tip, 8 xi. 1990, *D.L. Jones 7100 & C.H. Broers* (MEL *250349*, HO 326130, CANB *9614197*); Peggs Beach, 4 xi. 1990, *D.L. Jones 6982 & C.H. Broers* (CANB *9614079*).

Distribution and habitat: South Australia, New South Wales, Australian Capital Territory, Victoria and Tasmania (Fig. 26). Grows in a wide range of habitats including dry grassy woodlands, open forests, wet and dry heathlands and grassland. Altitude: 5–1000 m.

Conservation status: Widespread, reasonably common and well conserved.

Flowering period: September to November.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra peniculata* is a moderately robust species with a long, fairly narrow leaf. The inflorescence usually has two to eight flowers that open tardily and have deep purplish perianth segments that are mostly 6–10 mm long. The column is usually considerably more than half the length of the perianth segments. The post-anther lobe is large and inflated and usually deeply bifid at the apex. The lateral lobes usually curve gently upwards and are terminated by a moderately sparse, semi-erect tuft of white trichomes that are about 1 mm long. At least the proximal one quarter to one half of the lateral lobes is glabrous.

Thelymitra peniculata has been confused with *T. holmesii*, but the two species are distinct. The latter usually grows in wetter habitats and flowers somewhat later, the post-anther lobe is usually more deeply bifid at the apex and the trichomes on the lateral lobes are usually longer, cream or yellow (seldom white as in *T. peniculata*) and are generally arranged in a more elongate, open, untidy tuft.

Plants of *T. peniculata* from more mesic sub-coastal areas flower later, are often more robust and often have more flowers. Plants from the northern end of the range often have three sterile bracts and a longer, more thin-textured leaf, thus approaching *T. angustifolia* in vegetative morphology. Interesting populations from South Australia (Alligator Gorge National Park and Spring Gully Conservation Park) and New South Wales (Cocoparra area) have few or no trichomes on the lateral lobes. These plants are best regarded as aberrant since occasionally flowers with perfectly formed penicillate lateral lobes will occur on the same inflorescence as flowers with glabrous or sparsely trichomic lateral lobes.

Etymology: Latin *peniculus,* brush, tuft like the tail of a horse; the trichomes are more or less confined to the upper half of the lateral lobes in a loose, semi-erect tuft resembling a horse's tail.

13. *Thelymitra angustifolia* R.Br., *Prodr.* 314 (1810).

Type: Tropical Australia; Port II (Port Clinton, Queensland), 22 ix. 1802, *R. Brown s.n.* (lectotype α BM!, fide Clements 1989; isolectotypes BM!, AD!).

Illustration: Dockrill (1992) page 173 (as *T. pauciflora*).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear, 15–50 cm long, 5–10 mm wide, erect, thin textured, canaliculate near base becoming flat distally, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute to acuminate. *Inflorescence* 20–60 cm tall, 1.5–3 mm diam., slender, straight, green or purplish. *Sterile bracts* usually 3, sometimes 2 or 4, linear to linear-lanceolate, 1.5–7.5 cm long, 2.5–9 mm wide, closely sheathing, acute to acuminate, green or purplish. *Fertile bracts* ovate-acuminate to obovate-acuminate, 5–16 mm long, 3–6 mm wide, green or purplish, acute to acuminate, sheathing pedicels. *Pedicels* 1–6 mm long, stout to slender. *Ovary* narrow-obovoid, 2.5–11 mm long, 1–4 mm wide. *Flowers* 2–10, 18–27 mm diameter, purplish blue, opening only on warm to hot days. *Perianth segments* 8–12(–15) mm long, 3–6 mm wide, often shortly apiculate; *dorsal sepal* ovate, obtuse to subacute; *lateral sepals* lanceolate to ovate, asymmetric, acute; *petals* ovate, obtuse to subacute; *labellum* elliptic to

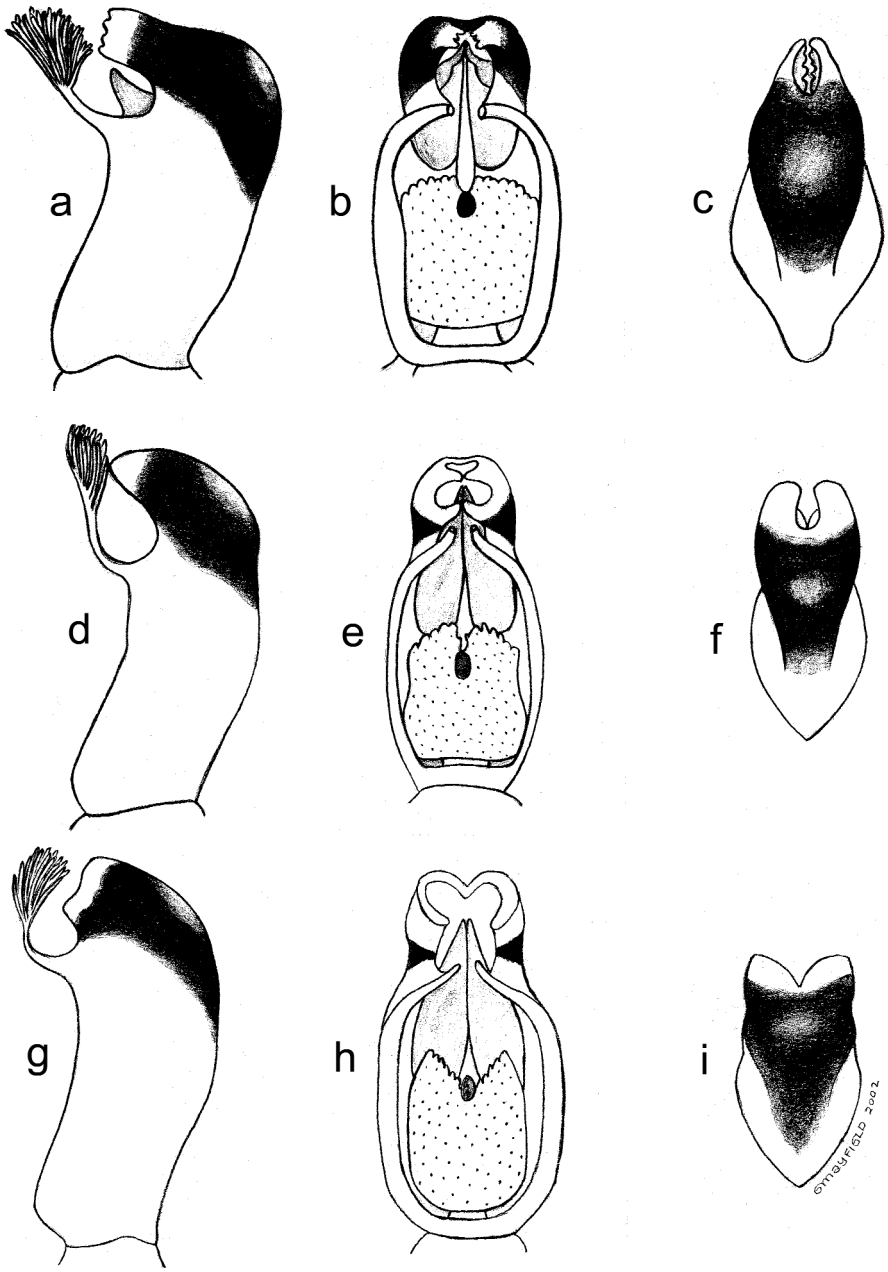

Figure 5.
Thelymitra atronitida: **a** column from side x 8; **b** column from front x 8; **c** post-anther lobe from rear x 8
Thelymitra peniculata: **d** column from side x 8; **e** column from front x 8; **f** post-anther lobe from rear x 8
Thelymitra angustifolia: **g** column from side x 8; **h** column from front x 8; **i** post-anther lobe from rear x 8

oblanceolate, acute, often narrower than other segments. *Column* erect from the end of ovary, 4.5–6 mm long, 2.2–3.2 mm wide, pale blue to pinkish; *post-anther lobe* hooding the anther, 3–4 mm long, 1.5–2.2 mm wide, tubular, gently curved, brownish, apex deeply bilobed, yellow, lobes with irregularly undulate margins; *post-anther lobe extension* 0.4–0.8 mm; *auxiliary lobes* absent or reduced to 2 tiny incurved spurs on distal margin of the post-anther lobe; *lateral lobes* converging, 1–1.5 mm long, digitiform, fleshy, porrect at base, curved gently upwards, distal half with an erect, mop-like arrangement of white trichomes, the individual trichomes 0.9–1.2 mm long. *Anther* inserted about mid-way along column, ovoid, 2.2–3 mm long, 1.4–2.1 mm wide, connective produced into an apical beak 0.6–0.8 mm long; *pollinarium* 1.5–2.5 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.8–2.5 mm long, 1.6–2 mm wide, margins irregular. *Capsules* obovoid, 8–12 mm long, 4–6 mm wide, erect, ribbed. (Fig. 5 g–i; Plate 3. Fig. 27)

Selected specimens examined: **Queensland**: Cook District: Wild River Gorge, 8 km from Herberton, 5 vi. 1972, *J. Wrigley & I. Telford NQ742* (CANB *47708*); Kennedy South District: Crediton, 27 vii. 1994, *A. & S. Pearson DLJ13123* (CANB *96129691*); Leichhardt District: Spring Creek, Blackdown Tableland, 8 ix. 1988, *T. Pederson DLJ2785* (CANB *88064471* & CANB *88064472*); Western Main Divide N of Herberton Range, 26 viii. 1954, *L.S. Smith 5300* (CANB *264760*); Kennedy South district: c. 4.2 km along The Diggings Road, Eungella National Park, 20 vi. 1993, *D.L. Jones 11682, C.H. Broers & S. Pearson* (CANB *9704701*); Moreton district: Mapleton State Forest, 21 viii. 1991, *R. Crane 694* (CANB *9202177*); Moreton District: Mt Ballow National Park, 18 viii. 1997, *R. Crane 1844* (CANB *9710461*); Port Curtis: Stockyard Point Byfield, viii. 1996, *R. Melzer RM730* (BRI *588081*). **New South Wales**: Pacific Highway, 12 miles S of Kempsey, 29 ix. 1969, *R. Coveny 2149* (NSW *171262*); Picton to Bargo, ix. 1891, (NSW *109540*); 6 km WNW of Mittagong, 26 xi. 1978, *J. Thompson 2981* (NSW & AD *98919110*); Mullumbimby, 6 ix. 1973, *T.B. Muir 5112* (MEL *2039733* & MEL *669884*); Wadalba, ix. 2001, *B. Branwhite JAJ1029* (MEL *2136713*); Warnervale, edge of Porters Creek wetland, ix. 2001, *B. Branwhite JAJ1032* (MEL *2136712*); 300m S of Ross Lane, Lennox Heads, 16 ix. 2001, *B. Dalyell JAJ1024* (MEL *2136735* & MEL *2136736*); Mittagong, *W.A. Dixon 2118* (NSW *156397*).

Distribution and habitat: Queensland and New South Wales where distributed widely between Mossman to just south of Sydney (Fig. 29). Also possibly occurs in Papua/New

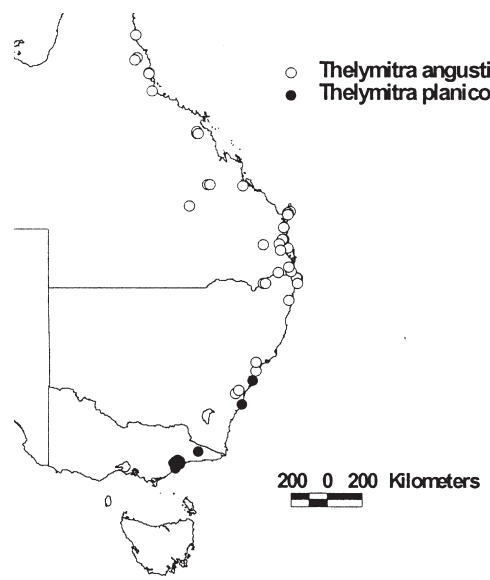

Figure 29. Distribution of *Thelymitra angustifolia* and *Thelymitra planicola*.

Guinea and New Caledonia. Found in a variety of habitats including open forest and woodland, but most often around the margins of rain forest and wet sclerophyll forest. Altitude: 0–1000 m.

Conservation status: Widespread and well conserved.

Flowering period: June to November.

Pollination biology: This species is facultatively autogamous.

Typification: The type sheet contains three specimens, all of similar appearance and apparently of common origin. The left hand specimen has only a single flower remaining and lacks the leaf. The middle specimen has three flowers remaining (at least an upper fourth flower is missing) and a leaf. The right hand specimen 'α' was designated as the lectotype by Clements (1989), probably because at that time it was the most complete of the three specimens, having an almost whole leaf and four flowers. Since then a flower from specimen 'α' has been removed, softened and stored in spirit by J.Z. Weber (AD *99005005*). Two of the plants have a long narrow leaf (about as long as the inflorescence). Two have three sterile bracts the other has two. All are of moderate height (to about 30 cm tall), slender and have up to four flowers. The flowers are small, the perianth segments 7–11.5 mm long, and probably self-pollinating as most of the ovaries are at least partially swollen.

Robert Brown in the *Prodromus* (Brown 1810) mistakenly gives the collection locality as Port Jackson (J), but the label on the type specimens gives the provenance as Port II (Port Clinton, Queensland, near Shoalwater Bay c. 100 km NNE of Rockhampton). Bennett gave the number 5572 to this particular collection.

Brown's Latin description (Brown 1810): *T. angustifolia*, perianthio patulo, cuculli laciniis extimis penicillatis: intermediâ dorso nudo emarginatâ lobulis dentatis, spicâ pauciflorâ, folio scapum aequante. (perianth widely spreading, side lobes penicillate: post-anther lobe naked, emarginate, lobules toothed, spike few-flowered, leaf equal to inflorescence.)

Notes: Plants consistent with Brown's description of *T. angustifolia*, and with the specimens on the type sheet, have been collected recently in various places in Queensland and northeastern New South Wales, This taxon appears to be relatively common and widespread, but under-collected and poorly known. The presence of other taxa in eastern Australia that bear several features in common with *T. angustifolia* has caused confusion. Several characters can be used in combination to define *T. angustifolia sensu stricto*. It flowers over a long interval between June and October and usually grows in open forests. The leaf is about as long as the inflorescence, narrow and thin-textured, rarely exceeding 10 mm wide, and the inflorescence is slender and up to 60 cm tall, usually with three sterile bracts. There are usually three to eight flowers that are autogamous and will open tardily only on very warm to hot days. The perianth segments are usually up to 13 mm long, about half as wide and blue to purplish in colour. The post-anther lobe is more or less tubular (widely open on the ventral side), not greatly inflated and shallowly bilobed at the apex. The lateral lobes are usually about 1.5 mm long and curve gently upwards. The trichomes on the lateral lobes are about 1 mm long and are arranged in dense sub-terminal mop-like bundles that embrace the tip of the post-anther lobe.

Thelymitra peniculata is similar to *T. angustifolia*, but the former has a shorter, fleshier, more channelled leaf and usually only two sterile bracts. It also has a more southerly distribution.

Although beyond the scope of this paper, it is interesting to note that all the *Thelymitra* specimens that I have seen from New Caledonia (usually identified as *Thelymitra sarasiniana* Kraenzl.) and from New Guinea (usually identified as *Thelymitra papuana* J.J.Sm.) are a good match for *T. angustifolia*. It is highly probable that the three taxa are conspecific, in which case *T. angustifolia* is the earliest name and should take

precedence. Hallé (1977) reduced *T. sarasiniana* to synonymy under *T. longifolia*, but Clements (1989) suggests that the two are separate species and that the former is endemic to New Caledonia. As stated earlier in this paper (see introduction), in my opinion *T. longifolia* is endemic to New Zealand. It differs from *T. angustifolia* and *T. sarasiniana* in its usually white flowers and the more toothbrush-like arrangement of the trichomes on the lateral lobes of the column.

14. *Thelymitra planicola* Jeanes*, Muelleria* 14: 94 (2000).

Type: Victoria. Golden Beach. SE edge of Lake Reeve, c. 200 m NE of causeway and adjacent to rare plant reserve, 26 x. 1999, *J.A. Jeanes 608* (holotype MEL!, isotypes MEL!, CANB!).

Illustrations: Jeanes (2000) fig. 1 e,f,g & h; fig. 5; Jeanes & Backhouse (2001) page 168.

Glabrous, somewhat glaucous terrestrial *herb*. *Tubers* not seen. *Leaf* linear to linear-lanceolate, 10–30 cm long, 5–20 mm wide, erect, leathery, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute. *Inflorescence* 22–45 cm tall, 2–5 mm diam., straight, purplish. *Sterile bracts* 2–4, linear to lanceolate, 2–8 cm long, 5–15 mm wide, green or purplish, lower ones often leaf-like, closely sheathing for most of their length, acute to acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 10–20 mm long, 4–8 mm wide, green or purplish, sheathing the pedicels. *Pedicels* 1–8 mm long, stout. *Ovary* cylindrical to narrow-obovoid, 3–12 mm long, 1.5–4 mm wide. *Flowers* 2–12, (15–)20–25(–30) mm diameter, medium blue with darker blue longitudinal veins, opening readily only on hot days. *Perianth segments* (7–)10–13(–15) mm long, 4–8 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate to obovate, obtuse to subacute; *lateral sepals* ovate-lanceolate, slightly asymmetric, acute; *petals* ovate to obovate, obtuse to subacute; *labellum* oblanceolate to obovate, acute, often smaller than other segments; *column* erect from the end of ovary, 5–6 mm long, 3–4 mm wide, white to pale blue; *post-anther lobe* hooding the anther, 1.5–2 mm long, 1.5–2 mm wide, semi-cylindric, gently curved, mostly dark blackish brown with a thin blue collar, apex shallowly bilobed, yellow, lobes shallowly and irregularly toothed; *post-anther lobe extension* 0.5–1.2 mm; *auxiliary lobes* absent; *lateral lobes* converging, 1.2–2 mm long, digitiform to somewhat flattened, obliquely erect, curved, each with a short, terminal, mop-like arrangement of white trichomes, the individual trichomes 0.9–1.5 mm long. *Anther* inserted c. mid-way along column, basal part obscured behind stigma, ovoid, 2.7–4 mm long, 1.5–2.2 mm wide, connective produced into an apical beak c. 0.5 mm long; *pollinarium* 1.5–2.2 mm long; *viscidium* circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, more or less quadrate, 2–2.5 mm long, 2–2.5 mm wide, margins irregular. *Capsules* obovoid, 10–16 mm long, 3.5–7 mm wide, erect, ribbed. (Fig. 6 a–c; Plate 3. Fig. 28).

Selected specimens examined: **New South Wales**: Cultivated CANB ex Orient Point, E of Nowra, 4 xi. 1988, *D.L. Jones 3422* (CANB *8807085*); Narrabeen, suburb of Sydney, 1 x. 1954, *A.W. Dockrill & B.B. Lowry 815* (AD *97631544*). **Victoria**: Gippsland Lakes Reserve, 27 x. 1984, *A.C. Beauglehole 78814* & *J.R. Turner* (MEL *669448*); Providence Ponds Flora and Fauna Reserve, 22 x. 1984, *A.C. Beauglehole 78729* (MEL *670413*); Golden Beach, SE edge of Lake Reeve, 4 xi. 1996, *J.A. Jeanes 258* (MEL *2034950*); Rail Reserve WSW of Lindenow South, 27 x. 1999, *J. Turner JAJ633* (MEL *2069954*); Bairnsdale, 24 x. 1987, *R.J. Bates 11393* (CANB *478099* specimen 2); Marlo Airport, 15 xi. 1987, *R.J. Bates 12172* (AD *98753040*).

Distribution and habitat: Eastern Victoria and the central coast of New South Wales. Most collections are from the eastern section of the Gippsland Plain Natural Region (Conn 1993), between Sale and Bairnsdale, Victoria, with disjunct collections from near Marlo and from New South Wales, east of Nowra and near Sydney (Fig. 29). Grows in

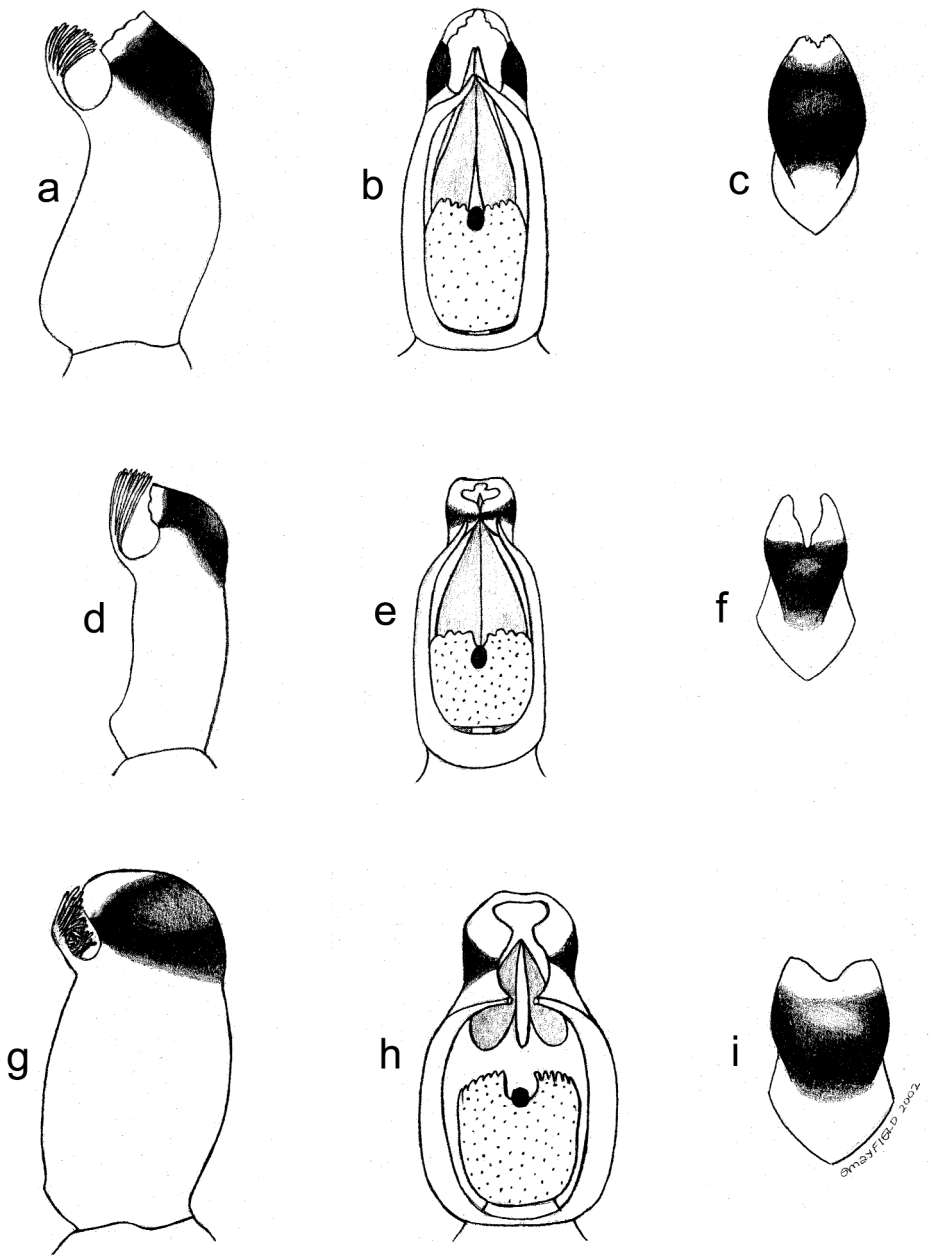

Figure 6.
Thelymitra planicola: **a** column from side x 8; **b** column from front x 8; **c** post-anther lobe from rear x 8
Thelymitra vulgaris: **d** column from side x 8; **e** column from front x 8; **f** post-anther lobe from rear x 8
Thelymitra arenaria: **g** column from side x 8; **h** column from front x 8; **i** post-anther lobe from rear x 8

herb-rich grassland and grassy woodland and heathland on soils ranging from sandy loams to clay loams. Altitude: 0–80 m.

Conservation status: Known from only about six colonies and very few plants. Suggest 3EC by criteria of Briggs & Leigh (1996).

Flowering period: Late October to early November.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra planicola* is a very distinctive species that is characterised by its overall glaucous appearance, moderately tall habit, large leaf-like lower sterile bracts, short pedicels, medium-blue, longitudinally veined flowers mostly 20 to 25 mm in diameter, and the short, semi-cylindric post-anther lobe. The structure of the post-anther lobe is unique for the group, so identification of fresh and spirit-preserved specimens is relatively simple. In the dried and pressed state however, *T. planicola* may be difficult to differentiate from *T. pauciflora*, although the persistent glaucous appearance of the leaf, scape, bracts and ovaries, and the often leaf-like lower sterile bracts are useful distinguishing characters.

The structure of the post-anther lobe of *T. planicola* is somewhat intermediate between those of *Thelymitra aristata* Lindl. and *T. pauciflora sens. lat.*, but these two taxa have not been recorded growing sympatrically with *T. planicola*, so the latter is unlikely to be of recent hybrid origin.

15. *Thelymitra vulgaris* Jeanes *sp. nov.*

T. pauciflorae R.Br. affinis sed bractea sterili solitaria, inflorescentia floribus pluribus generatim composita, lobo post-antheram inflatiore leviter, columna dilatata apicem versus, ad apicem incisum profunde differt.

Type: Western Australia. Warradale Road, c. 3 km from Brookton Highway, 15 x. 2000*, J.A. Jeanes 842, C. French & H. Beyrle* (holotype MEL; isotypes MEL, PERTH).

Thelymitra pauciflora sensu N. Hoffman & A. Brown, *Orchids of South-west Australia*—revised second edition with supplement 263 (1998), *non* R.Br. (1810).

Thelymitra graminea sensu N. Hoffman & A. Brown, *Orchids of South-west Australia*—revised second edition with supplement 265 (1998), *non* Lindl. (1840).

Illustrations: Hoffman & Brown (1998) pages 263 (as *T. pauciflora*) & page 265 (as *T. graminea*).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear to linear-lanceolate, 10–20(–30) cm long, 4–8(–12) mm wide, erect, canaliculate, fleshy or leathery, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acuminate. *Inflorescence* 10–30(–40) cm tall, 1–2.7 mm diam., slender, straight, pale green to dark green, straw-coloured or purplish. *Sterile bracts* usually 1, rarely 2, linear to linear-lanceolate, 2–7.5 cm long, 3.5–7.5 mm wide, green to purplish, closely sheathing, apex sometimes free and diverging from scape, acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 4–15(–24) mm long, 3–6 mm wide, sheathing the pedicels, green to purplish. *Pedicels* 1–15 mm long, slender. *Ovary* narrow-obovoid, 5–12 mm long, 2–3.5 mm wide. *Flowers* 2–5(–9), 15–20(–25) mm diameter, usually pale blue, mauve or purplish, less often white, opening tardily only on warm to hot days. *Perianth segments* 6–10(–13) mm long, 2.5–5 mm wide, concave, often shortly apiculate; *dorsal sepal* lanceolate to ovate-lanceolate, obtuse to acute; *lateral sepals* lanceolate to ovate-lanceolate, often slightly asymmetric, acute; *petals* ovate-lanceolate to ovate, obtuse to acute; *labellum* lanceolate to ovate-lanceolate, acute, only slightly smaller than other segments. *Column* erect from the end of ovary, 4–5 mm long, 1.8–2.5 mm wide, white to pale blue; *post-anther lobe* hooding the anther, 2–2.5 mm long, 1–1.5 mm wide, tubular,

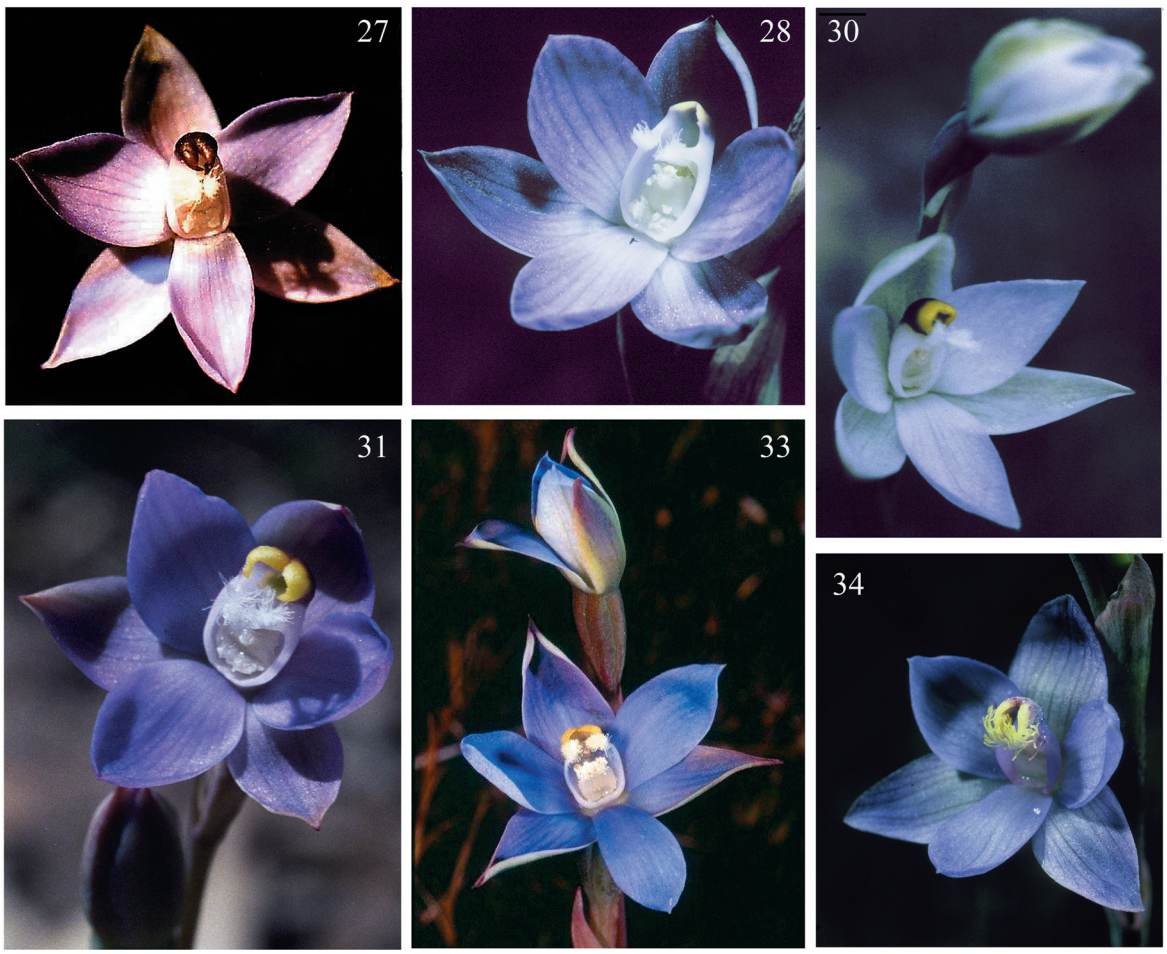

Plate 3. Figure 27. *Thelymitra angustifolia* Newcastle area, New South Wales (photograph by B.Branwhite); **Figure 28**. *Thelymitra planicola* Sale area, Victoria (photograph by J.A.Jeanes); **Figure 30**. *Thelymitra arenaria* Brisbane Ranges, Victoria (photograph by J.A.Jeanes); **Figure 31**. *Thelymitra batesii* Spring Gully C.P., South Australia (photograph by J.A.Jeanes); **Figure 33**. *Thelymitra frenchii* Jarrahdale, Western Australia (photograph by C.J.French); **Figure 34**. *Thelymitra mucida* Wilsons Promontory, Victoria (photograph by J.A.Jeanes)

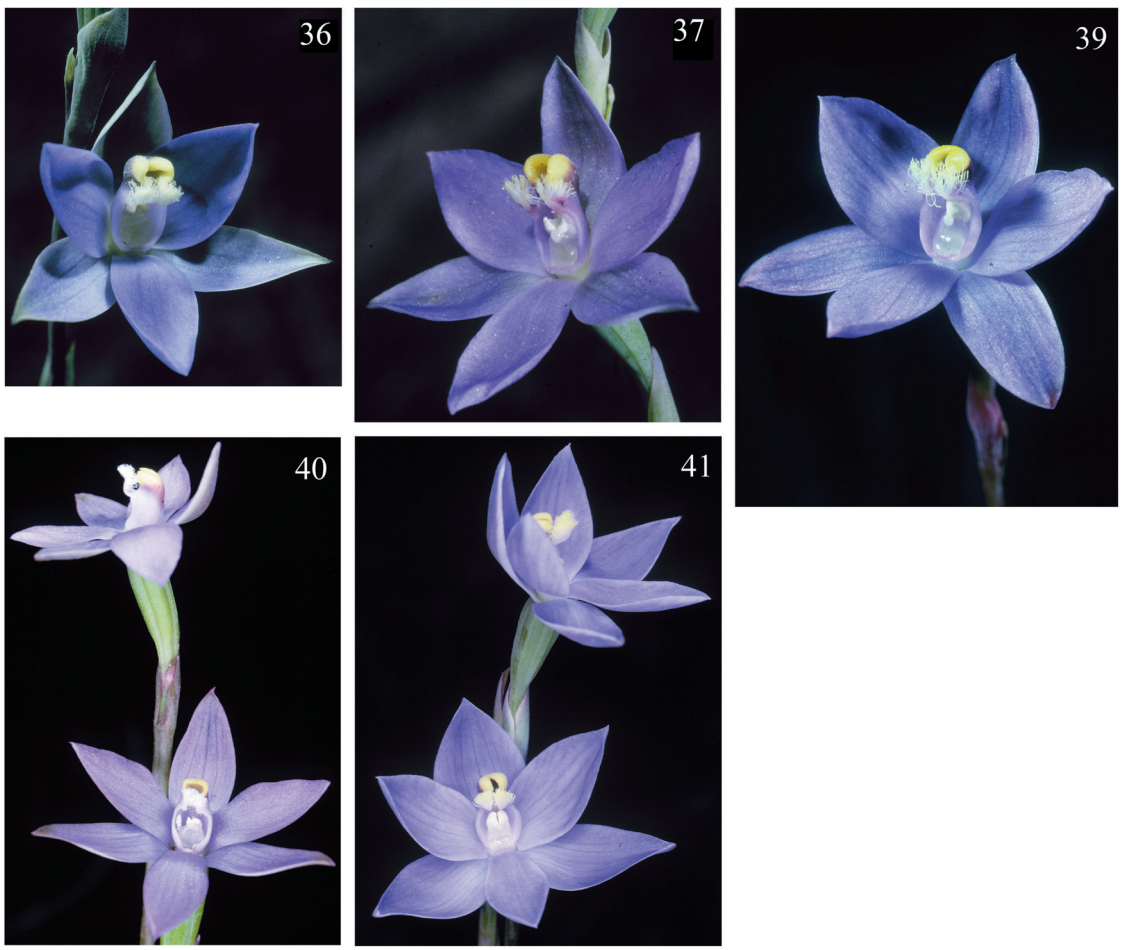

Plate 4. Figure 36. *Thelymitra lucida* Brisbane Ranges, Victoria (photograph by J.A.Jeanes); **Figure 37**. *Thelymitra inflata* Adelaide Hills, South Australia (photograph by M.Houston); **Figure 39**. *Thelymitra holmesii*: Wilsons Promontory, Victoria (photograph by J.A.Jeanes); **Figure 40**. *Thelymitra vulgaris* Darling Ranges, Western Australia (photograph by J.A.Jeanes); **Figure 41**. *Thelymitra xanthotricha* Darling Ranges, Western Australia (photograph by J.A.Jeanes)

widely open on ventral side, gently curved, reddish brown, apex deeply v-notched, yellow, distal margin not thickened, often shallowly and irregularly toothed; *post-anther lobe extension* 0.2–0.6 mm; *auxiliary lobes* absent; *lateral lobes* converging, 1.2–1.5 mm long, digitiform, porrect at base, curving gently upwards, each with a toothbrush-like arrangement of white trichomes along the distal half, the individual trichomes c. 0.5 mm long, gland-tipped. *Anther* inserted near centre of column, ovoid, 1.8–2.2 mm long, 1–1.5 mm wide, the connective produced into an apical beak 0.2–0.5 mm long; *pollinarium* 1.4–1.8 mm long; *viscidium* elliptic to more or less circular, c. 0.3 mm diam.; *pollinia* mealy, friable, white. *Stigma* situated at base of column, ovate-quadrate, 1.2–1.8 mm long, 1.2–1.8 mm wide, margins irregular. *Capsules* obovoid, 8–18 mm long, 3.5–6 mm wide, erect, ribbed. (Fig. 6 d–f; Plate 4. Fig. 40)

Selected specimens examined: **Western Australia**: Toolbrunup Road at the intersection with Aylmore Road. About 14 km ESE of Tumbellup, 17 x. 2000, *J.A. Jeanes 849* (MEL *2087480*, MEL *2093571* & PERTH); Mt Barker–Denmark Rd, c. 1 km NE of Harvey Road, 19 x. 2000, *J.A. Jeanes 853* (MEL *2093574*, MEL *2093575* & PERTH); Rock outcrop in Mehinup Nature Reserve c. 31 km E of Walpole, 19 x. 2000, *J.A. Jeanes 856 & W. Jackson* (MEL *2087474*, MEL *2087475* & PERTH); N edge of Lake Muir c. 1.5 km E of Thompson Rd, 20 x. 2000, *J.A. Jeanes 861* (MEL *2093612*, MEL *2093613* & PERTH); Capel–Donnybrook Rd, c. 4.7 km from Gibson Road towards Capel, 22 x. 2000, *J.A. Jeanes 868* (MEL *2093586*, MEL *2093587* & PERTH); Cranbrook–Boyup Brook Rd. W corner of Frankland turnoff, c. 10 km from Cranbrook, 21 x. 1998, *R.L. Heberle ORG1680* (CANB *610413*); Darling district: Lathams Hill, W of Wagin, 8 x. 1991, *D.L. Jones 8228* (CANB *610412*); Darling district: 18.1 km W of Mt Barker, Frankland River, E side, 12 x. 1991, *D.L. Jones 8383a* (CANB *611744*); Darling district: 5 km N of Manjimup beside road to Bridgetown, 10 x. 1991, *D.L. Jones 8296* (CANB *611741*); Roe district: The Humps, c. 20 km N of Wave Rock on Southern Cross road, 12 x. 1988, *D.L. Jones 3036* (CANB *8806699*).

Distribution and habitat: Endemic to southwestern Western Australia where very widespread (Fig. 42). Grows in a wide variety of habitats including open forest, woodland, heathy woodland and mallee scrub, often around swamp margins, near watercourses or on rock outcrops. Altitude: 0–500 m.

Conservation status: Widespread, often locally common and well conserved.

Flowering period: Late September to early November.

Pollination biology: This species is facultatively autogamous and often also cleistogamous.

Notes: *Thelymitra vulgaris* has been confused with *T. pauciflora*, but the two species are quite distinct morphologically as well as geographically. The former is confined to southwestern Western Australia, the latter to southeastern Australia. *Thelymitra pauciflora* has a generally narrower leaf, usually two sterile bracts, generally fewer flowers, a less inflated post-anther lobe that is more or less entire to emarginate at the apex and mop-like tufts of trichomes on the lateral lobes.

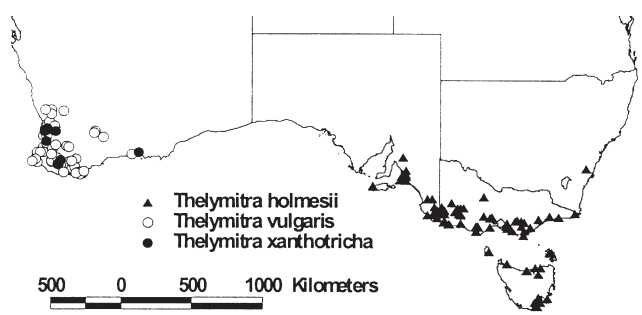

Figure 42. Distribution of *Thelymitra holmesii, Thelymitra vulgaris* and *Thelymitra xanthotricha*.

Thelymitra vulgaris has also been confused with *T. graminea*, but the latter is a generally larger flowered species belonging to the *T. macrophylla* alliance.

Thelymitra vulgaris occasionally hybridises with *T. macrophylla sens. lat.* producing plants of intermediate morphology.

Etymology: From the Latin *vulgaris*, common, usual; this is one of the most common and widespread *Thelymitra* species in Western Australia.

16. *Thelymitra arenaria* Lindl., *Gen. sp. pl.* 519–20 (1840)

Type: Tasmania, Circular Head, xi. 1837, *R. Gunn 937* (lectotype 6β K-L!, *fide* Clements 1989).

Illustrations: Jeanes & Backhouse (2001) page 171 figs A–C (as *Thelymitra* sp. aff. *pauciflora* 2).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear-lanceolate, 15–30 cm long, 8–18 mm wide, erect, scabrous, leathery, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute to acuminate. *Inflorescence* 25–40 cm tall, 1.5–4 mm diam., straight, pale green to straw-coloured. *Sterile bracts* usually 2, occasionally 1, linear to linear-lanceolate, 2.5–8.5 cm long, 4–11 mm wide, closely sheathing, green and purplish, acute to acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 6–22 mm long, 4–7 mm wide, green and purplish, sheathing the pedicels. *Pedicels* 4–15 mm long, slender. *Ovary* narrow-obovoid, 5–12 mm long, 2–3.5 mm wide. *Flowers* 2–12, (16–)20–26 mm diameter, usually purplish, opening only on hot days. *Perianth segments* (8–)10–15 mm long, 4–8 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate to elliptic, obtuse to subacute; *lateral sepals* narrow-ovate to elliptic, slightly asymmetric, acute; *petals* ovate to elliptic, obtuse to subacute; *labellum* narrow-ovate to elliptic, acute, slightly smaller than other segments; *column* erect from the end of ovary, 4.5–6 mm long, 2.5–3.5 mm wide, mostly pale blue with darker blue streaks; *post-anther lobe* hooding the anther, 2–3 mm long, 1.8–2.3 mm wide, tubular, inflated, gently curved through c. 90°, mostly dark brown, apex emarginate to shallowly bilobed, yellow, lobes 0.5–1.1 mm long; *post-anther lobe extension* 0.5–1.3 mm; *auxiliary lobes* absent or sometimes present as 2 tiny incurved spurs on the apical margin of the post-anther lobe; *lateral lobes* converging, 0.8–1.2 mm long, digitiform, porrect at base then bent sharply upwards through c. 90° near the middle, each with a toothbrush-like arrangement of white trichomes along most of their length, the individual trichomes 0.7–1 mm long. *Anther* inserted towards apex of column, ovoid, 2.5–3 mm long, 1.5–2 mm wide, the connective produced into an apical beak 0.4–0.7 mm long; *pollinarium* 1.9–2.4 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.5–2.2 mm long, 1.8–2.5 mm wide, margins irregular. *Capsules* obovoid, 10–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 6 g–i; Plate 3. Fig. 30)

Selected specimens examined: **South Australia**: Southern Lofty Region: National Park, Belair, 8 x. 1911, *R.S. Rogers s.n.* (AD *97725215*);); Mount Lofty Range: SE side of Clarendon to Kangarilla Rd at Bakers Gully Road turnoff, 2 xi. 1969, *R.C. Nash s.n.* (AD *97003273*); Southern Lofty Region: Kennet-Stirling Conservation Park near Bridgewater Park, 4 xi. 1990, *J.Z. Weber 10204* (AD *99037083*); Kangaroo Island Region: American Beach/Brown Beach area c. 10.2 km from Penneshaw, ix. 2000, *D.L. Jones 16813* (MEL *2136731* & CANB *606708*); c. 4 km SE of Naracoorte, 22 x. 2001, *K. Alcock JAJ1072* (MEL *2136730*); Southern Lofty Region: Scott Creek Conservation Park, 18 x. 2001, *R.J. Bates JAJ1294* (MEL *2136718*); Southern Lofty Region: Upper Waterfall Gully, 14 x. 1966, *Hj. Eichler 18794* (AD *96650441*). **New South Wales**: Southwest Slopes: Nailcan Range, Albury, 4 xi. 1999, *P.G. Branwhite 43* (CANB *622597*). **Australian Capital Territory**: Brindabella Ranges, c. 7.3 km along Bendora Dam Rd from Bulls Head, 24 xi. 1991, *D.L. Jones 8568 & B.E. Jones* (CANB *9803959*); Black Mountain, 28 x. 1953, *E. Gauba s.n.* (CANB *14377*). **Victoria**: Wannon: Apsley, 11 x. 1996, *K. Alcock s.n.* (MEL *2032963*);

Beside Calder Hwy, 6 km SE of Harcourt, 9 xi. 1970, *T.B. Muir 4895* (MEL *518815*); Morrl Morrl, 26 km NE of Stawell, in State Forest, 18 x. 1980, *T.B. Muir 6490* (MEL *581494*); Beside railway line, 3 miles west of Yea, 28 x. 1964, *T.B. Muir 3561* (MEL *221682*); 8.5 km W of Bacchus Marsh, near northwest railway line, 11 xi. 1976, *T.B. Muir 5469* (MEL *114546*); Whroo Forest. Whroo, 7 km SSW of Rushworth, 27 x. 1974, *T.B. Muir 5373* (MEL *114551*); About 3 km SSE of Macedon, near railway line, 9 xi. 1970, *T.B. Muir 4893* (MEL *518816* & MEL *2039683*); 0.5 km SW of Broadford, in railway reserve, 12 x. 1978, *T.B. Muir 6162* (MEL *565912* & MEL *2039750*); Volcanic Plain. Inverleigh Common Flora Reserve, 30 km W of Geelong, 3 xi. 1991, *T.J. Entwisle 2124* (MEL *2016283* & MEL *2046963*); Cosstick Wildflower Reserve, 5 km WSW of Maryborough P.O., 26 x. 1981, *A.C. Beauglehole 69475 & L. & E. Courtney* (MEL *1530851*). **Tasmania**: Symmons Plains, 5 xi. 1974, *W.M. Curtis s.n.* (HO *410817*); Kapi Creek, 4 xii. 1981, *D.I. Morris 81221* (HO *409314*); Barossa Road, Lenah Valley, ix. 1950, *J.F. Thompson s.n.* (HO *97695*); Mt Cameron, 18 xi. 1983, *A. Moscal 4170* (HO *94555*); Sisters Beach, near store, 31 x. 1998, *D.L. Jones 16019 & M. Garratt* (CANB *605652*); Duck Bay, 25 x. 1997, *L. Hyatt ORG983* (CANB *609362*); Campbell Town Golf Course, 21 xi. 1995, *H. Wapstra DLJ14684* (CANB *9609757*); Wynyard Cemetery, 2 xi. 1990, *D.L. Jones 6921 & C.H. Broers* (CANB *9016391*); Moorina Cemetery, 9 xi. 1990, *D.L. Jones 7133 & C.H. Broers* (CANB *9614230*); Risdon, 29 x. 1992, *J.E. Wapstra DLJ10565* (CANB *9702414*); Mount Wellington, Lenah Valley Track, 14 xii. 1993, *M. Wapstra DLJ12745* (CANB *9603651*).

Distribution and habitat: Southeastern Australia, mostly Victoria and Tasmania but extending to the Mount Lofty Ranges of South Australia and southeastern New South Wales including the Australian Capital Territory (Fig. 32). Grows in a wide variety of habitats including open forest, woodland, heathland and scrubland. Altitude: 5–1000 m.

Conservation status: Widespread, reasonably common and well conserved.

Flowering period: October to December.

Pollination biology: This species is facultatively autogamous.

Typification: The type sheet contains seven specimens with two labels, representing two separate collections. The three specimens on the left have Gunn's number 943α, and were collected in December to January 1837 at Circular Head, Tasmania. The four specimens on the right have Gunn's number 937, and were collected in November 1837, also at Circular Head. All seven specimens are of fairly uniform appearance and both

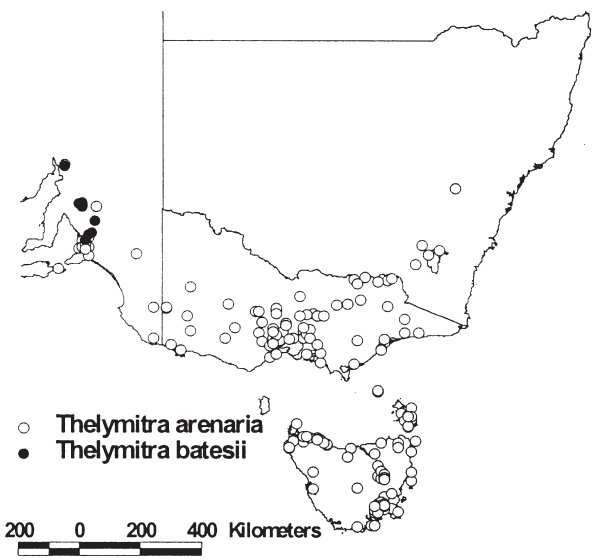

Figure 32. Distribution of *Thelymitra arenaria* and *Thelymitra batesii*.

collections were cited by Lindley in the protologue. Each collection is accompanied by a sketch of the column, apparently executed by Lindley, and these also show some similarities. In 1984, Clements softened and drew a dissected flower taken from a specimen belonging to each collection (Clements pers. comm.). The column from the 943α specimen has the lateral lobes with more or less terminal trichomes, while the trichomes on the lateral lobes of the 937 specimen are distributed almost along their entire length. This fact together with the disparity in flowering times and Gunn's allocation of discrete numbers would suggest that the two collections are of different taxa. Since Clements (1989) designated collection 937 as the lectotype of *T. arenaria*, collection 943α should not be considered as part of the type. In fact, collection 943α appears referable to the new species *T. peniculata* (described above in this paper), a common species often sympatric with *T. arenaria*. Although all four plants of the lectotype have open or partially open flowers, and Lindley describes the flowers as spreading, this could be due simply to the fact that the plants were collected and pressed on a hot day.

Lindley's Latin description (Lindley 1840b): *T. arenaria*. T. folio lineari, racemo 2–6-floro, cuculli emarginati glabri laciniis lateralibus petiolatis stuposis, floribus purpureis patulis. (*Thelymitra* with leaf linear, raceme 2–6-flowered, hood emarginate, glabrous, lateral flap stalked with matted hair, flowers purple, spreading).

Notes: Plants consistent with Lindley's description, sketch and notes on *T. arenaria*, and with collection 937 on the type sheet, are common in northwestern Tasmania and have been collected recently and studied. This taxon is relatively common and widespread throughout much of southeastern Australia, but remains poorly known today due to the presence of several superficially similar taxa. A combination of characters can be used to define *T. arenaria sensu stricto*. It is a moderately tall, slender species with a long, narrow, fleshy leaf, and usually two sterile bracts. There are up to 12 autogamous flowers that open only on warm to hot days. The perianth segments are usually about 10 mm long, but may be as long as 15 mm, about half as wide and usually purplish in colour. The post-anther lobe is more or less tubular, widely open on the ventral side, inflated and emarginate at the apex. The lateral lobes are up to 1.2 mm long and bend upwards sharply (at c. 90°) near their middle. The trichomes on the lateral lobes are up to 1 mm long and are arranged in very dense toothbrush-like tufts along virtually their entire length.

The column structure of *T. nuda* is virtually identical to that of *T. arenaria*, but the former is generally a more robust species with larger, entomophilous flowers and a larger column. Intermediates have often been observed and collected, and these may represent hybrid swarms.

17. *Thelymitra batesii* Jeanes, *sp. nov*.

T. pauciflorae R.Br. affinis sed inflorescentia floribus pluribus generatim composita, lobo post-antheram columnae inciso profunde saepe et lobis lateralibus curvatis (non flexibus acute) et trichomatibus longioribus instructis differt.

Type: South Australia. Spring Gully Conservation Park, Cascades Walk, 16 x. 2002, *J.A. Jeanes 1252* (holotype AD; isotypes CANB, MEL, NSW, HO, BRI).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear to linear-lanceolate, 10–30 cm long, 5–11 mm wide, erect, canaliculate, fleshy, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute to acuminate. *Inflorescence* 20–45 cm tall, 1.5–2.5 mm diam., slender, straight, green to purplish. *Sterile bracts* usually 2, linear to linear-lanceolate, 2–7 cm long, 4–8 mm wide, closely sheathing, acute to acuminate, green to purplish. *Fertile bracts* ovate-acuminate to obovate-acuminate, 7–20 mm long, 4–7 mm wide, sheathing the pedicels, green to purplish. *Pedicels* 0.5–10 mm long, slender. *Ovary* narrow-obovoid, 4–11 mm long, 2–3.5 mm wide. *Flowers* 2–8, 14–22

mm diameter, opening tardily on warm to hot days, usually mauve or bluish purple inside, outside of sepals pinkish with darker longitudinal stripes, unopened flower buds inflated. *Perianth segments* 6–10 mm long, 3.5–6.5 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate, obtuse to subacute; *lateral sepals* lanceolate to ovate, often asymmetric, acute; *petals* ovate to obovate, obtuse to subacute; *labellum* obovate to oblanceolate, acute, often slightly smaller than other segments. *Column* erect from the end of ovary, 4.5–5.5 mm long, 2.5–3.5 mm wide, pink or purplish; *post-anther lobe* hooding the anther, 2.5–3.5 mm long, 1.9–2.7 mm wide, tubular, often somewhat compressed dorsally, curving abruptly through c. 90°, dark purplish, apex deeply bilobed, yellow, the lobes 1–1.5 mm long, margins thickened and recurved; *post-anther lobe extension* 0.5–0.8 mm; *auxiliary lobes* often present as 2 small incurved spurs on the lower apical margin of the post-anther lobe, sometimes touching near tip of anther beak; *lateral lobes* converging or more or less parallel, 1.3–1.7 mm long, digitiform, porrect at base, curving gently upwards, each with a sub-terminal, mop-like, dense, untidy tuft of trichomes that embrace the apex of post-anther lobe, the individual trichomes 1.1–1.5 mm long, white. *Anther* inserted about mid-way along column, ovoid, 2.5–3 mm long, 1.7–2.2 mm wide, the connective produced into an apical beak 0.5–0.7 mm long; *pollinarium* 1.9–2.5 mm long; *viscidium* more or less circular, c. 0.4 mm diam.; *pollinia* mealy, friable, white. *Stigma* situated at base of column, ovate-quadrate, 1.8–2.5 mm long, 1.7–2 mm wide, margins irregular. *Capsules* obovoid, 10–18 mm long, 4–7 mm wide, erect, ribbed. (Fig. 4 a–c; Plate 3. Fig. 31)

Selected specimens examined: **South Australia**: Southern Lofty Region: Flora reserve on the Kersbrook–Williamstown Road, c. 6.5 km N of Kersbrook, 15 x. 2002, *J.A. Jeanes 1247* (MEL *2144479* & MEL *2144480*); Northern Lofty Region: Hughes Park via Sevenhill, x. 2000, *R.J. Bates 57681* (MEL *2100132*); Mt Lofty Range. Stonyfell, Ferguson Recreation Park, 7 x. 1973, *K. Preiss 260* (AD *97351306*); Northern Lofty Region: Emu Flat Native Reserve via Clare, 9 x. 1999, *R.J. Bates 54361* (AD *111895*); Southern Lofty Region: Above the Little Para crossing Para Wirra, 9 x. 1996, *R.J. Bates 44805* (AD *99826175*); Flinders Ranges Region: Alligator Gorge, xi. 1997, *R.J. Bates 42625* (AD *99841285*); Northern Lofty Region: 10 km N of Nuriootpa, 25 x. 1992, *R.J. Bates 29514* (AD *99321292*).

Distribution and habitat: Apparently endemic to South Australia where found in hill country in the Northern Lofty and Southern Lofty Regions (Fig. 32). Grows in heathy woodlands and heathy open forests in sandy or gravelly clay loams. Altitude: 300–600 m.

Conservation status: Widespread, reasonably common and conserved.

Flowering period: Late September to early November.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra batesii* is a slender species with a long, fairly narrow leaf. The inflorescence usually has two to eight flowers that open tardily and have mauve to bluish purple perianth segments that are short (mostly 6–10 mm long) and broad (mostly 3.5–6.5 mm wide). The mature unopened flower buds are distinctive, having a plump appearance with the exterior of the sepals pinkish with darker longitudinal veins. The column is usually about half the length of the perianth segments. The post-anther lobe is large, dorsally compressed, inflated and deeply bifid at the apex. The lateral lobes usually curve upwards gently and are terminated by a dense, semi-erect tuft of white trichomes to about 1.5 mm long. At least the proximal quarter to half of the lateral lobes is glabrous.

Thelymitra batesii has been confused with *T. peniculata* and *T. brevifolia*; it can be distinguished from the former by its less robust habit, generally narrower leaf, the flower buds that are short and plump and the exterior of the sepals that is pink and longitudinally striped and from the latter by its proportionately longer and narrower leaf, purplish and yellow post-anther lobe that is more regularly notched and the lateral lobes that have larger tufts with longer trichomes.

Etymology: Named after Robert (Bob) J. Bates (1946–), field naturalist, orchid enthusiast and author. Bob has an enormous knowledge of Australian orchids, in particular those of South Australia, and was probably the first person to recognise *T. batesii* as a distinct species. Bob has also been of immeasurable help during my research on *Thelymitra* by supplying me with specimens and with information.

18. *Thelymitra frenchii* Jeanes, *sp. nov*.

T. granitorae D.L.Jones & M.A.Clem. affinis sed lobo post-antheram columnae non obstipo, floribus minoribus generatim et azureis intense, bractea sterili infera bifida interdum differt.

Type: Western Australia. Darling District: Blue Rock near Jarrahdale, 13 x. 2002, *C.J. French 3565* (holotype MEL; isotypes PERTH, CANB).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear-lanceolate, 6–12 cm long, 5–12 mm wide, more or less erect to curved strongly away from scape, canaliculate, fleshy, scabrous, pale green, ribbed abaxially, sheathing at base, apex acute. *Inflorescence* 5–14 cm tall, 1.5–3 mm diam., stout, straight, purplish. *Sterile bracts* 1 or 2, linear-lanceolate, 1.5–4 cm long, 4–8 mm wide, free for much of their length and diverging from scape, acute to acuminate, green to purplish, lower bract sometimes deeply bifid, the lobes 15–25 mm long, acute to acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 7–20 mm long, 4–7 mm wide, sheathing the pedicels, green to purplish, occasionally the proximal margins of lowest bract connate. *Pedicels* 6–15 mm long, slender. *Ovary* cylindrical to narrow-obovoid, 5–10 mm long, 2.5–3.5 mm wide, curved. *Flowers* 1–3, 18–25 mm diameter, blue, opening freely even in cool weather and remaining open until late in the day. *Perianth segments* 8–12 mm long, 3.5–6 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate, distal margins often incurved, acute; *lateral sepals* lanceolate to ovate, slightly asymmetric, distal margins often incurved, acute; *petals* ovate, acute; *labellum* lanceolate, acute, usually slightly smaller than other segments. *Column* erect from the end of ovary, 5–5.5 mm long, 2.5–3 mm wide, pale blue; *post-anther lobe* hooding the anther, 2–3 mm long, 1.5–2.2 mm wide, tubular, widely open on ventral side, slightly inflated, truncate, mostly yellow with a narrow purplish collar, apex shallowly but widely v-notched, distal margin more or less smooth; *post-anther lobe extension* 0.4–0.6 mm; *auxiliary lobes* absent; *lateral lobes* converging, 1–1.3 mm long, digitiform, more or less erect, each with a toothbrush-like arrangement of white trichomes along most of their length, the individual trichomes 0.6–0.9 mm long. *Anther* inserted about mid-way along column, ovoid, 2–3 mm long, 1.5–2.5 mm wide, connective produced into a beak 0.4–0.6 mm long; *pollinarium* 1.5–2.5 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.5–2.5 mm long, 1.5–2.2 mm wide, margins irregular. *Capsules* obovoid, 9–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 4 d–f; Plate 3. Fig. 33)

Specimens examined: **Western Australia**: Darling District: Near Jarrahdale, 14 x. 2001, *C.J. French 3215* (MEL *2144483*).

Distribution and habitat: Western Australia. Known with certainty only from a single locality near the town of Jarrahdale, which is c. 50 km southeast of Perth (Fig. 35). Grows in soil pockets on a granite rock outcrop in *Eucalyptus marginata* (Jarrah) forest. Reports of this species occurring on other rock outcrops in the region are in need of confirmation. Altitude: c. 300 m.

Conservation status: Currently known with certainty from only about 150 plants at the type locality and critically endangered. Suggest 2E by criteria of Briggs & Leigh (1996).

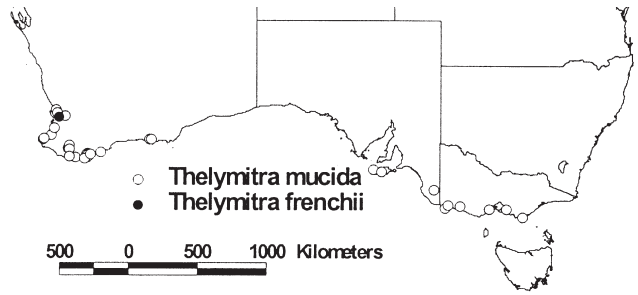

Figure 35. Distribution of *Thelymitra mucida* and *Thelymitra frenchii*.

Flowering period: October.

Pollination biology: The friable, mealy pollen and high level of seed capsule production would suggest that this species is most likely facultatively autogamous.

Notes: *Thelymitra frenchii* is a distinctive species that is probably related most closely to *Thelymitra granitora* (generally regarded as a member of the *T. nuda* complex) with which it shares a fondness for growing in shallow soil pockets on granite rocks, a short, stocky habit, a long, curved, fleshy leaf and self-pollinating flowers. However, the post-anther lobe in *T. frenchii* is a different shape and is more or less continuous with the base of the column (i.e. it doesn't curve forward through about 90° like that of *T. granitora*). Also the flowers are generally smaller and deeper blue in colour and the lowest sterile bract is sometimes deeply bifid. The flowers of this species remain open late into the day when other nearby *Thelymitra* species have their flowers already closed.

Etymology: Named after Christopher (Chris) J. French (1958–), field naturalist, orchid enthusiast and probably the first person to recognise the uniqueness of this species. Chris has been of immeasurable help during my research on *Thelymitra* by supplying me with specimens (including the type of *T. frenchii*) and acting as guide and companion during my Western Australian field trips.

19. *Thelymitra mucida* Fitzg., *Gard. Chron*. new ser. 17: 495 (1882).

Type: Wilson's Inlet, Western Australia, ix., *R.D. Fitzgerald s.n.* (lectotype α, β & γ BM! *fide* A.S.George 1971; isolectotypes BM!, NSW!).

Illustrations: Fitzgerald (1885) 2: 2; Nicholls (1969) Plate 21; Backhouse & Jeanes (1995) page 353; Hoffman & Brown (1998) page 262; Jeanes & Backhouse (2001) page 173.

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear, 10–30 cm long, 2–8 mm wide, erect, fleshy, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute to acuminate. *Inflorescence* 18–55 cm tall, 0.8–2 mm diam., slender, straight, green to purplish. *Sterile bracts* usually 2, rarely 3, linear to linear-lanceolate, 2–4 cm long, 2.5–5 mm wide, closely sheathing, acute to acuminate, green to purplish. *Fertile bracts* ovate-acuminate to obovate-acuminate, 6–12 mm long, 3–6 mm wide, sheathing the pedicels, green to purplish. *Pedicels* 0.5–12 mm long, slender. *Ovary* narrow-obovoid, 5–12 mm long, 2–3.5 mm wide. *Flowers* 1–6, 14–22 mm diameter, pale to dark blue or purplish often also with strong pinkish tones, opening tardily on warm to hot days. *Perianth segments* 6–12 mm long, 3–6.5 mm wide, concave, broad and overlapping, often shortly apiculate; *dorsal sepal* ovate, subacute to obtuse; *lateral sepals* ovate, acute to obtuse; *petals* ovate, obtuse; *labellum* ovate-lanceolate to lanceolate, more or less acute, usually smaller than other segments. *Column* erect from the end of ovary,

4–6 mm long, 2.5–3.7 mm wide, blue or pinkish; *post-anther lobe* hooding the anther, 2.5–3.5 mm long, 1.5–2.5 mm wide, tubular, inflated, narrowly open on the ventral side, narrow at base, widening abruptly towards apex, purplish brown, covered with a thick, sticky, hoary secretion, apex deeply v-notched, yellow, the lobes 1–2 mm long, apical margin thickened; *post-anther lobe extension* 1.4–1.8 mm; *auxiliary lobes* absent; *lateral lobes* converging, (1–)1.5–2 mm long, digitiform or laterally compressed, rather thick and fleshy, porrect to obliquely erect, each with a shaggy toothbrush-like arrangement of trichomes along upper edge, the individual trichomes 1.2–2.2 mm long, to c. 0.1 mm thick, embracing the apex of the post-anther lobe, coarse, yellow or cream (rarely white), often pink at base, at least the proximal trichomes connate at base. *Anther* inserted towards base of column, mostly obscured by stigma, broad-ovoid to subglobose, 2–2.5 mm long, 1.5–2 mm wide, the connective produced into an apical beak c. 0.4 mm long; *pollinarium* 1.6–2.2 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, more or less quadrate, c. 2 mm long, c. 2 mm wide, margins irregular. *Capsules* obovoid, 9–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 7 a–c; Plate 3. Fig. 34)

Selected specimens examined: **Western Australia**: Lake Unicup area, 19 x. 1984, *R.J. Bates 4532* (MEL *725414*); Cape Le Grande road, 5 km E of Esperance, 6 x. 1981, *C. Lloyd 36* (MEL *604083*); Tone Bridge, 22 x. 1990, *R.J. Bates 24447* (MEL *725415*); Upper King River near Albany, x. 1946, *W.H. Nicholls s.n.* (MEL *1532688*); Youngs Siding, 26 x. 1932, *Rica Erickson s.n.* (PERTH *281557*); Swamp at Bartram Rd, Jandacot, 23 x. 1960, *A.S. George 1678* (PERTH *281565*); Caves Road, 9.8 km S of Moses Rock Rd, 1.7 km N of Cowramup Bay Rd, 21 x. 2000, *J.A. Jeanes 865 & C.J. French* (MEL *2093580*, MEL *2093581* & PERTH). **South Australia**: Kangaroo Island: Flinders Chase, 2 xi. 1986, *R.J. Bates s.n.* (AD *99112094*); Kangaroo Island: Peat bog 1 km E of Ravine De Casoars along Playford Highway, 2 xi. 1986, *R.J. Bates 7474* (AD *98650303*); Kangaroo Island: 9 km NW of Vivonne Bay, 9 xi. 1989, *R. Barratt & D.N. Kraehenbuehl 222* (AD *99116293*); Southeast Region: Big Heath, 6 xi. 1965, *D. Hunt 2590* (AD *98620068*). **Victoria**: Five Mile Rd, c. 1.5 km E of Tidal River Rd, Wilsons Promontory, 19 xi. 1979, *J. Eichler s.n.* (MEL *1546644*); 15 km WNW of Heywood P.O. c. 30 km NNW of Portland P.O., 28 xi. 1976, *A.C. Beauglehole 55327* (MEL *652736*); Heath Rd, Kentbruck, 14 xi. 1983, *C. & D. Woolcock 1360* (MEL *654677*); Anglesea, 30 xi. 1969, *G.W. Carr s.n.* (MEL *2039692*); Syphon Road swamp, Grampians, 12 xi. 1985, *R.J. Bates 6520* (AD *98551084*).

Distribution and habitat: Western Australia, South Australia and Victoria (and possibly Tasmania) (Fig. 35). Grows in moist depressions and around swamp margins under dense scrubland, heathy woodland or heathland on peaty sands that remain moist for most of the year. Altitude: 0–50 m.

Conservation status: Common and widespread and well conserved in Western Australia, but rare and seldom collected in the eastern states.

Flowering period: August to December.

Pollination biology: This species is facultatively autogamous and often also cleistogamous.

Typification: The type sheet contains five specimens and appears to consist of two separate collections. The three specimens on the left (α, β & γ) are small, slender and at the peak of their flowering, with one flower pressed in a semi-open position and readily identifiable. These specimens agree well with the protologue and with Fitzgerald's illustration (Fitzgerald 1875–95) of *T. mucida*, and have been designated as the lectotype by A.S.George (1971). The two specimens on the right are larger and in advanced fruit, but appear to be of the same taxon collected later in the season.

Notes: *Thelymitra mucida* is one of only three *Thelymitra* taxa that have a glaucous or shiny bloom on the post-anther lobe, the others being *Thelymitra inflata* Jeanes and *Thelymitra lucida* Jeanes from southeastern Australia (see below). *Thelymitra mucida* can be distinguished from these and from all other taxa by a combination of characters. The

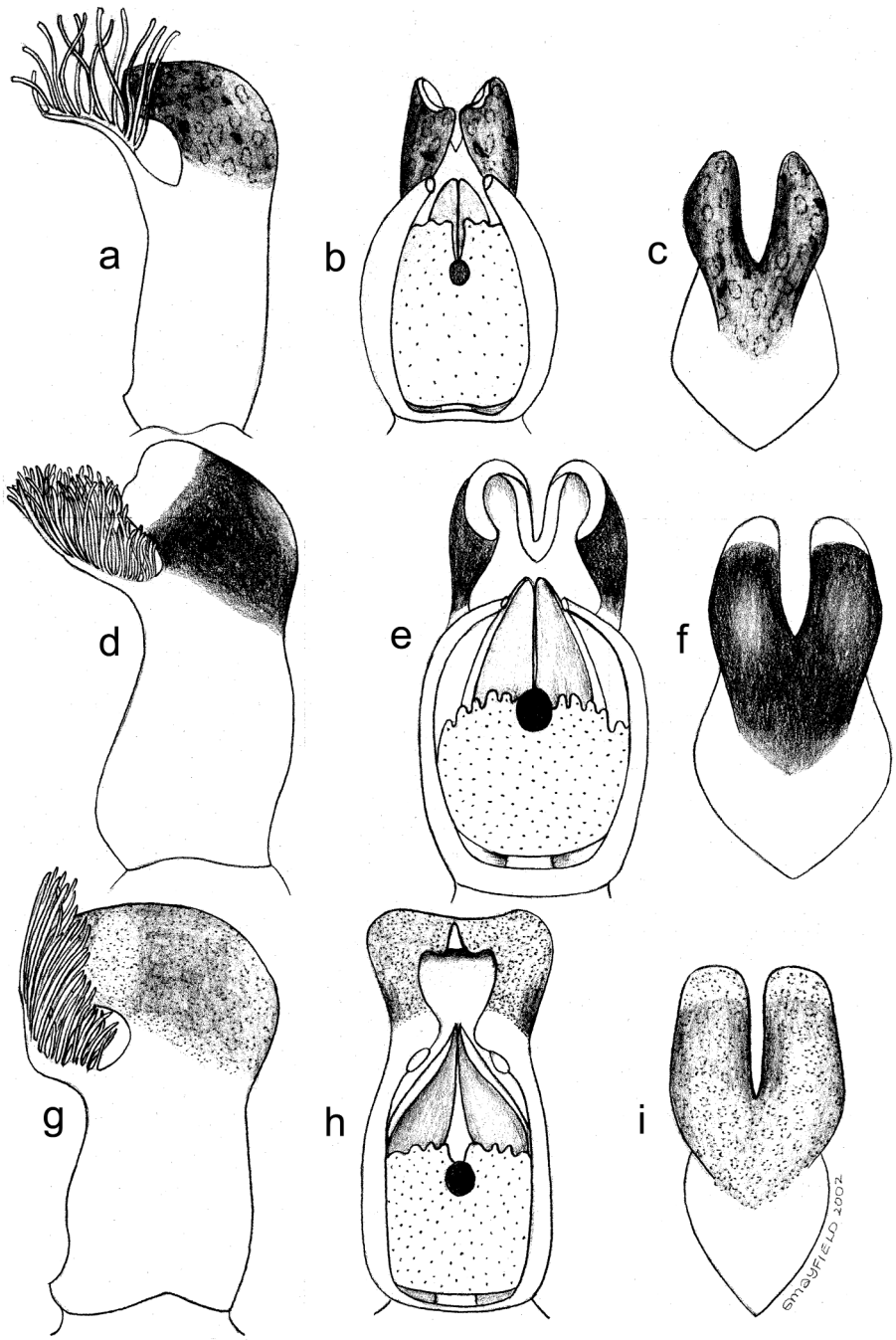

Figure 7.
Thelymitra mucida: **a** column from side x 10; **b** column from front x 10; **c** post-anther lobe from rear x 10
Thelymitra lucida: **d** column from side x 10; **e** column from front x 10; **f** post-anther lobe from rear x 10
Thelymitra inflata: **g** column from side x 10; **h** column from front x 10; **i** post-anther lobe from rear x 10

flowers are pale to dark blue or purplish, usually with strong pink colourations. The post-anther lobe is more or less cuneate, being quite narrow at the base and then widening abruptly above, and is at its widest near the apex where it is deeply v-notched. The bloom on the post-anther lobe is a copious thick, sticky, hoary secretion. The trichomes on the lateral lobes are bright yellow, few, sparse, relatively thick, long and of an untidy appearance and at least the proximal ones are usually fused together at the base. The anther in *T. mucida* is situated more or less at the base of the column and mostly obscured behind the stigma.

The occurrence of *T. mucida* in Tasmania is rather doubtful and in need of confirmation, being based on a single, poorly preserved, fragmentary specimen from Bruny Island.

20. *Thelymitra lucida* Jeanes, *sp. nov*.

Thelymitra holmesii Nicholls affinis sed lobo post-antheram columnae rorido nitido, trichomatibus in lobis lateralibus densioribus brevioribus albeis vel cremeo-luteis differt.

Type: Victoria. Brisbane Ranges, Durdidwarrah. Leveretts Road, c. 1 km W of Stony Creek Road. At the southern end of a sedge swamp just south of the road, 27 xi. 1989, *J. Eichler 118* (holotype MEL; isotype MEL).

Illustration: Jeanes & Backhouse (2001) page 173 (as *Thelymitra* sp. aff. *holmesii* 1).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear to linear-lanceolate, 20–35 cm long, 5–12 mm wide, erect, fleshy, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute. *Inflorescence* 30–55 cm tall, 1–3.5 mm diam., straight, green to purplish. *Sterile bracts* usually 2, occasionally 3, linear to linear-lanceolate, 1.3–7 cm long, 3–9 mm wide, closely sheathing, acute to acuminate, green to purplish. *Fertile bracts* ovate-acuminate to obovate-acuminate, 8–20 mm long, 4–8 mm wide, sheathing the pedicels, green to purplish. *Pedicels* 6–13 mm long, slender. *Ovary* narrow-obovoid, 6–10 mm long, 2–3.5 mm wide. *Flowers* 1–7, 16–24 mm diameter, dark blue, the petals and labellum often darker than the sepals, opening only on hot days. *Perianth segments* 8–12 mm long, 4–7 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate, acute; *lateral sepals* ovate to lanceolate, slightly asymmetric, acute; *petals* ovate, acute or obtuse; *labellum* narrow-ovate to lanceolate, acute, only slightly smaller than other segments. *Column* erect from the end of ovary, 5–6 mm long, 2.5–3.5 mm wide, blue to pinkish; *post-anther lobe* hooding the anther, 2.5–4 mm long, 2–2.7 mm wide, tubular, compressed dorsally, inflated, gently curved, dark purplish black with a thin glistening bloom on the dorsal surface, margins thickened, apex deeply bilobed, yellow, lobes 1.2–1.6 mm long; *post-anther lobe extension* 0.8–1.5 mm; *auxiliary lobes* absent; *lateral lobes* converging, 1–1.5 mm long, digitiform, fleshy, porrect, more or less straight, each with a toothbrush-like arrangement of white or creamy yellow trichomes along virtually their entire length, the individual trichomes 1–1.2 mm long, c. 0.04mm thick. *Anther* inserted c. mid-way along column, partly obscured behind stigma, ovoid, 2–2.7 mm long, 1.5–2 mm wide, the connective produced into a blunt, apical beak 0.3–0.5 mm long; *pollinarium* 1.5–2.2 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.5–2.5 mm long, 1.8–2.5 mm wide, margins irregular. *Capsules* obovoid, 10–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 7 d–f; Plate 4. Fig. 36)

Selected specimens examined: **Victoria**: Grampians. Glenelg River Rd 1.1 km from intersection of Woohlpooer Rd & Old Billywing Track, 10 xi. 2000, *A. Tindall 37 & B. Tindall* (MEL *2136723*). **Tasmania**: Huon Highway, Crabtree turnoff, 3 xi. 2001, *J.A. Jeanes 1194, L. Rubenach, H. & A. Wapstra* (MEL *2136745*, MEL *2136746* & HO).

Distribution and habitat: Recorded reliably only for Victoria and Tasmania. In Victoria

it is found in the Grampians and Midlands Natural Regions (Conn 1993) and in Tasmania in the Huon area south of Hobart (Fig. 38). Grows in or near sedge swamps on moist sandy or peaty soils, sometimes in standing water at flowering time. Altitude: 10–200 m.

Conservation status: Reasonably widespread and represented in reserves but extremely rare and seldom collected. Suggest 3EC by criteria of Briggs & Leigh (1996).

Flowering period: November and December.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra lucida* has been confused with *T. mucida*, but in the latter the post-anther lobe is widest towards the apex and the lateral lobes have fewer, sparser, generally thicker, longer, more untidily arranged, often basally connate, bright yellow trichomes that hug the tip of the post-anther lobe. The bloom on the post-anther lobe is a rather thin, glistening layer in *T. lucida* but is a copious thick, sticky, hoary secretion in *T. mucida*. *Thelymitra inflata* is immediately distinguished from *T. lucida* (at least in the fresh state) by its more inflated and more deeply cleft post-anther lobe. The former also often flowers earlier and grows in drier habitats.

Etymology: From the Latin *lucidus*, bright, glittering; in reference to the glistening bloom on the post-anther lobe of the column.

21. *Thelymitra inflata* Jeanes, *sp. nov.*

Thelymitra mucidae Fitzg. affinis sed lobo post-antheram columnae inflatiori ad medium latissimum, ad apicem incisum profundiorem angustiorem, trichomatibus in lobis lateralibus pluribus angustioribus brevioribus generatim albeis vel cremeo-luteis ad basin connatis nunquam differt.

Type: South Australia: Southern Lofty Region. Mylor township common, 31 x. 2001, *R.J. Bates 60152* (holotype AD; isotypes MEL, CANB).

Illustrations: Bates & Weber (1990) Plate 217; Jones *et al*. (1999) page 261 (both as *T. mucida*).

Glabrous terrestrial *herb*. *Tubers* ovoid, 1–3 cm long, 5–12 mm wide, fleshy. *Leaf* linear, 13–30 cm long, 4–10 mm wide, erect, fleshy, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acute. *Inflorescence* 20–40(–65) cm tall, 1.3–3 mm diam., straight, green to purplish. *Sterile bracts* usually 2, linear-lanceolate, 1.5–7 cm long, 3–7 mm wide, closely sheathing, acute to acuminate, green to purplish. *Fertile bracts* ovate-acuminate to obovate-acuminate, 6–17 mm long, 4.5–8 mm wide, sheathing the pedicels, green to purplish. *Pedicels* 1–16 mm long, slender. *Ovary* narrow-obovoid, 3–12 mm long, 2–4 mm wide. *Flowers* 1–6, 16–27 mm diameter, dark blue to purplish, opening only on warm to hot days. *Perianth segments* 6–13 mm long, 4–8 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate, obtuse to subacute; *lateral sepals* ovate to lanceolate, slightly asymmetric, acute; *petals* ovate, obtuse to subacute; *labellum* narrow-ovate to lanceolate, subacute, only slightly smaller than other segments. *Column* erect from the end of ovary, 5–6 mm long, 2.5–3.5 mm wide, blue to pinkish; *post-anther lobe* hooding the anther, 3–4 mm long, 1.9–2.6 mm wide, tubular, very inflated, projecting at c. 90° to basal part of column, pinkish brown, brown or less often black, with a narrow purplish collar, usually covered with a waxy, often glistening bloom, margins thickened and incurved, apex deeply split into 2 more or less parallel lobes 1.5–2.5 mm long, grading to yellow; *post-anther lobe extension* 1.2–1.6 mm; *auxiliary lobes* absent; *lateral lobes* converging, 1.5–2 mm long, c. 0.5 mm thick at the base, digitiform, fleshy, porrect in basal half, distal half projecting upwards at c. 45°, each with a toothbrush-like arrangement of white, cream or yellow trichomes along virtually their entire length, the individual trichomes 1.2–1.6 mm long, c. 0.04 mm thick. *Anther*

inserted towards base of column, mostly obscured behind stigma, ovoid, 2.5–3 mm long, 1.5–2 mm wide, the connective produced into a blunt, apical beak 0.4–0.8 mm long; *pollinarium* 1.9–2.5 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 1.5–2.5 mm long, 1.8–2.2 mm wide, margins irregular. *Capsules* obovoid, 10–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 7 g–i; Plate 4. Fig. 37)

Specimens examined: **South australia**: Southern Lofty: Mt Bold Rd adjacent Scott Creek C.P., 28 x. 1988, *R.J. Bates 15802* (MEL *725413* & CANB *484781*); Bugle Ranges, 28 x. 1917, *R.S. Rogers s.n.* (MEL *725416*, AD *97726267* & CANB *484789*); Southern Lofty region: National Park, Belair, 21 x. 1911, *R.S. Rogers s.n.* (MEL *725417*, AD *97708763* & CANB *484771*); Southeast: Marses Swamp, 2 xi. 1981, *R.J. Bates 1040* (AD *98152343*); Mylor, Mt Lofty, 23 x. 1977, *R.J. Bates s.n.* (AD *RJB*); Southern Lofty. Peters Creek near Kuitpo, xi. 1979, *R.J. Bates 546* (AD *RJB546*); Southern Lofty. Cleland Conservation Park, 7 xi. 1983, *R.J. Bates 3534* (AD *98402136*); Adelaide Gully Road via Millbrook, 18 x. 2001, *R.J. Bates JAJ1070* (MEL *2136732*); Southeast District. Along tracks in Scott Creek Conservation Park, 18 x. 1998, *R.J. Bates 51301* (CANB *609396*). **Victoria**: 9 miles NNW of Dergholm P.O., 29 xi. 1971, *A.C. Beauglehole 37986* (MEL *652670* & CANB *8505278*); Black Waterhole Education Area, 30 xi. 1983, *A.C. Beauglehole 75478* (MEL *1531703*); 10.5 miles WNW of Casterton P.O., 17 xi. 1971, *A.C. Beauglehole 37915* (MEL *652735* & MEL *2039598*); 8 miles NNE of Dartmoor, 10 miles W of Digby, S of Weecurra Road, 19 i. 1972, *A.C. Beauglehole 38160* (MEL *652443*); Western Plains: 28.7 km W of the railway line crossing in Portland via main Portland to Nelson Road, 2 xi. 1981, *M.A. Clements 2407* (CANB *8111963*); 20 km WSW of Casterton in Drajurk State Forest, 4 xi. 2001, *D. Rouse JAJ1115* (MEL *2136742* & MEL *2136742*); Woohlpooer Road, NE of Woohlpooer, 15 xi. 2000, *D.L. Jones 17676 & K.J. FitzGerald* (CANB *631075*). **Tasmania**: Ridgeway Park, near Mount Wellington, 16 xii. 1992, *M. Wapstra DLJ11008* (CANB *605294*); Leslie Hill, near Longley, 20 xi. 1991, *A. Moscal 21960* (HO *142369*).

Distribution and habitat: South Australia, Victoria and Tasmania. In South Australia recorded for Kangaroo Island, Northern and Southern Lofty Regions and the Southeast Region, in Victoria for the Wannon Natural Region (Conn 1993) and in Tasmania for two sites near Hobart (Fig. 38). It usually grows in dry to moist woodlands and open forests, often in disturbed, winter-wet sites on clay loam soils. Altitude: 10–350 m.

Conservation status: Widespread, sometimes locally common and represented in reserves. Suggest 3RC by criteria of Briggs & Leigh (1996). Probably vulnerable or endangered in Victoria and Tasmania, where seldom collected.

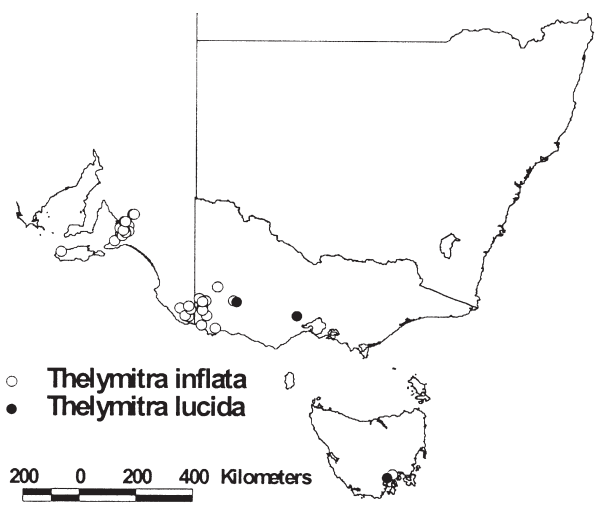

Figure 38. Distribution of *Thelymitra inflata* and *Thelymitra lucida*.

Flowering period: Late September to early December.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra inflata* has been confused with *T. mucida*, but the post-anther lobe of the latter is narrowest at the base and widest towards the apex and is broadly v-notched at the apex. The lateral lobes of *T. mucida* have fewer, sparser, generally thicker, longer, more untidily arranged, bright yellow trichomes that are often connate at the base and hug the tip of the post-anther lobe. *Thelymitra inflata* is also similar to *T. lucida*, but the latter usually grows in wetter habitats, often flowers later, has a less inflated post-anther lobe that is not as deeply notched at the apex and is covered with a much less obvious sparkling bloom and the lateral lobes are generally shorter and have shorter, white or creamy yellow trichomes.

Thelymitra inflata apparently hybridizes with *Thelymitra antennifera*, *Thelymitra juncifolia* and *Thelymitra rubra* in South Australia (R.J. Bates pers. comm.).

Etymology: From the Latin *inflata*, puffed up, inflated; in reference to the very inflated post-anther lobe on the column.

22. *Thelymitra holmesii* Nicholls, *Victorian Naturalist* 49: 263, f. (1933).

Type: Victoria: Gorae (via Portland), xii. 1932, *M. Holmes s.n.* (lectotype MEL *625480*!*, hic designatus;* isolectotypes MEL!; syntypes MEL!, AD).

Thelymitra pauciflora R.Br. var. *holmesii* (Nicholls) Nicholls, *Victorian Naturalist* 60: 56 (1943).

Illustrations: Nicholls (1933) page 262; Nicholls (1969) Plate 22, figs m & n (as *T. pauciflora* var. *holmesii*); Jeanes & Backhouse (2001) page 173.

Glabrous terrestrial *herb*. *Tubers* ovoid, 1–3 cm long, 5–12 mm wide, fleshy. *Leaf* linear, (7–)15–35 cm long, 3–10 mm wide, erect, fleshy, canaliculate, ribbed abaxially, dark or light green with a purplish base, sheathing at base, apex acute to acuminate. *Inflorescence* 18–75 cm tall, 1–2.6 mm diam., slender, straight, green to purplish. *Sterile bracts* usually 2, rarely 3, linear to linear-lanceolate, 1–7 cm long, 3–8 mm wide, closely sheathing, acute to acuminate, green to purplish. *Fertile bracts* ovate-acuminate to obovate-acuminate, 5–17 mm long, 3–8 mm wide, sheathing the pedicels, acute to acuminate, green to purplish. *Pedicels* 1–12 mm long, slender. *Ovary* narrow-obovoid, 8–12 mm long, 2–4 mm wide. *Flowers* 1–9, (12–)16–22(–30) mm diameter, usually deep purplish blue or mauve, opening reasonably freely on hot days. *Perianth segments* (6–)8–11(–15) mm long, 3.5–8 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate, obtuse to subacute; *lateral sepals* lanceolate to ovate, often slightly asymmetric, acute; *petals* ovate, obtuse to subacute; *labellum* ovate to lanceolate, acute, often slightly smaller than other segments. *Column* erect from the end of ovary, 4.5–6.5 mm long, 2.5–3.5 mm wide, pale to dark mauve or pink; *post-anther lobe* hooding the anther, 2.5–3.5 mm long, 1.5–2.5 mm wide, tubular, compressed dorsally, inflated, curving through c. 90°, usually dark purple to almost black, apex deeply bilobed, yellow, lobes 1–1.5 mm long, parallel or divergent; *post-anther lobe extension* 0.8–1.2 mm; *auxiliary lobes* absent or sometimes present as 2 minute bumps on the lower apical margin of the post-anther lobe; *lateral lobes* converging to more or less parallel, 1–1.5 mm long, digitiform, porrect at base, curving gently upwards, each with a sparse, toothbrush-like arrangement of trichomes along most of their length, the individual trichomes 1.2–1.8 mm long, usually cream or yellow (some basal ones often pink), loose and shaggy, embracing apex of post-anther lobe. *Anther* inserted near centre of column, partly obscured behind stigma, ovoid, 2–3 mm long, 1.4–2.2 mm wide, the connective produced into an apical beak 0.5–0.8 mm long; *pollinarium* 1.6–2.4 mm long; *viscidium* more or less circular, 0.3–0.6 mm diam.; *pollinia* mealy, friable, white. *Stigma* situated at base of column, ovate-quadrate, 1.5–2.5

mm long, 1.3–2.2 mm wide, margins irregular. *Capsules* obovoid, 8–15 mm long, 4–7 mm wide, erect, ribbed. (Fig. 8 a–c; Plate 4. Fig. 39)

Selected specimens examined: **South Australia**: Honans Scrub area via Glencoe, 20 xi. 1988, *R.J. Bates s.n.* (MEL *725412* & CANB *484785*); S of Glenroy Conservation Park, 18 xi. 1989, *R.J. Bates 21543* (AD *98949166*); Southeast Region: Marshes Swamp, xi. 1991, *R.J. Bates 26823* (AD *RJB26823*); Mylor, Boyles Swamp, 20 xi. 1977, *R.J. Bates 4052* (AD *97807174*); Southeast Region: Big Heath, 5 xi. 1965, *D. Hunt 2590* (AD *966060970*); Kangaroo Island: Western end, xi. 1993, *R. Cox s.n.* (AD *99436243*); Southern Lofty: Mylor, 24 xi. 1976, *R.J. Bates s.n.* (AD *RJBSL*); Southern Lofty: Near Tooperang, 30 xi. 2000, *R.J. Bates 57807* (MEL *2100143*); Northern Lofty: Hughes Park via Sevenhill, x. 2000, *R.J. Bates 57688* (MEL *2100140*); Southern Lofty: Adelaide Gully, via Kersbrook, 20 x. 2000, *R.J. Bates 57689* (MEL *2100151*). **New South Wales**: Morton National Park. Bundanoon, i. 1970, *P. Moikrisz s.n.* (CANB *324385*). **Victoria**: Irrewillipe, 30 xi. 1994, *J.A. Jeanes 128* (MEL *2024472*); French Island, 4 xi. 1987, *C. Gordes 24* (MEL *1581003*); Wrights Swamp Road, 15 xi. 1986, *C.E. Woolcock s.n*. (MEL *2039702*); Darlimurla area, c. 500 m W of Darlimurla railway station beside old rail line, 8 xi. 2000, *J.A. Jeanes 937* (MEL *2087458*); Glenelg Shire, 9 miles NNW of Dergholm Post Office, main swamp in area, 29 xi. 1971, *A.C. Beauglehole 37987* (MEL *653452* & CANB *8505277*); Glenelg Shire, 10.5 miles WNW of Casterton Post Office, 17 xi. 1971, *A.C. Beauglehole 37916* (MEL *652728*); Wilsons Promontory National Park, 8 xi. 1983, *A.C. Beauglehole 75299* & *J.G. Eichler* (MEL *1531708*); 17.5 km NE of Yarram Post Office, 14 xii. 1978, *A.C. Beauglehole 62519* (MEL *640894*); Westernport Bay. East-central portion of Quail Island, 21 xi. 1952, *J.H. Willis s.n.* (MEL *221752*). **Tasmania**: Squeaking Point, Port Sorrel, 3 xii. 1998, *P. Tonelli ORG1975* (CANB *610398*); Black Rock Point, 3 km E of Stony Head, 26 xi. 1983, *A. Moscal 4515* (HO *409251*); Nunamara, quarry, 27 xi. 1961, *T.E. Burns 468* (HO *99414*); Knocklofty Park, Knocklofty, Hobart, 26 xi. 2000, *L. Rubenach JAJ794* (MEL *2136720*); Bridport, 31 x. 1987, *R.J. Bates 11409* (AD *RJB11409*); Police Point Rd near Police Point, 3 xi. 2001, *J.A. Jeanes 1193, L. Rubenach, H. & A. Wapstra* (MEL *2150701*, HO); Entrance to South Bruny National Park, South Bruny Island, 5 xi. 2001, *J.A. Jeanes 1208, L. Rubenach, H. & A. Wapstra* (MEL *2136739*, MEL *2136740* & HO); Airstrip, North Bruny Island, 5 xi. 2001, *J.A. Jeanes 1206, L. Rubenach, H. & A. Wapstra* (MEL *2136737*, MEL *2136738* & HO).

Distribution and habitat: South Australia, Victoria and Tasmania with a single outlying collection from Bundanoon, New South Wales (Fig. 42). Usually grows in and around swamps, in soaks or beside streams in open forest, woodland, heathy woodland or heathland, mostly on moist, water-retentive soils. Altitude: 0–200 m.

Conservation status: Widespread and well conserved, but rather uncommon.

Flowering period: Mostly November and December, rarely late October.

Pollination biology: This species is facultatively autogamous and sometimes also cleistogamous.

Typification: There are three herbarium sheets at MEL of plants collected by Murray Holmes in 1932 (two in December, and one in November of that year). The specimen that most closely resembles Nicholls' original illustration (Nicholls 1933) is specimen 'a' on MEL *625480*, and, since all three specimens on that sheet appear to be part of the same collection, this entire collection is here designated as the lectotype.

Notes: Plants consistent with Nicholls' description of *T. holmesii* and with the type specimens are relatively common in southeastern Australia. However, *T. holmesii* remains poorly known today due to the presence of several taxa that superficially resemble it. Several characters can be used in combination to define *T. holmesii sensu stricto*. It generally occurs at low elevations where it flowers primarily in November and December, and it usually prefers to grow in moist soils in seasonally inundated depressions and around swamp margins. The leaf is long, narrow and fleshy, rarely exceeding 10 mm wide, and the inflorescence is slender and up to 75 cm tall, usually with two sterile bracts. There are usually one to nine flowers that are autogamous (sometimes also cleistogamous) and will open freely only on very warm to hot days. The perianth segments are usually up to 11 mm long (but can be as long as 15 mm), and about half as

wide, purplish blue or mauve, or less often pink, in colour. The post-anther lobe is more or less tubular (almost closed on the ventral side), compressed dorsally, inflated, and extends to about 4 mm beyond the point of insertion of the anther and c. 1 mm beyond the point of insertion of the lateral lobes. The apex of the post-anther lobe is deeply bilobed with thickened margins. The lateral lobes are usually 1 to 1.5 mm long and are more or less straight or curve upwards gently. The trichomes on the lateral lobes are usually 1.2 to 1.8 mm long, cream or yellow in colour (proximal trichomes sometimes pinkish) and are arranged in sparse, untidy toothbrush-like tufts.

Thelymitra holmesii has been confused with *T. peniculata*, but the latter grows in drier habitats, generally flowers earlier and the lateral lobes have more or less terminal tufts of white trichomes.

Thelymitra pauciflora grows in drier habitats, flowers earlier, generally has fewer, paler flowers, a less inflated, entire or emarginate post-anther lobe and the lateral lobes have more or less terminal tufts of white trichomes.

23. *Thelymitra xanthotricha* Jeanes*, sp. nov.*

T. macrophyllae Lindl. affinis sed folio minori generatim, inflorescentia floribus paucioribus minoribus composita, trichomatibus in lobis lateralibus luteolis, lobo post-antheram inciso profundiori differt.

Type: Western Australia. Warradale Road, 3.5 km S of Brookton Highway, 20 x. 1998, *G. Brockman GBB452* (holotype PERTH).

Illustrations: Hoffman & Brown (1998) page 452 (as *Thelymitra* aff. *holmesii*) & page 453 (as *Thelymitra* aff. *pauciflora*).

Glabrous terrestrial *herb*. *Tubers* not seen. *Leaf* linear, 10–30 cm long, 5–10 mm wide, erect, fleshy, canaliculate, ribbed abaxially, dark green with a purplish base, sheathing at base, apex acuminate. *Inflorescence* 30–50 cm tall, 1.5–3 mm diam., straight, straw-coloured to purplish. *Sterile bracts* usually 2, linear to linear-lanceolate, 2–7 cm long, 4–8 mm wide, closely sheathing, green to purplish, acute to acuminate. *Fertile bracts* ovate-acuminate to obovate-acuminate, 5–25 mm long, 3–8 mm wide, green to purplish, sheathing the pedicels. *Pedicels* 2–15 mm long, slender. *Ovary* narrow-obovoid, 4–10 mm long, 2–3.5 mm wide. *Flowers* 1–6, (16–)25–30(–34) mm diameter, blue with indistinct darker longitudinal veins, opening only on warm to hot days. *Perianth segments* (8–)12–15(–17) mm long, 3–8 mm wide, concave, often shortly apiculate; *dorsal sepal* ovate to elliptic, obtuse to subacute; *lateral sepals* ovate to elliptic, often slightly asymmetric, acute; *petals* ovate to elliptic, obtuse to subacute; *labellum* elliptic to lanceolate, acute, often narrower than other segments; *column* erect from the end of ovary, 5–6.5 mm long, 2.5–3.5 mm wide, mostly pale blue; *post-anther lobe* hooding the anther, 2.5–3.5 mm long, 2–2.5 mm wide, tubular, inflated, gently curved through c. 90°, mostly dark brown, apex bilobed, yellow, lobes 0.8–1.5 mm long; *post-anther lobe extension* 1–1.5 mm; *auxiliary lobes* absent; *lateral lobes* converging, 1.5–2 mm long, digitiform, porrect at base then curving gently upwards, each with a very dense toothbrush-like arrangement of creamy yellow trichomes virtually along their entire length, the individual trichomes 1–1.5 mm long. *Anther* inserted c. mid-way along column, partially obscured behind stigma, ovoid, 3–3.8 mm long, 2–2.5 mm wide, the connective produced into an apical beak 0.7–1 mm long; *pollinarium* 2–3 mm long; *viscidium* more or less circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white. *Stigma* situated at base of column, ovate-quadrate, 2–2.5 mm long, 1.8–2.5 mm wide, margins irregular. *Capsules* obovoid, 10–15 mm long, 4–6 mm wide, erect, ribbed. (Fig. 8 d–f; Plate 4. Fig. 41)

Selected specimens examined: **Western Australia**: Yarloop, ix. 1946, *W.H. Nicholls s.n.* (MEL *643663* & MEL *2039606*); Gosnells, 1 ix. 1946, *W.H. Nicholls s.n.* (MEL *1549092*, MEL

1549085, MEL *1549087* & MEL *2039774*); Tone River Bridge, 22 x. 1990, *R.J. Bates 24446* (AD *99111191*); Kwinana, 27 ix. 1984, *R.J. Bates 4284* (AD *98510274*); c. 1 km S of junction of Thomas Rd and Johnson Rd, E of Medina, 18 ix. 1977, *A.S. George 14904* (PERTH *279595* & PERTH *3114A*); Roe District: Just N of Gibson, 12 x. 1993, *D.L. Jones 12300* (CANB *9710266*); Dale Creek at crossing of the Brookton Hwy, 24 x. 2001, *G. Brockman JAJ1082* (MEL *2136728*); Stirling Road E of Forrestdale Lake, Forrestdale, 20 ix. 2001, *J.A. Jeanes 1149 & A.P. Brown* (MEL *2136743*, MEL *2136744* & PERTH); Darling District: 66.2 km along Muirs Highway from Manjimup to Mt Barker, 16 x. 1988, *D.L. Jones 3199* (CANB *8806861*).

Distribution and habitat: Endemic to southwestern Western Australia mostly in the Darling Ranges and the coastal plain between Perth and Bunbury, with isolated more southerly collections from the Manjimup and Esperance districts (Fig. 42). Grows in winter-wet areas along creek lines, flowering most prolifically after fire. Altitude: 10–350 m.

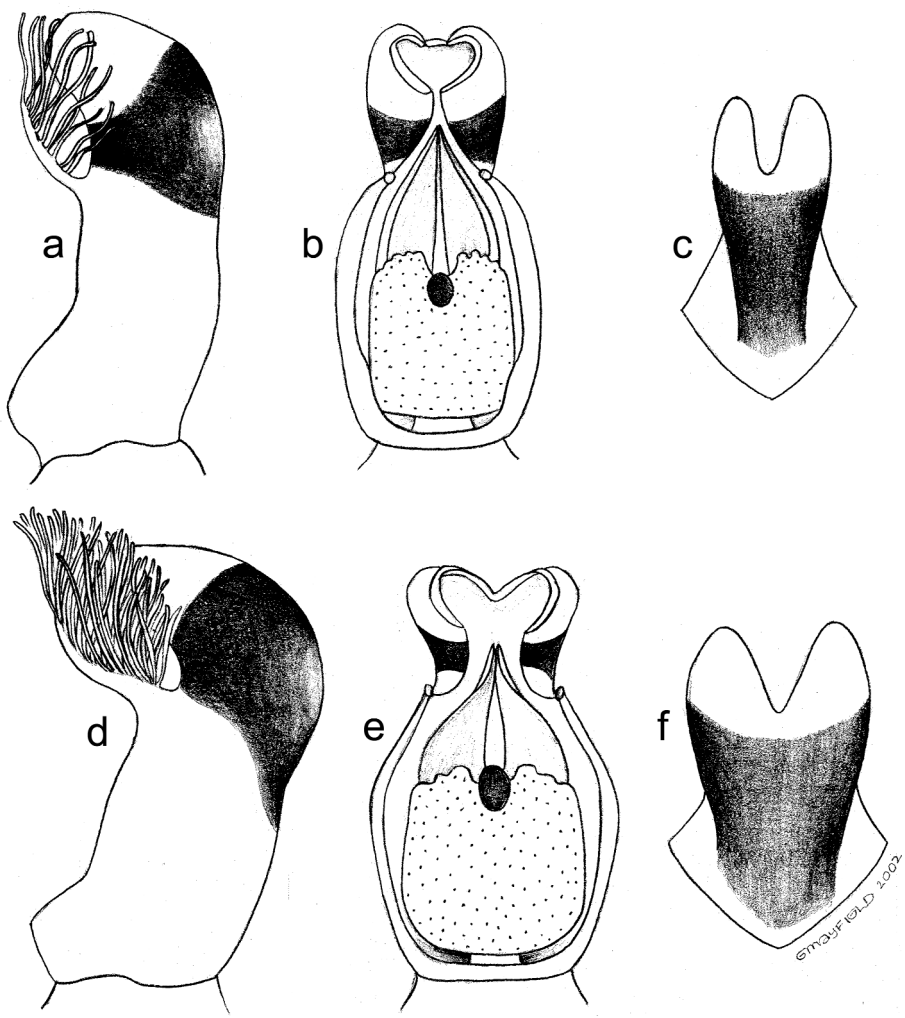

Figure 8.
Thelymitra holmesii: **a** column from side x 10; **b** column from front x 10; **c** post-anther lobe from rear x 10
Thelymitra xanthotricha:**d** column from side x 10; **e** column from front x 10; **f** post-anther lobe from rear x 10

Conservation status: Poorly known, but apparently extremely rare and seldom collected; suggest 3EC by criteria of Briggs & Leigh (1996).

Flowering period: September and October.

Pollination biology: This species is apparently facultatively autogamous.

Notes: *Thelymitra xanthotricha* is readily identified by its moderately large mid-blue flowers that have a prominently cleft post-anther lobe and dense creamy yellow trichomes along the entire length of the lateral lobes. *Thelymitra vulgaris* has generally smaller flowers with a more obviously v-notched post-anther lobe and white trichomes. *Thelymitra mucida* has generally smaller flowers with a more obviously v-notched post-anther lobe covered by a copious hoary bloom.

Thelymitra xanthotricha superficially resembles *Thelymitra macrophylla*, but the latter (a member of the *T. nuda* complex) is a generally more robust species with a much larger leaf, larger insect-pollinated flowers, less prominently cleft post-anther lobe and white trichomes on the lateral lobes.

The type locality of *T. xanthotricha* is an area rich in *Thelymitra* species including *T. graminea* and *T. mucida*, and the intermediate nature of its flowers suggests that *T. xanthotricha* may represent a stabilised hybrid between these two species.

Etymology: From the Greek *xanthos*, yellow; *trichos*, hair; in reference to the creamy yellow trichomes on the lateral lobes.

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I am grateful to the Australian Biological Resources Study (ABRS) and the Australian Orchid Foundation (AOF) for their financial support of my work on *Thelymitra*, and to the Royal Botanic Gardens, Melbourne (MEL) for supplying me with a work area, access to technical equipment and library support. I wish to thank Kath Alcock, Barbara Archer, Gary Backhouse (DSE), Bob Bates, Cam Beardsell, Boris Branwhite, Gary Brockman, Andrew Brown (CALM), Mark Clements (CSIRO), Bruce Dalyell, Michael Duncan (DSE), Marco Duretto (HO), John Eichler, Tim Entwisle (NSW), Chris and Marie French, Wayne Gebert (MEL), Geoff Glare, Roger Hay, Cathy and Malcolm Houston, †Bill and Gloria Jackson, Sandra Jeanes, David (CSIRO) and Barbara Jones, Bill and Helen Kosky, Simon Lewis (MEL), Anne Looney, Margaret MacDonald, Steve Mueck (Biosis), David Munro, Allan and †Margaret Peisley, Andrew Pritchard (DSE), Jim Ross (MEL), Dean Rouse, Les Rubenach, James Todd (DSE), Peter Tonelli, Clive and Merle Trigg, Neville Walsh (MEL), Hans and Annie Wapstra, John Whinray, †Ron and Kath Williamson and Warren Worboys (RBGC) for supplying me with locality information, specimens and photographs, or for accommodation, transport, meals or companionship during field trips. My colleague Neville Walsh also kindly wrote the Latin diagnoses for the new taxa, performed the English translations from the original Latin descriptions of Brown and Lindley and made helpful comments on the text. My appreciation also goes to Enid Mayfield (MEL) for executing the line drawings, Peter Neish (MEL) for help with production of the distribution maps and the directors and curatorial staff at AD, BM, BRI, CANB, E, HO, MEL, NSW, P, PERTH, QRS and WELT for access to specimens.

Biosis = Biosis Research Pty Ltd (Vic.)
CALM = Department of Conservation and Land Management (W.A.)
CSIRO = CSIRO, Centre for Plant Biodiversity Research (A.C.T.)
DSE = Department of Sustainability and Environment (Vic.)
HO = National Herbarium, Hobart (Tas.)
MEL = National Herbarium, Melbourne (Vic.)
NSW = National Herbarium, Sydney (N.S.W.)
RBGC = Royal Botanic Gardens, Cranbourne (Vic.)

References

Backhouse, G.N. & Jeanes, J.A. (1995). *The Orchids of Victoria* (Melbourne University Press, Carlton).
Bates, R.J. (1999). 'Self Pollinated Sun Orchids of the *Thelymitra pauciflora–T. longifolia* Alliance in Australia', *The Orchadian*, 13(2): 65.
Bates, R.J. & Weber, J.Z. (1990). *Orchids of South Australia* (Government Printer, South Australia).
Bentham, G. (1873). *Flora Australiensis*, vol. 6. (L. Reeve & Co., London).
Bernhardt, P. (1993). *Thelymitra*, in 'Flora of New South Wales', vol. 4. ed. G.W. Harden (New South Wales University Press, Kensington).
Briggs, J.D. & Leigh, J.H. (1996). *Rare or Threatened Australian Plants*, Revised Edition. (CSIRO and Australian Nature Conservation Agency, Canberra).
Brown, R. (1810). *Prodromus Florae Novae Hollandiae et Insulae van Diemen* (London).
Clements, M.A. (1989). Catalogue of Australian Orchidaceae, *Australian Orchid Research* 1: 138.
Conn, B.J. (1993). *Natural Regions and Vegetation of Victoria*, in 'Flora of Victoria', vol. 1. eds D.B. Foreman & N.G. Walsh. (Inkata Press, Melbourne).
Dockrill, A.W. (1992). *Australian Indigenous Orchids*. vol. 1. (Surrey Beatty & Sons Pty Ltd, Chipping Norton, NSW).
Fitzgerald, R.D. (1875–95). *Australian Orchids* vol. 1 & 2 (Government Printer, Sydney).
Fitzgerald, R.D. (1882). 'New Australian Orchids', *The Gardners' Chronicle*, new series, 17: 495.
George, A.S. (1971). 'A checklist of the orchids of Western Australia.' *Nuytsia* 1(2): 166–96.
Hallé, N. (1977). *Flore de la Nouvelle Caledonie et Dépendances 8: Orchidacées*, (Muséum National D'Histoire Naturelle, Laboratoire de Phanérogamie, Paris)
Hoffman, N. & Brown, A. (1998). *Orchids of South-west Australia*, edn 2 with supplement (University of Western Australia Press, Nedlands).
Jeanes, J.A. (2000). 'Two new species of *Thelymitra* (Orchidaceae) from southeastern Australia', *Muelleria* 14: 91–97.
Jeanes, J.A. (2001). 'Two new species of *Thelymitra* (Orchidaceae) from southeastern Australia' errata, *Muelleria* 15: 95–96.
Jeanes, J.A. & Backhouse, G.N. (2001). *Wild Orchids of Victoria, Australia.* (Zoonetics, Seaford).
Jones, D.L. (1988). *Native Orchids of Australia*. (Reed Books, Frenchs Forest).
Jones, D.L. & Clements M.A. (1988). 'New orchid taxa from southeastern Queensland', *Austrobaileya* 2(5): 550.
Jones, D.L. & Clements M.A. (1998a). 'Two New Species, Characterisation of Two Poorly Known Species and a New Name in *Thelymitra* J.R. & G.Forst. (Orchidaceae) from Australia', *Orchadian* 12(5): 326–33.
Jones, D.L. & Clements M.A. (1998b). Contributions to Tasmanian Orchidology–8: A Taxonomic Review of *Thelymitra* J.R. & G. Forst. in Tasmania, *Australian Orchid Research* 3: 178–203.
Jones, D., Wapstra, H., Tonelli, P. & Harris, S. (1999). *The Orchids of Tasmania* (Melbourne University Press, Carlton South).
Lindley, J. (1840a). *Edwards's Bot. Reg*. 1-23: Swan Riv. Append., 49.
Lindley, J. (1840b). *The Genera and Species of Orchidaceous Plants* (Ridgways, London).
Nicholls, W.H. (1933). 'A New Sun-orchid', *Victorian Naturalist*, 49: 262.
Nicholls, W.H. (1935). 'The Sun Orchids of Australia', *Orchidologia Zeylanica*, 2(4): 159.
Nicholls, W.H. (1969). *Orchids of Australia*, the complete edition (eds Jones, D.L. & Muir, T.B., 1969) (Thomas Nelson, Melbourne).

APPENDIX 1. INDEX

Bold page numbers are the main entries for accepted names. *Italic* page numbers are synonyms. Roman page numbers are for incidental mentions. Underlined page numbers are for illustrations. Double underlined page numbers are for maps.