

Utricularia subulata L. (Lentibulariaceae): a new weed record of an Australian native for New South Wales, Australia

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Abstract

Utricularia subulata L., commonly called the zig-zag bladderwort because of its flexuose inflorescence axis, is reported as a new naturalised record for New South Wales and has been collected in the Central Coast and South Coast bioregions. The full extent of the New South Wales distribution is not yet known. This is a mainly pan-tropical species that occurs naturally in northern tropical regions of Australia.

Introduction

During the summer of 2011–2012, three populations of *Utricularia subulata* L. (Lentibulariaceae) were found to occur in New South Wales; growing at two sites on independent drainages (separated by c. 4 km) in the Royal National Park, south of Sydney (Central Coast botanical division), and c. 150 km (by road) further south in Morton National Park, at Porters Creek Dam near Yatte Yattah (South Coast botanical division) (Fig. 1). These three populations are new weed records for the State. Further field surveys are required to reveal the full extent of the distribution of this species within New South Wales. Although this species has a mainly pan-tropical distribution, it is also widespread across cooler regions e.g., in north eastern U.S.A. and Canada (pers. observation - RWJ; Taylor 1989).

Within Australia, *U. subulata* is native to far northern Queensland and to the Darwin and Gulf region of the Northern Territory (Fig. 1). Recently (July 2011) two populations of chasmogamous specimens were discovered (pers. observation - RWJ, not collected) just south of Musgrave, Queensland (approx. 25 km apart) (Fig. 1). These could be regarded as the most southerly naturally occurring populations known in Queensland, separated from the populations within New South Wales by approximately 2,300 km (Fig. 1). The populations from New South Wales form small colonies with small inflorescences (4–15 cm tall). All plants observed at two of these sites possessed only cleistogamous flowers (Fig. 2b), whereas flowers at a third site (within the Royal National Park), were chasmogamous (Fig. 3a) in October and cleistogamous (Fig. 3b) in July.

Due to its small stature and inconspicuous flowers, populations may have been overlooked in previous botanical surveys of New South Wales. Although extensive field surveys were undertaken in northern Australia in the early 1900s, it was not until 1980 that the first Australian collection from the Northern Territory was gathered (Taylor 17180, 25 May 1980). Only four voucher collections are recorded for Queensland (refer 'specimens examined' below).

In cultivation, *U. subulata* is well known for its high fecundity, spreading throughout collections of potted carnivorous plants. With the vigorous trade in live carnivorous plants increasing the probability of intentional introductions, it is likely that this species will become naturalised in many sites with suitable habitats across New South Wales.

A similar situation exists in Portugal, with the *Instituto da Conservacao da Natureza* (GCW 2007) considering the local populations of *U. subulata* to be naturalised, although Taylor (1989) provides anecdotal evidence to suggest that they are perhaps native.

Two recently discovered South African carnivorous plants introduced to New South Wales include *Drosera capensis* L. (Droseraceae) (Jobson & Conn 2012) found near one of the known populations of *U. subulata*, and *U. sandersonii* found in the Central Tablelands of New South Wales (Conn *et al.* 2004).

These illegal introductions highlight the potential damage that might be caused when enthusiastic growers inadvertently or intentionally release exotic cultivated plants into natural plant communities. Future genetic studies may reveal more information on populations of *U. subulata* in New South Wales, and thereby provide necessary data for determination of origin.

A taxonomic description, modified from Taylor (1989), is here provided, together with notes on habitat preferences and diagnostic features. A taxonomic key containing all species of *Utricularia* occurring in New South Wales is provided as an aid to identification.

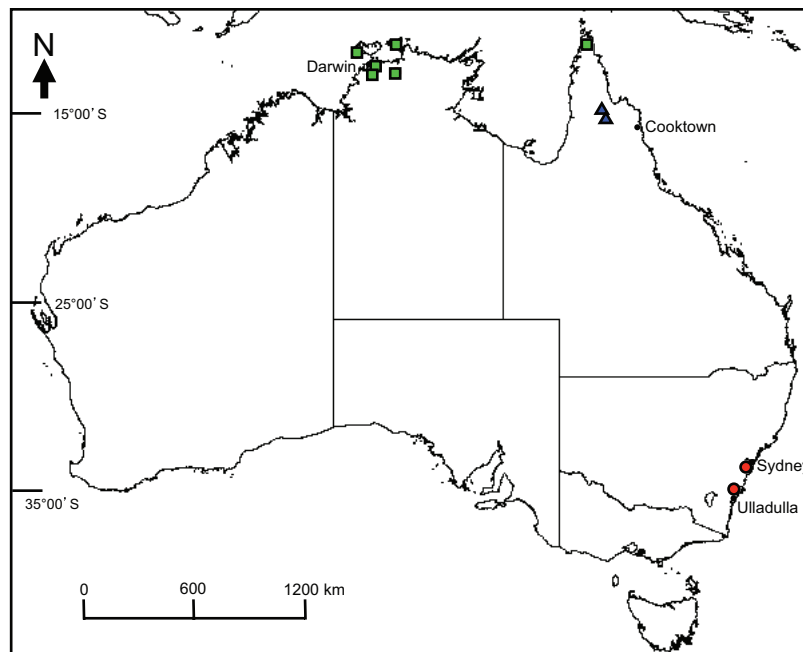


Fig. 1. Australian distribution of *Utricularia subulata*; herbarium based records in northern Australia (green squares), RWJ observations (no collections; blue triangles), and collection sites of naturalised populations in New South Wales (red circles).

***Utricularia subulata* L.**, *Species Plantarum* 1: 18 (1753)

Small to very small annual terrestrial herb. Rhizoids filiform with short papillose branches, usually less than 1 cm long. Stolons numerous, capillary, branched, to several cm long. **Leaves** numerous, petiolate, narrowly linear with apex subacute, single nerved, up to 1 mm wide, c. 20 mm long. **Traps** numerous, attached to stolons and leaves, stalked, ovate, 0.2–0.7 mm long, mouth lateral with two dorsal subulate, sparsely branched appendages. **Inflorescence** erect, solitary, simple or branched, often flexuose, 1– at least 25-flowered, 2–50 cm tall (4–15 cm in N.S.W.), peduncle terete, filiform, 0.3–0.6 mm thick, usually glabrous throughout; peduncle **scales** numerous, similar to bracts but narrower, sometimes ciliate; **bracts** circular to transversely elliptic, rounded at each end, basiolate, peltate, amplexicaule, 1–2 mm long; **bracteoles** absent; **pedicels**, ascending, capillary, 2–10 mm long. **Calyx** lobes subequal, broadly ovate to circular, convex, 1–1.5 mm long; nerves moderately conspicuous. **Corolla** 5–10 mm long, yellow (chasmogamous) (Fig. 3a), or white to slightly reddish (cleistogamous) (Figs 2b, 3b); lower lip rhombic to broadly cuneate, base with a prominently rounded bilobed swelling, apex deeply 3-lobed; spur subulate, apex acute, rounded or denticulate, slightly shorter or slightly longer than lower lip; upper lip broadly ovate, apex rounded. **Staminal filaments** \pm straight, to c. 1 mm long; anther theca confluent. **Ovary** globose; style short; stigma lower lip semicircular. **Capsule** globose, 1–1.5 mm diam.; walls thin, dehiscent by a ventral ovate pore. **Seeds** obovoid, c. 0.23 mm long, c. 0.16 mm wide. **Flowering**: collected in flower October (chasmogamous), and December to July (cleistogamous) in N.S.W., and January to August (both flowering forms) in northern Australia.

Distribution: Pantropical: Australia, native to Queensland and Northern Territory; introduced in New South Wales, Central Coast, Royal National Park (*Ciric* 4; *Jobson* 1355, 1409), and South Coast, Morton National Park, Porters Creek Dam, c.16 km W of Yatte Yattah (*Jobson* 1359). The extent of the distribution and habitat preferences of this species are inadequately known, largely because only 19 other naturally occurring specimens are known from herbarium collections.



Fig. 2. *Utricularia subulata*. **a**, riparian habitat, Royal National Park, Sydney (Central Coast); **b**, 'zig-zag' habit of inflorescences (cleistogamous flowers).

Specimens examined: AUSTRALIA: Northern Territory: Darwin and Gulf: East of McMinns Lagoon about 25 km SE of Darwin, *Taylor 17180*, 25 May 1980 (CANB, DNA) (cleistogamous); Gunn Point Road, just after Howard River, *Murfet 5950*, 2 Mar 2008 (AD) (cleistogamous); Jenkins Road, Noonamah, *Murfet 6797*, 24 Mar 2010 (AD) (cleistogamous); 5 km E of Howard River and 2 km S of Gunn Point Road, *Murfet 6832*, 29 Mar 2010, (AD) (cleistogamous); Flying Fox Creek, 14 km W of South Alligator Resort, *Murfet 7196*, 22 Mar 2011 (AD) (cleistogamous); Girraween near Hep 1 Bore, *Murfet 7207*, 24 Mar 2011 (AD) (cleistogamous).

Queensland: Cook: Elliot Falls, S of Jardine River, *Jacobs 6286*, 03 Mar 1992 (NSW) (chasmogamous); Cowal Creek area, N of Sanamere Lagoon, *Murfet 6118*, 2 Aug 2008 (AD) (cleistogamous); Biffin Swamp, Injinoo, *Murfet 6144*, 3 Aug 2008 (AD) (cleistogamous); Sanamere Lagoon catchment, S of new road, *Murfet 6177*, 5 Aug 2008 (AD) (cleistogamous).

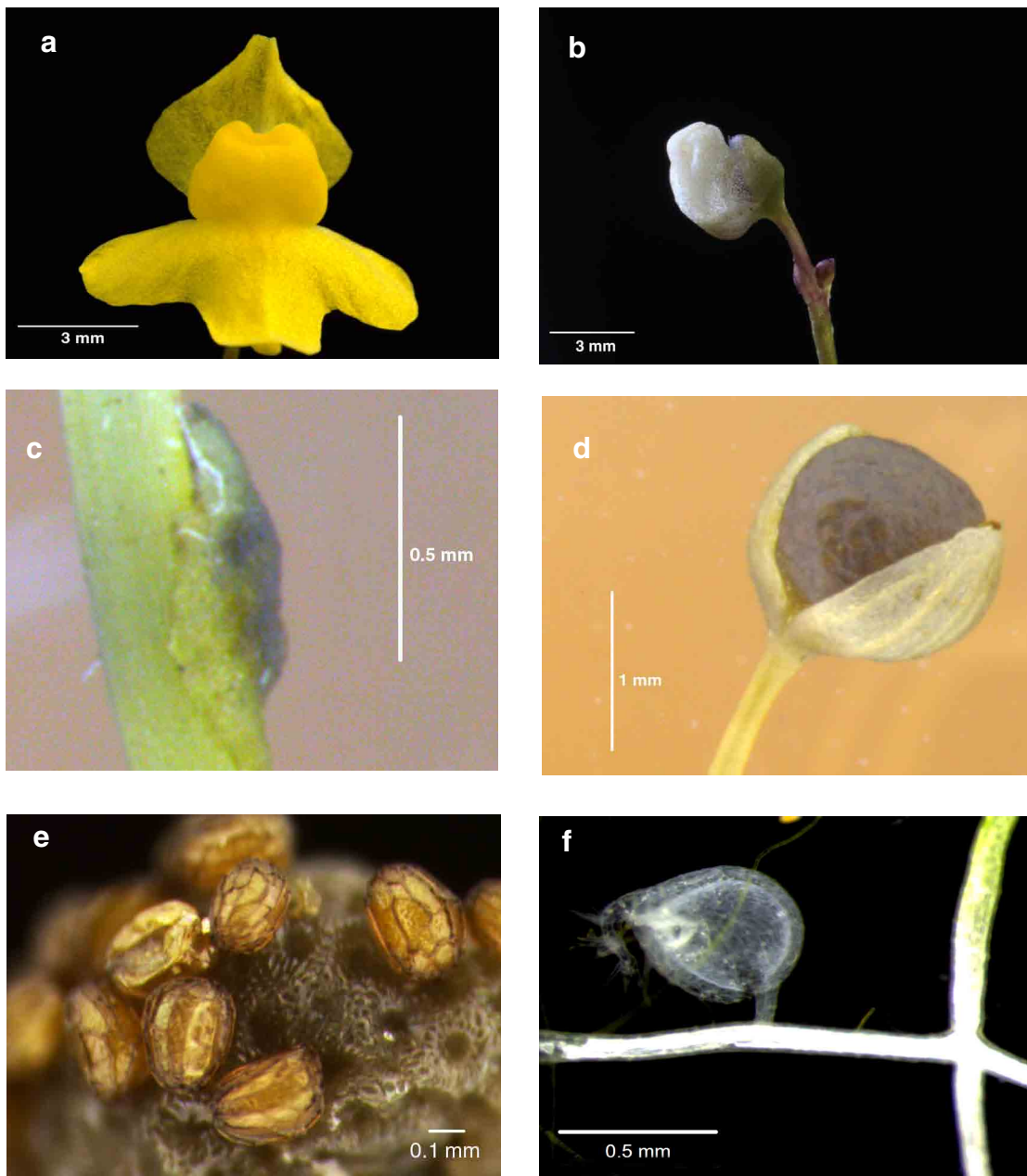


Fig. 3. *Utricularia subulata*. **a**, chasmogamous flower frontal view; **b**, cleistogamous flower lateral view; **c**, peduncle scale; **d**, capsule; **e**, seed attached to placenta; **f**, bladder-trap lateral view. (a and b, Images Barry Rice, Robert Gibson respectively, reproduced with permission; c–f, *Jobson 1255*). Scale bars shown.

New South Wales: Central Coast: Royal National Park, Kangaroo Creek, *Ciric* 4, 28 Oct 2011 (NSW) (chasmogamous); *ibid.*, *Jobson* 1409, 26 July 2012 (NSW) (cleistogamous); Flatrock Crossing of South West Arm Creek, *Jobson* 1355, 13 Dec 2011 (NSW) (cleistogamous); South Coast: Morton National Park, Porters Creek Dam, near wall on western end of reservoir, *Jobson* 1359, 10 Feb 2012 (NSW) (cleistogamous).

Habitat: in northern Queensland and the Northern Territory plants are usually found on sandy substrates in moist gullies and fringes of *Melaleuca*-dominated swamps. Within New South Wales, the species occurs in riparian habitats, in small colonies growing in wet sandy soils with *Drosera binata*, *D. pygmaea*, *D. spatulata*, *Juncus* spp. and *Cyperus* spp. (Fig. 2a). A detailed search of the known sites in the Royal National Park found many small, scattered colonies (each <1 m²) growing along sections of the creeks. A small colony of cleistogamous plants was observed growing on soakage along the track leading into Kangaroo Creek gorge (elevation 150 m). Two other potentially suitable habitats in drainage lines of Uloola and Toonoum Brooks, both tributaries of the Hacking River within the Royal National Park, were also searched (approximately 500 m creek-line transect); but no further populations were observed. However, this cursory survey is not sufficient to evaluate the distribution of this species within the extensive drainage systems within the Park.

Notes: *Utricularia subulata* is a member of *Utricularia* subgenus *Utricularia* section *Setiscapella* (Taylor 1989; *Jobson et al.* 2003). A detailed taxonomic description and illustration are provided in Taylor (1989, fig. 165). Of the *Utricularia* species found in N.S.W., it is most closely related to *U. biloba* R.Br. (subgenus *Utricularia*, section *Nelipus*; *Jobson et al.* 2003), which has a subaquatic habit and bi- or tri-pinnately divided leaves consisting of filiform segments. The corolla of *U. biloba* is conspicuously dark blue with two white strips at the base of the two-lobed lower lip, whereas the corolla of *U. subulata* is either completely yellow, with a three-lobed lower lip (chasmogamous) (Fig 3a), or highly reduced and white or reddish (cleistogamous) (Figs 2b, 3b) (refer to Key below).

Key to species of *Utricularia* in New South Wales

Modified from Rowe and Brown (1992).

- 1a. Bracteoles absent; flowers yellow (if not cleistogamous) or white to slightly reddish (cleistogamous) or blue..... 2
- 1b. Bracteoles present; flowers white or shades of pink to violet, usually with a yellow palate..... 7
- 2a. Inflorescence with a whorl of ellipsoid floats above middle *U. stellaris*
- 2b. Inflorescence lacking floats 3
- 3a. Stolons anchored in substrate 4
- 3b. Stolons freely suspended in water column 5
- 4a. Leaf lamina filiform, bi- or tri-pinnately divided; flowers blue *U. biloba*
- 4b. Leaf lamina linear with subacute apex; corolla yellow (chasmogamous) or corolla reduced and white or reddish (cleistogamous)..... *U. subulata*
- 5a. Leaves with ultimate segments few (2–8); upper corolla lip larger than lower *U. gibba*
- 5b. Leaves with ultimate segments numerous (20–80); upper corolla lip smaller than lower 6
- 6a. Corolla externally glabrous; peduncle with 1 or more scales; leaves with 2 primary segments *U. australis*
- 6b. Corolla externally pubescent; peduncle lacking scales; leaves with 3 or more primary segments *U. aurea*
- 7a. Peduncle with scales present 8
- 7b. Peduncle lacking scales..... 11
- 8a. Corolla with upper lip deeply and distinctly 2-lobed (like rabbit ears) *U. sandersonii*
- 8b. Corolla with upper lip unlobed or shallowly 2-lobed 9
- 9a. Bracts basiolute (medifixed) *U. caerulea*
- 9b. Bracts (inserted at base of flower pedicel) basifixed 10
- 10a. Bracts c. 4 times broader than bracteoles, c. 2 mm long, with apex acute *U. uliginosa*
- 10b. Bracts mostly only slightly broader than bracteoles (up to twice width), c. 1 mm long, with apex subacute *U. lateriflora*

- 11a. Lower corolla lip with central yellow pair of ridges not projecting apically beyond ridges on either side *U. uniflora*
- 11b. Lower corolla lip with central yellow pair of ridges projecting apically beyond ridges on either side 12
- 12a. Inflorescence 1–4 cm high, usually 1-flowered; corolla 6–10 mm long *U. monanthos*
- 12b. Inflorescence 10–50 cm high, 2–many-flowered; corolla 12–22 mm long 13
- 13a. Lower corolla lip with 2 or 3 conspicuous yellow central ridges *U. dichotoma*
- 13b. Lower corolla lip with 4–11 conspicuous yellow central ridges *U. beaugleholei*

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References

- Conn BJ, Brown EA & Fairley AT (2004) *Utricularia sandersonii* (Lentibulariaceae), a new record for Australia. *Telopea* 10: 811–814.
- GCW (2007) Global compendium of weeds (<http://www.hear.org/gcw/>; viewed 4 April 2012)
- Jobson RW & Conn BJ (2013) *Drosera capensis* (Droseraceae), a new naturalised record for Australia. *Telopea* 14: 89–92.
- Jobson RW, Playford J, Cameron KM & Albert VA (2003) Molecular phylogeny of Lentibulariaceae inferred from *rps16* and *trnL-F* chloroplast gene regions: implications for character evolution and biogeography. *Systematic Botany* 28: 157–171.
- Rowe RR & Brown EA (1992) Lentibulariaceae. Pp 598–601 in Harden GJ (ed.) *Flora of New South Wales*, vol. 3. (University of New South Wales Press: Kensington)
- Taylor P (1989) The genus *Utricularia* – a taxonomic monograph. *Kew Bulletin Additional Series* 14: 1–724.

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