

## NOTES ON *ISOETES* AND *TMESIPTERIS* IN VICTORIA

R.J. CHINNOCK\*

### ABSTRACT

Chinnock, R.J. Notes on *Isoetes* and *Tmesipteris* in Victoria. *Muelleria* 8(1): 57–60 (1993). — A new species of *Isoetes*, *I. pusilla* Marsden & Chinnock, and a new subspecies, *I. drummondii* subsp. *anomala* Marsden & Chinnock, are described and illustrated. *Tmesipteris obliqua* Chinnock is also described as a new species and replaces *T. billardieri* Endl. an illegitimate name.

### INTRODUCTION

The second volume of the Flora of Victoria is expected to be published in the latter part of 1993, before Volume 48 (Gymnospermae and Pteridophyta) of the *Flora of Australia*. For this latter work I have prepared treatments of a number of fern and fern-ally groups some of which contain new taxa and three of these are required for use in the *Flora of Victoria* so they are here treated formally.

### *ISOETES* L.

In 1979 C. Marsden, who had undertaken a morphological and taxonomic study of *Isoetes* in Australasia and surrounding areas, submitted a doctoral thesis to the University of Adelaide. Unfortunately this work, which included a number of new species and taxa of lower rank, was never formally published but with the permission of Dr Marsden I have prepared a modified treatment of the Australian species for the *Flora of Australia* based on his thesis. I have not altered in any way his concepts in *Isoetes* with the exception of raising a variety to subspecies.

#### 1. *Isoetes pusilla* Marsden & Chinnock, *sp. nov.*

*Isoetes pusilla* Marsden *ex* Britton & Brunton, Fern Gaz. 14, 2:79 (1991) *nom. nud.*

Herba amphibia parva, cormo bilobo vel trilobo; foliis 4–8, spiratim depositis, flexilibus; fibris peripheralibus et pilis internis absentibus; stomatibus praesentibus; ligula late triangula; labio absentibus; sporangiis ellipticis ad orbiculatis, translucetibus; velamene sporangium tegenti; microsporis superficiebus proximalibus laevibus, superficie distali spinea; megasporis typis I, 0.35–0.45 mm diametro; superficiebus proximalibus cristis humilibus acutis anastomosantibus, superficie distali reticulata, in sicco alba vel cana.

TYPUS: Victoria, Mt Pilot Scenic Reserve, N of Beechworth, 8 Dec. 1973, *A.C. Beaglehole* 43797 (HOLOTYPUS: AD; ISOTYPUS: MEL).

Small amphibious *herb.* *Corm* very small, 0.3–0.5 cm in diam., 2- or 3-lobed, lobes small. *Roots* brownish, thin and wiry. *Leaves* 4–8, 2–6 cm long ± erect or recurved, light green with pale bases. *Peripheral fibre* strands and internal hairs absent, stomates present. *Lacunar* walls 1–2 cells thick, translacunar diaphragms clearly visible (fresh or dried) through leaves. *Leaf bases* dilated into translucent membranous wings 4–5 mm across at base and extending a short distance along the leaf margins above the sporangium, tapering gradually. *Ligule* minute, triangular, broader than long, *c.* 0.75 mm across. *Labium* absent. *Velum* present, pale, translucent, usually completely covering the sporangia. *Sporangia* very small, orbicular to elliptic, 1.5–2 × 2–3 mm, megasporangia containing 10–20 megaspores. *Sporangial wall* thin, translucent, wall cells not thickened, rarely pigmented. *Megasporis* monomorphic, Type I (see Marsden 1976, p. 42) only produced, 345–435 µm in diam., white or pale grey when dry, ornamented on both

---

\*State Herbarium, Botanic Gardens, North Terrace, Adelaide, Australia 5000

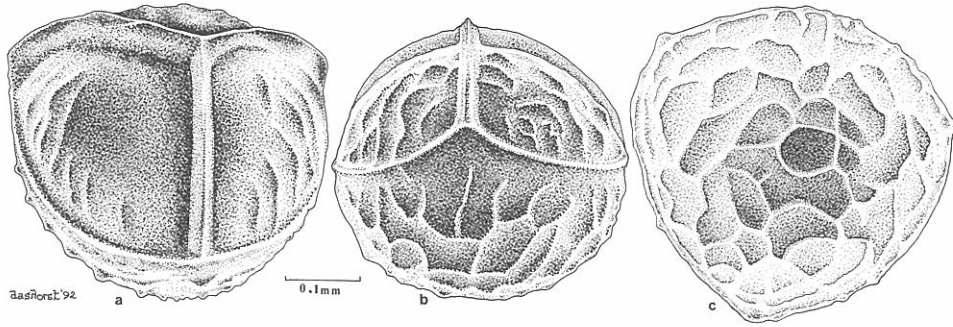


Fig. 1. *Isoetes pusilla*. a — proximal view, b — side view, c — distal view of megaspore. Drawn from scanning electron micrographs of isotype (MEL).

proximal and distal faces by narrow, low, sharp, anastomosing ridges, becoming reticulated on distal faces (Fig. 1c), megaspore surface covered by a matted meshwork bearing recurved spinules. *Tri-radiate ridges* straight, narrow and high, semi-bladelike, covered with recurved spinules like spore surface. *Commissural ridges* straight, very narrow and low, produced to small points where tri-radiate ridges adjoin. *Microspores* rusty brown in colour,  $28\text{--}33 \times 20\text{--}25 \mu\text{m}$ , distal faces covered with  $\pm$  conical spines, proximal faces  $\pm$  smooth or with slight projections. (Fig. 1a-c)

#### DISTRIBUTION AND ECOLOGY

*Isoetes pusilla* is known only from Victoria.

Very little has been recorded concerning the habitat and growth cycle of populations of *I. pusilla*. This species is only recorded from shallow rock pools, and according to Marsden (1979) appears to follow a similar growth pattern to *I. muelleri* from the same areas.

#### NOTES

*Isoetes pusilla* resembles *I. muelleri* but differs in having a more angular ornamentation on the megaspores and producing only monomorphic spores. In addition, *I. pusilla* usually produces microspores whilst in *I. muelleri* they are extremely rare.

Plants of *I. pusilla* are usually smaller than those of *I. muelleri*, although the size of plants of the latter species is very variable.

The specific name *pusilla* refers to the small stature of this species.

#### SPECIMENS EXAMINED

Victoria — Near Minyip, Wimmera, Nov. 1892, J.P. Eckert (AD, MEL); Hawkesdale, Sep. 1903, H.B. Williamson (LE); Chiltern, Nov. 1910, H.B. Williamson (MEL); Beechworth, Dec. 1922, H.B. Williamson (CANB).

#### 2. *Isoetes drummondii* subsp. *anomala* Marsden & Chinnock, *subsp. nov.*

*Isoetes drummondii* var. *anomala* Marsden ex D. Britton & D. Brunton, Fern Gaz. 14, 2:73 (1991) *nom. nud.*

Ab subspecie typica megasporis irregulari Typi III aliquot Typi I, microsporibus absentibus chromosomatium numero  $4n = 44$ ,  $5n = 55$  differt.

TYPUS: South Australia, Comaum Forest Reserve, swamp in centre of pines near Arleena, 19 Dec. 1973, C.R. Marsden 33 & K.M. Alcock (HOLOTYPE: AD; ISOTYPE: MEL, NSW).

*Corm* 2-(3-) lobed. *Sporangia*: megasporangia only produced, orbicular to obovate not usually as elongate as in subsp. *drummondii* up to  $5 \times 8$  mm, con-

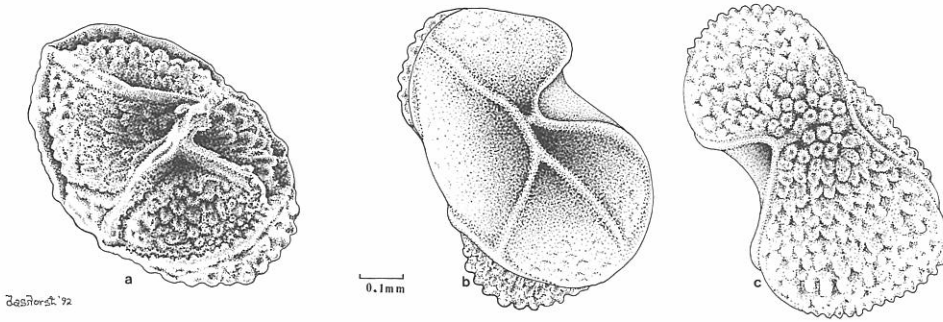


Fig. 2. *Isoetes drummondii* subsp. *anomala*. a — proximal view of megaspore. Drawn from scanning electron micrograph. b–c proximal and distal view of megaspore. a–c based on holotype.

taining *c.* 50–200 megaspores. *Megaspores* irregular, mostly Type III with a few Type I produced. *Megaspores* tuberculate, tubercles usually crowded and sometimes confluent into short cristae. *Megaspore* covered with dense spinules. *Commissural ridges* as for subsp. *drummondii*. *Microspores* not observed. (Fig. 2a–c)

#### KEY TO SUBSPECIES

- 1 Megaspores regular, Type I only; megasporangia and microsporangia produced..... subsp. **drummondii**
1. Megaspores irregular, mostly Type III with a few Type I; microsporangia not produced ..... subsp. **anomala**

#### SPECIMENS EXAMINED

*Western Australia* — Gnarlbine Rock, 16 Sep. 1975, R.J. Chinnock P1093 (AD); Petruda Rocks, E of Pithara, 23 Jul. 1971, N.G. Marchant 71/310 (AD)

*South Australia* — 4 km SW of Wandilo, Mt Gambier Forest Reserve, 1973, B. Grigg (AD); Comaum Forest Reserve, 19 Dec. 1973, C.R. Marsden 33 & K.M. Alcock (AD) (TYPE); W of Durr Swamp, Southeast, 23 Dec. 1973, K.M. Alcock (AD).

*Victoria* — 2.5 km N of Beechworth on Wodonga Rd., 2 Nov. 1952, E.J. McBarron 5931 (NSW); Hawkesdale, Feb. 1904, H.B. Williamson (AD); Warmwillah, March 1904, H.B. Williamson (MEL); 5.5 km NNW of Creswick, 3 Jan 1953, J.H. Willis (MEL); Chiltern, Dec. 1910, *s.dat.* (LE).

*New South Wales* — 5 km S of Gregory, 24 Dec. 1952, E.J. McBarron 5905 (NSW).

#### NOTES

Whether *I. drummondii* subsp. *anomala* is a good subspecies or a interspecific hybrid is not yet certain. However, Britton & Brunton (1991) hold the view that this taxon is probably of hybrid origin. It is pentaploid\*, lacks microspores and has Type 3 megaspores (irregular dumbbell-shaped and large monolete forms) which are all indicative characteristics of known *Isoetes* hybrids (eg. Brenton & Taylor 1990, Button & Brunton 1991). Furthermore they consider that although *Isoetes drummondii* subsp. *drummondii* is cited only as a diploid (Marsden 1979) microspore and megaspore size ranges suggest that populations with higher ploidy are involved. They consider a hidden allotetraploid may be in the complex and that subsp. *anomala* could be the result of a cross between the undescribed 4x (unreduced) and 2x *drummondii* although a wider cross is not ruled out.

\*Marsden (1973) recorded the subspecies as pentaploid but in 1979 he also recorded it as a tetraploid.

The epithet refers to the abnormal condition of this subspecies which does not produce microspores and has largely Type III megaspores.

*TMESIPTERIS* BERNH.

*Tmesipteris obliqua* Chinnock, *sp. nov.*

*T. billardieri* Endl., *Prod. Fl. Norf.* 6 (1833) *nom. illeg.*

Surculi aerii 15–70 cm longi, unici vel semel furcate, pendentes vel plus minusque erecti, foliis spiralibus, 2 vel 3 per cm, 12–28 mm longis, 4–12 mm latis, oblongo-lanceolatis, basibus obliquis apicibus truncatis ad emarginatis raro aliquot obtusis. Synangium biconicum, 5–9 mm longum.

TYPE: Tasmania, below Russel Falls, Mt Field National Park, Dec. 1974, *R.J. Chinnock P1007* (HOLOTYPE: AD; ISOTYPE: HO).

*Plant* epiphytic or rarely terrestrial. *Aerial shoots* 15–70 cm long, continuing growth for several years but eventually terminated by a small sterile or sporogenous leaf, unbranched or occasionally forked once, pendulous or rarely suberect, lower portion of shoot below leaves ribbed only on one side. *Leaves* spirally arranged, 2–3 per cm, 12–30 mm long, 4–12 mm wide towards base, broadly oblong-lanceolate, base oblique with adaxial margin parallel to branch near base and then abruptly projecting away from it, apex truncate to emarginate, rarely some obtuse, mucronate, surfaces shiny. *Synangia* at intervals along stem or towards tip, biconic, gradually tapering, persistent, 5–9 mm long, length *c.* 3 times height. *n = c.* 200, 203–210, 208–214, H.N. Barber, *Proc. Linn. Soc. N.S.W.* 82: 203 (1957). Long fork-fern.

DISTRIBUTION AND ECOLOGY

*Tmesipteris obliqua* extends from southern New South Wales through Victoria and Tasmania where it is common on the trunks and bases of tree-ferns, *Todea barbara* and in humus accumulations on banks and around tree bases. In terrestrial situations the shoots become suberect but curved in the distal part.

NOTES

Unfortunately Endlicher (1833) included *Psilotum truncatum* R. Br. in the synonymy of his new species *T. billardieri* thus making the name illegitimate.

*Tmesipteris obliqua* is the largest and most robust of the Australian species with aerial shoots attaining lengths of up to 70 cm although shoots of 20–40 cm are more commonly encountered. The leaves, which can be up to 12 mm wide, have very oblique bases and the specific epithet is derived from this feature.

SELECTED SPECIMENS

Victoria — Kallista, Monbulk Forest, 15 Jun. 1958, *R. Schodde 779* (AD, CANB); Aire River, base of Phillips track, 19 Oct. 1984, *R.J. Chinnock 6478* (AD, MEL).

New South Wales — Mt Wilson, 14 Apr 1953, *R. Melville 3775 & M.D. Tindale* (K, MEL); 10 km NNW of Bemboka, 2 Oct. 1982, *I.R. Telford 8852* (AD, CBG, NSW).

Tasmania — Derwent, no date, *R. Brown* (Bennett No. 122) (MEL 52375); Mt Wellington, 8 Jan. 1931, *E.A. Atkinson 58* (CANB); Brittons Swamp, 21 km SW of Smithton, 29 Nov. 1974, *R.J. Chinnock P965* (AD, HO).

REFERENCES

- Britton, D.M. & Brunton, D.F. (1991a). *Isoetes × hickeyi* in Canada. *Fern Gaz.* 14: 17–22.  
 Britton, D.M. & Brunton, D.F. (1991b). The spores and affinities of *Isoetes taiwanensis*. *Fern Gaz.* 14: 73–81.  
 Marsden C.R. (1973). The genus *Isoetes* in South Australia. B.Sc. Honors thesis, Department of Botany, Adelaide (unpublished).  
 Marsden C.R. (1976). Morphological variation and taxonomy of *Isoetes muelleri* A.Br. *J. Adelaide Bot. Gard.* 1: 37–54.  
 Marsden C.R. (1979). Morphology and taxonomy of *Isoetes* in Australasia, India, north-east & south-east Asia, China & Japan. Ph.D. thesis, Department of Botany, Adelaide (unpublished).