

Redescription of *Utricularia singeriana* and a new species *Utricularia baliboongarnang* Baleeiro & R.W.Jobson for north-eastern Western Australia

Paulo C. Baleeiro^{1,3}  & Richard W. Jobson² 

¹Department of Biological Science, University of Queensland, St Lucia, Qld 4076, Australia

²National Herbarium of New South Wales, Australian Institute of Botanical Science, Australian Botanic Garden,
Locked Bag 6002, Mount Annan, New South Wales 2567, Australia

³Corresponding author: p.baleeirosouza@uq.net.au

**We dedicate this work to the memory of our friend and colleague Mr Allen Lowrie
whose work has advanced our understanding of the systematics and ecology of
Utricularia.**

Abstract

A new species of *Utricularia* (Lentibulariaceae) is recognised for north-eastern Western Australia. A description of *Utricularia baliboongarnang* Baleeiro & R.W.Jobson is provided along with a new circumscription for the Northern Territory species *U. singeriana* F.Muell. to which it was previously assigned. We also provide comparison with *U. hamiltonii* E.E.Lloyd, a Northern Territory species for which *U. baliboongarnang* was recently found to be the phylogenetic sister, and the distantly related western Kimberley species *U. byrneana* R.W.Jobson & Baleeiro with which it shares a superficially similar corolla. Diagnostic features are illustrated, a taxonomic key containing related species from northern Australia is provided, and distribution, habitat, and conservation status are discussed.

Introduction

Taylor (1989) placed *Utricularia singeriana* F.Muell. within section *Pleiochasia* Kamienski of subgen. *Polypompholyx* sensu Jobson *et al.* (2017) and included two disjunct collections from near Kununurra in Western Australia with those from the type region near Darwin in the Northern Territory. Cowie (2010) provides a morphological comparison of the *U. singeriana* collections from Kununurra with those from the Northern Territory. On close inspection Cowie (2010) realised that the two entities bear little resemblance to each other and proceeded to differentiate them based on the shape of leaves, corolla lower lip limb and spur, in addition to their geographic disjunction. The Darwin specimens that Taylor examined (*Holtze s.n.*) possessed a corolla that is smaller than is typical for the species, and this may have led to Taylor's inclusion of the specimens from Western Australia under his concept of *Utricularia singeriana*.

The comparative study of Cowie (2010) led to the assignment of the informal phrase name *U. sp. Kununurra* (Glover 81) (<https://florabase.dpaw.wa.gov.au/browse/profile/50363>) in addition to the enhanced conservation status of both entities. This was later supported by both Lowrie (2013) and the recent molecular phylogenetic study of Jobson *et al.* (2017) who provided strong evidence that Taylor's concept of *U. singeriana* is indeed paraphyletic. In their study, Jobson *et al.* (2017) included accessions from the two known Kununurra sites finding that these were nested within a clade containing the Northern Territory endemic *U. hamiltonii* that were together sister to the Kimberly endemic *U. hamata* R.W.Jobson & M.D.Barrett. This latter species is only distantly related to the broadly sampled accessions fitting the type description and representing the concept of *U. singeriana* as it is outlined in Cowie (2010).

We here describe the taxon *U. sp. Kununurra* (Glover 81) as the new species *Utricularia baliboongarnang* Baleeiro & R.W.Jobson from the eastern Kimberly region of Western Australia. We also provide an updated taxonomic description for *U. singeriana* that is restricted to populations distributed across the Northern Territory (Fig. 5) and fitting the type material (Fig. 3). Morphological differences are compared between the newly described entity and its closely allied species *U. hamata* and *U. hamiltonii*, with notes on distribution, ecology and conservation status provided. An identification key representing the related species of section *Pleiochasia* from northern Australia also is provided.

Methods

Relevant dried and alcohol-preserved material representing all related species, held at the National Herbarium of New South Wales (NSW), Australian National Herbarium (CANB), Northern Territory Herbarium (DNA), Western Australia Herbarium (PERTH), and State Herbarium of South Australia (AD), were examined. Pollen characteristics were investigated using a standard compound microscope (magnification $\times 100$).

Taxonomy

Utricularia singeriana F.Muell., *J. & Proc. Roy. Soc. New South Wales* 24: 76, 176 (1890).

Type: Port Darwin, N.T., *M.Holtze 1026*; holo: MEL (MEL 1513939); iso: K, MEL (MEL 1513940), NSW (NSW 58087).

= *Utricularia pachyceras* O.Schwarz, *Feddes Repert.* 24: 98 (1927).

Type: 6 km NE of Darwin, N.T., *F.A.K.Bleeser 212*; holo: B (destroyed – *fide* Taylor 1989).

Medium to large sized annual, terrestrial herb. **Rhizoides** capillary, simple, up to 10 mm long, 0.45 mm thick at base tapering to 0.15 mm near the apex, numerous from the peduncle base, few from stolon nodes. **Stolons** few, filiform, 0.2–0.3 mm thick, internodes 4–6 mm long. **Leaves** few, rarely at peduncle base and 1 or 2 on stolon nodes, petiolate, lamina oblanceolate to spatulate, 2.5–4.3 mm long, 1–2.1 mm wide, single nerve, apex rounded, total length up to 5–6.5 mm long. **Traps** stalked, ovoid, 1.5–3.3 mm long; 1 or 2 from the base of the peduncle and nodes; uniform, mouth lateral with a simple dorsal appendage 1–3 mm long, and two simple lateral appendages 1–2.3 mm long, ventral wings absent. **Inflorescence** solitary, 120–310 mm long; peduncle erect, hollow, terete, glabrous, 0.9–1.8 mm thick; **Scales** absent; **Bract and bracteoles** equal, basifixed, sparsely glandular, obovate, apex rounded 1.7–2.0 mm long, c. 1 mm wide. **Flowers** solitary; **Pedicel** erect, remaining erect post-anthesis, filiform, tapering and dorsiventrally compressed apically, 5–8.5 mm long. **Calyx** lobes unequal; upper lobe ovate or obovate, 2.8–4.4 mm long, 2–3.1 mm wide; lower lobe shorter, depressed-ovate, with apex emarginate 2–2.4 mm long, 2.4–4 mm wide. **Corolla** 15–27 mm long, upper side purple or violet, underside dark maroon; **upper lip limb** constricted near the base, 8–15 mm long, superior part obovate or oblanceolate with apex emarginate, inferior part ovate with margin ciliate; **lower lip limb**, flabellate in outline, 6–13 mm long, 11–24 mm wide, apex rounded; base of lower lip white near pallet rim with central yellow or orange patch; **spur** projecting parallel to the lower lip, to ascending at c. 30°, tetragonal in cross-section at the base, tapering to a dorsi-ventrally flattened, retuse apex, 5–6.1 mm long, c. 3.3 mm wide near base, c. 3/4 to equal or slightly longer than the length of lower lip. **Capsule** globose, 3.3–6.2 mm in diameter, dehiscing from a longitudinal, dorsi-ventral, non-thickened slit. **Seeds** cylindrical, 0.85–1.25 mm long. **Pistil** c. 2.3 mm long; **Filaments** curved c. 2.1 mm long. **Pollen** 3-colporate, c. 35 x 28 μ , (*Holtze s.n.*, 27. Iii. 1904, NSW) (Taylor 1989). Figures 1a–b, 2, 3; Taylor (1989), fig. 21: 1–3, 11 (from *Holtze s.n.*).

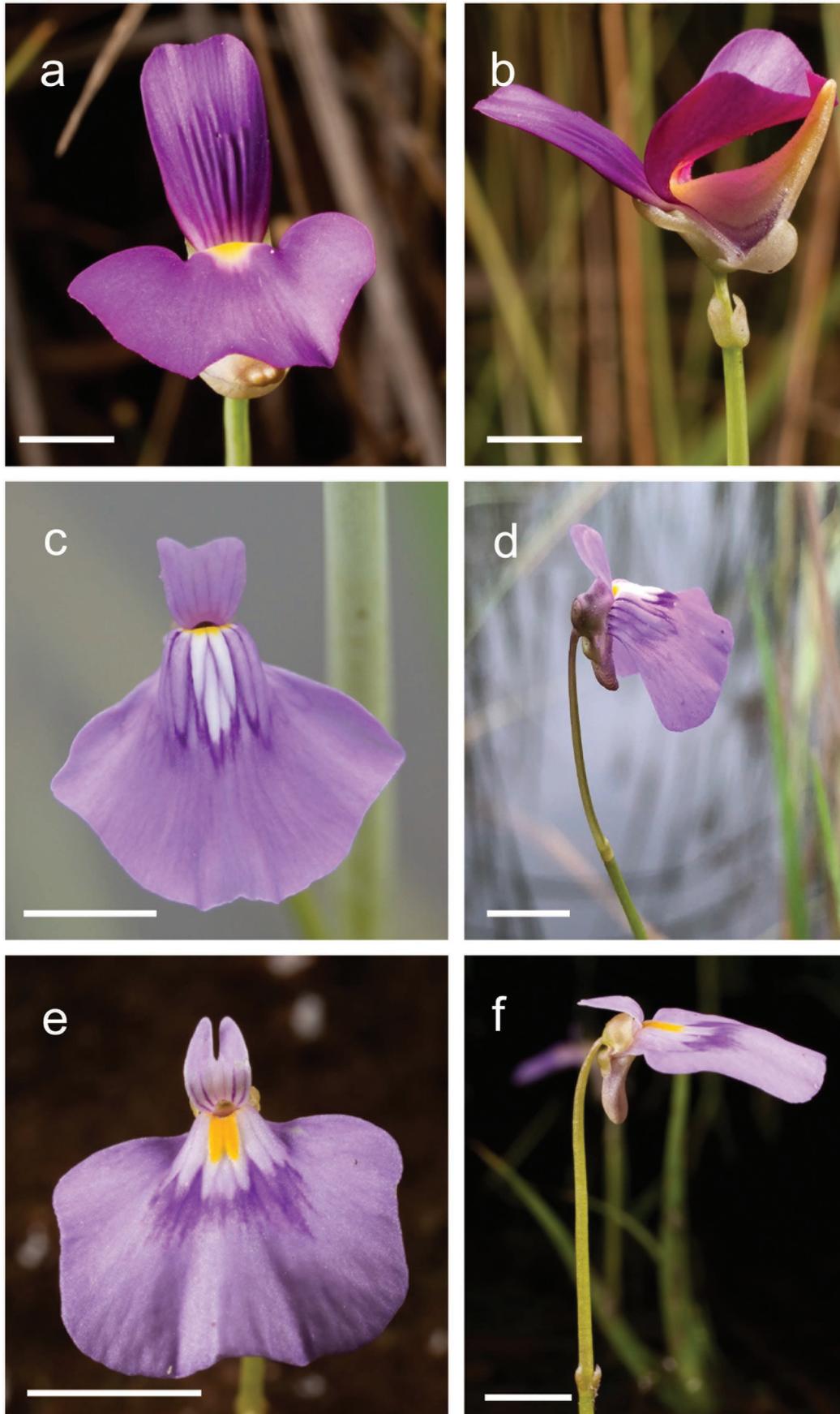


Fig. 1. *Utricularia singeriana* (a, b), *U. baliboongarnang* (c, d) and *U. hamiltonii* (e, f): a, c & e, corolla frontal view; b, d & f, corolla lateral view. Scale bars: a–f = 30 mm. Images: a, b, e & f by W. Cherry; c & d by P.C. Baleeiro.

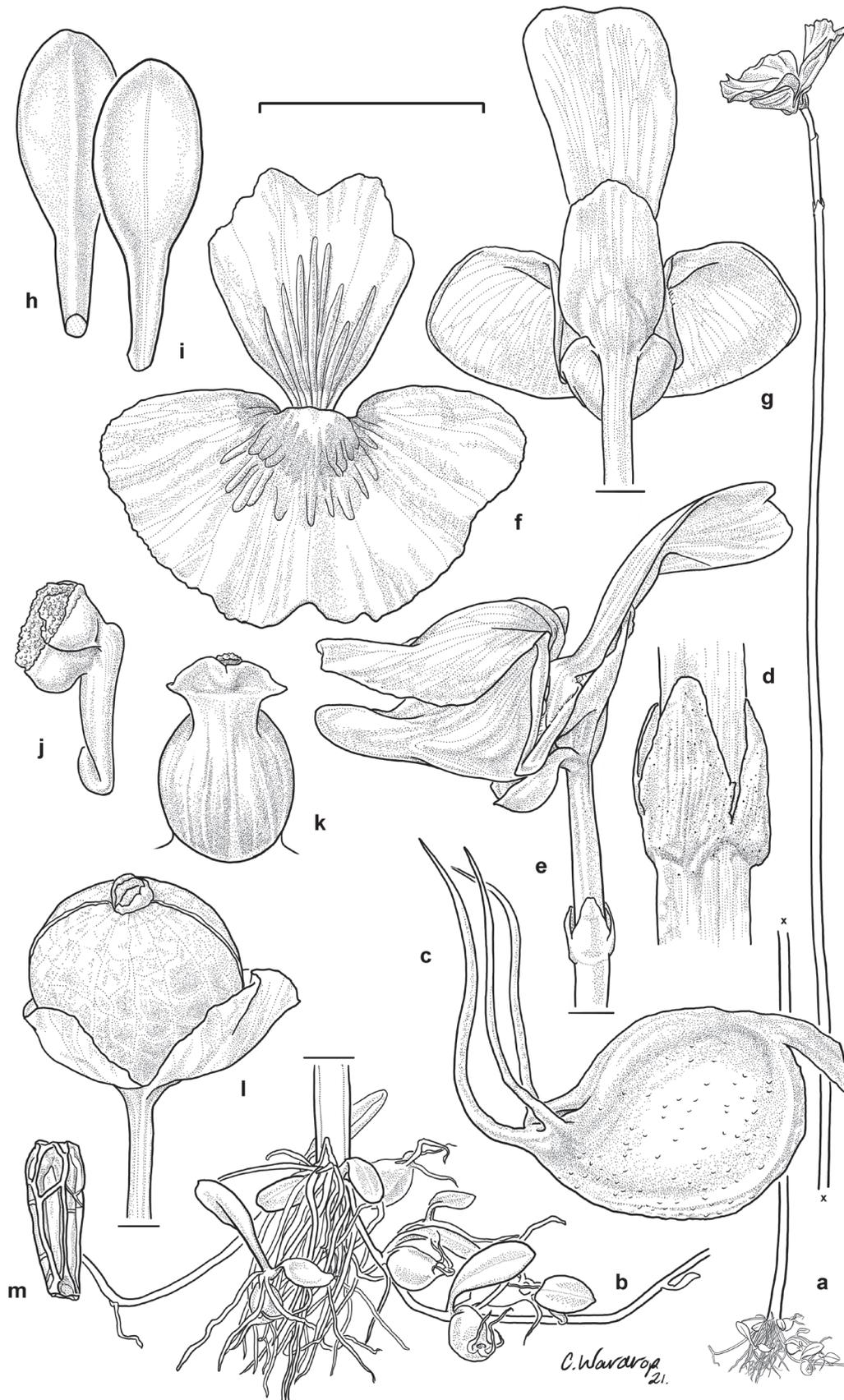


Fig. 2. *Utricularia singeriana*. a, habit; b, vegetative habit; c, bladder-trap lateral view; d, bract and bracteole; e, flower lateral view; f, flower frontal view; g, flower rear view; h, leaf adaxial surface; i, leaf abaxial surface; j, stamen lateral view; k, ovary rear view; l, mature fruit capsule in situ; m, seed. Scale bar: a = 40 mm; b = 10 mm; c = 2 mm; d, j, k = 2.5 mm; e–g = 8 mm; h & i = 3.3 mm; l = 6.6 mm; m = 1.25 mm. Material used: b–k, m from R.W. Jobson 2711 & P.C Baleeiro (NSW927139 spirit); a, l & m from R.W. Jobson 3190 & P.C Baleeiro (NSW1115031).

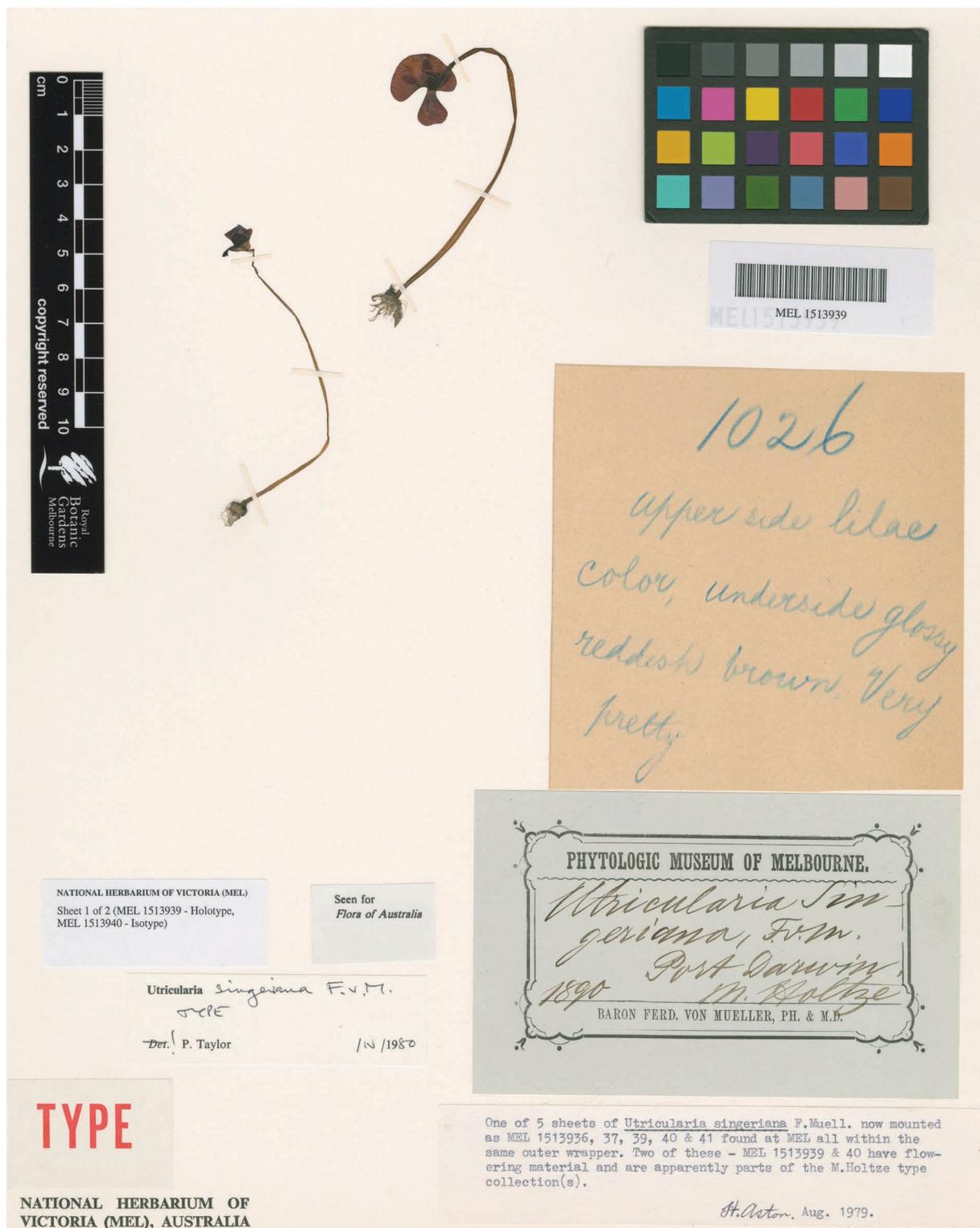


Fig. 3. Holotype of *Utricularia singeriana* F.Muell. (M.Holtze 1026; MEL 1513939).

Additional specimens examined. Northern Territory [precise localities withheld for conservation reasons]: near Darwin, *M. Holtze s.n.* 27 Mar 1904 (NSW 58087); Edith River, *C. Michell* 2699, 11 May 2000 (DNA); Nitmiluk National Park, *A. Gibbons* 41, 26 Mar 2002 (DNA); Murrumbidgee Plateau, *K. Brennan* 6535, 17 Apr 2005 (DNA); towards Jabiru, *D.E. Murfet* 6472 & *A. Lowrie*, 7 Apr 2009 (AD); Finnis River, *I. Cowie* 12540, 23 May 2010 (DNA); Weddell area, *B. Stuckey* 749, 2 May 2011 (DNA); Road to Oenpelli, *R.W. Jobson* 2216 & *P.C. Baleeiro*, 19 Apr 2014 (NSW 852225); Weddell, *R.W. Jobson* 2711 & *W.A. Cherry*, 20 Apr 2015 (NSW 927139); Litchfield National Park, *I. Cowie* 14076, 20 Mar 2016 (DNA).

Distribution, Ecology & Phenology. Occurs in the vicinity of Darwin, Jabiru, Finnis River and Edith River areas of the Northern Territory (Fig. 5). The recent collection from Groote Eylandt (*Cowie* 14804) suggests that the distribution may be wider across Arnhem Land and nearby islands. Grows in wet sand and boggy seepage in swamps and near creeks. Flowers from March to June (Taylor 1989).

Conservation Status. Considered Vulnerable under Northern Territory legislation. Although the species has a wide distribution across the Darwin region, populations are locally restricted.

Notes. When observed in the field the morphologically distinct *U. singeriana* is unlikely to be confused with any other species (Fig. 1 a–b, 2, 3). According to Cowie (2010), Peter Taylor probably did not observe this species during his trip to northern Australia and instead was limited to the faded 1890 sheet specimen of *Holtze s.n.* It is likely this is the reason he included the very different material from Western Australia (i.e., *Glover* 81 (sic 82)) in his description of *U. singeriana* (Taylor 1989).

Utricularia baliboongarnang Baleeiro & R.W. Jobson, *sp. nov.*

Type: AUSTRALIA: WESTERN AUSTRALIA: East Kimberley [precise locality withheld for conservation reasons]: Racecourse Swamp, SE of Kununurra, *R.W. Jobson* 3999 & *P.C. Baleeiro*, 25 March 2021 (holo: NSW 834760 - spirit).

Diagnosis: Similar to the distantly related *U. byrneana* in overall corolla appearance but differing in its longer inflorescence (120–370 mm vs 60–170 mm) and bladder traps with ventral wings present. Also similar to the closely related *U. hamiltonii* in having spur always less than half the length of the corolla lower lip and leaf apex acuminate, but differs in having corolla upper-lip limb emarginate or shallowly bilobed with lobes apically rounded, corolla lower lip limb obovate with 3 or 4 raised white ridges at base, and a slight deflexing of the peduncle post anthesis.

Medium sized possibly perennial, affixed aquatic herb. **Rhizoides** capillary, simple, up to 12 mm long, 0.6 mm thick at base tapering to 0.1 mm near the apex, numerous from the peduncle base, few from stolon nodes. **Stolons** few, filiform, 0.21–0.29 mm thick, internodes 7–10 mm long. **Leaves** few, 1 or 2 from base of peduncle, in pairs at stolon node, petiole not obvious (c. 3–6 mm long), lamina linear, 6–16 mm long, 0.3–0.75 mm wide, single nerve, apex acuminate, total length 9–22 mm long. **Traps** stalked, ovoid, 1.5–3.0 mm long; 1 from the base of the peduncle, 1 or 2 from nodes; dimorphic, mouth lateral with one simple dorsal appendage c. 2 mm long, and two simple lateral appendages c. 1.5 mm long, ventral wings c. 1 mm long or sometimes absent, margin usually entire. **Inflorescence** solitary, 120–370 mm long; peduncle erect, hollow, terete, glabrous, 0.5–1.1 mm thick. **Scales** absent; **Bract and bracteoles** equal, basifixed, sparsely glandular, narrowly ovate, apex acute 1.5–2.0 mm long, c. 0.7 mm wide. **Flowers** solitary; **Pedicel** erect, shortly deflexed post-anthesis, filiform, tapering and dorsiventrally compressed apically, 7–13 mm long. **Calyx** lobes unequal; upper lobe broadly ovate, 2.6–3.4 mm long, 1.8–2.5 mm wide; lower lobe smaller, orbicular, with apex emarginate 1.9–2.6 mm long, 1.7–2.3 mm wide. **Corolla** 12–21 mm long, pale violet-blue (Periwinkle blue); **upper lip limb** constricted near the base, 5.5–6.2 mm long, superior part obovate with apex emarginate or shallowly bilobed, inferior part ovate with margin ciliate; **lower lip limb**, transversely elliptic in outline, 11–14 mm long, apex rounded; base of lower lip with 2 or 3 pale violet-blue ridges either-side of 3 or 4 central white ridges, all bordered marginally by a darker violet band, with yellow throat; **spur** conical at the base with apex obtuse, 4–5 mm long, c. 2 mm wide, c. 1/3 the length of lower lip. **Capsule** globose, c. 3.2 mm in diameter, dehiscing from a single longitudinal, ventral, marginally thickened slit. **Seeds** cylindrical, 0.7–0.8 mm long (immature). **Pistil** c. 1.4 mm long; **Filaments** curved c. 1.4 mm long. **Pollen** 3-colporate, c. 30 x 30 µ, *Jobson* 3999 (NSW). Figures 1c–d, 4; Taylor (1989), fig. 21: 4–10 (from *Glover* 81 (sic 82)).

Etymology. The epithet was selected in consultation with Miriwoong Elders and senior speakers of the Mirima Dawang Woorlab-gerring Language and Culture Centre. In the Mirriwoong Language the word Baliboong refers to a swamp habitat, and their word *baliboo-ngarnang* (sic) literally means “swamp-dwelling”.



Fig. 4. *Utricularia baliboongarnang*. a, vegetative habit; b, habit; c, bracts and bracteoles; d & e, bladder-trap lateral view; f, leaf dorsal view; g, fruit capsule lateral view; h, flower frontal view; i, flower lateral view. Scale bars: a = 10 mm; b = 80 mm; c, d & e = 2 mm; f & g = 3.3 mm; h & i = 8 mm. Material used: All from R. W. Jobson 3999 & P.C Baleeiro (NSW834760 spirit).

Additional specimens examined. Western Australia [precise localities withheld for conservation reasons]: S of township of Kununurra, C. Glover 81, 1 Apr 1982 (PERTH); [precise locality withheld for conservation reasons], SSE of Kununurra, K. Pajmans 2309, 10 Mar 1978 (CANB); SE of Wyndham, K. Pajmans 2532, 17 Mar 1978 (CANB).

Distribution, Ecology & Phenology: Known only from two sites in the East Kimberley region near Wyndham and Kununurra, Western Australia (Fig. 5). Grows in wet sand in large seasonal swamps (Fig. 6). Flowers March to April.

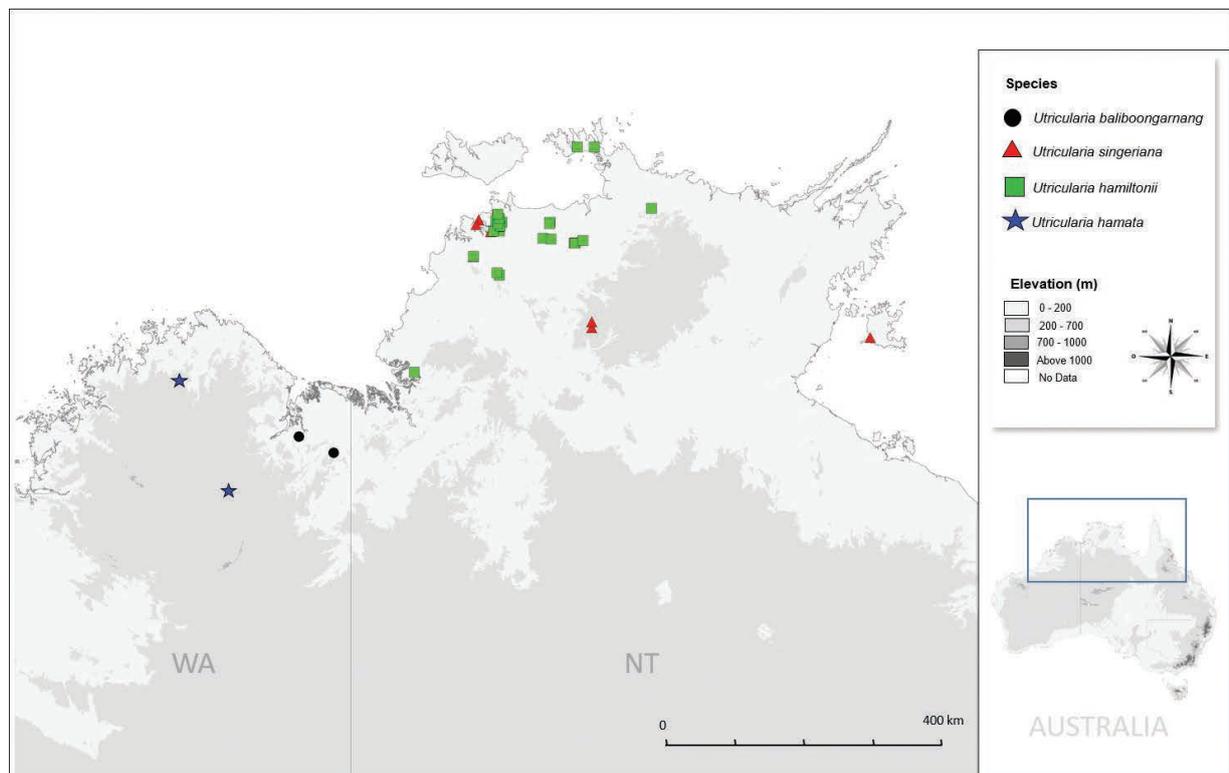


Fig. 5. Map of the Top End and Kimberley region showing the distribution of *Utricularia baliboongarnang* (black circle), *U. singeriana* (red triangle), *U. hamiltonii* (green square), and *U. hamata* (blue star).

Conservation status: This rarely collected species is known from two sites. It is listed as a Priority 2 taxon under its manuscript name *U. sp.* Kununurra (C.Glover 81). One of the sites is protected within the Parry Lagoon Nature Reserve, while the other occurs on non-conservation managed lands near Kununurra. Although there have been numerous searches for this taxon, ours was the first to record it at Kununurra since the original two collections in 1978 and 1982. Although our survey involved a broad search of a large wetland system south of Kununurra (Fig. 5), we uncovered only a few small colonies in a single small area (c. 5 m²) of the swamp. A thorough survey of the Parry Lagoon site was not possible due to presence of saltwater crocodiles, and no plants were observed from several safe vantage points. Until a thorough search of the area is conducted, we recommend that the current conservation code P2 be maintained to reflect the observed rarity and limited known distribution of this species.

Notes: Taxonomic descriptions and illustrations of *U. singeriana* provided in Taylor (1989) combine *Utricularia baliboongarnang* (Glover 81 (sic '82')), fig. 21: 4–10) and *U. singeriana* (Holtze s.n., 1–3, 11). The phylogeny of Jobson *et al.* (2017) placed two accessions of *U. baliboongarnang* (as *U. sp.* Kununurra (C.Glover 81) R.W.Jobson) from Kununurra and Wyndham, WA as nested within a clade containing accessions of the Northern Territory *U. hamiltonii* (Fig. 1e–f) with this clade in turn sister to accessions of *U. hamata* (Jobson *et al.* 2017). All three of these species share the affixed aquatic habit, although the smaller stature of *U. hamiltonii* limits it to very shallow habitats (Taylor 1989). *Utricularia baliboongarnang* is similar to *U. hamiltonii* in having spur always less than half the length of the corolla lower lip (Fig. 1c–f) and leaf apex acuminate. The most salient differences between *U. baliboongarnang* and *U. hamiltonii* are inflorescences medium sized (120–370 mm long) vs. small or very small (50–100 mm long), having corolla upper-lip limb emarginate or shallowly bilobed with lobes apically rounded vs. deeply divided lobes that are apically acute, corolla lower lip-limb obovate with

3 or 4 raised white ridges at base vs. corolla lower lip-limb quadrate, with a yellow patch at base, and a slightly vs. strongly deflexing of the peduncle post anthesis (Taylor 1989). *Utricularia baliboongarnang* differs from *U. hamata* (Jobson *et al.* 2018) in having a pale violet-blue corolla vs. mostly white, and a corolla upper lip limb with six purple streaks above middle vs. four (Fig. 4).

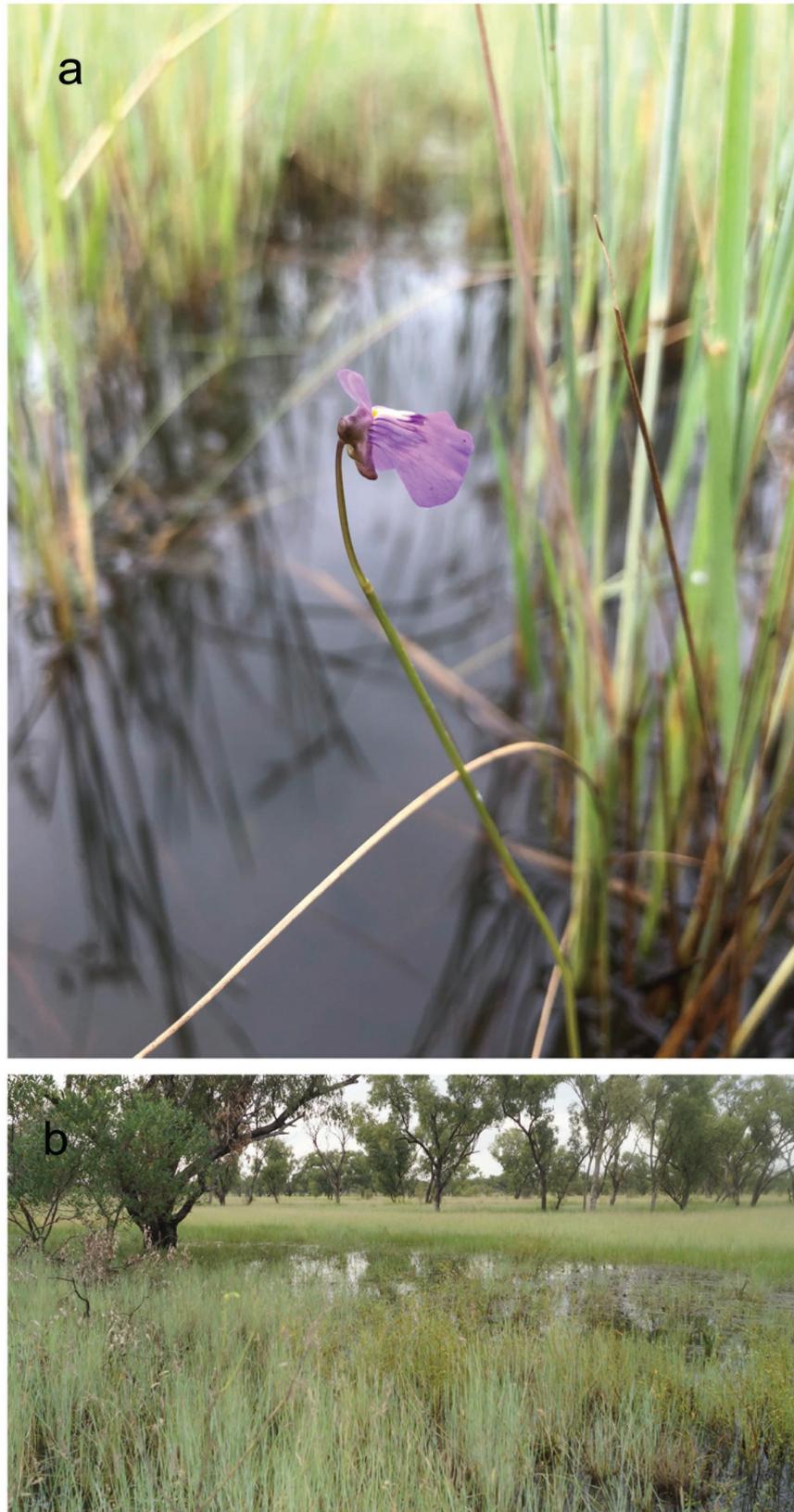


Fig. 6. Habitat of *U. baliboongarnang* from Kununurra, WA (type site). **a**, habit; **b**, habitat. Images: all by P.C. Baleeiro.

The flowers of *Utricularia baliboongarnang* (Figures 1a,b; 4) are similar to those of the West Kimberly *U. byrneana* R.W.Jobson & Baleeiro (Jobson and Baleeiro 2015), although their phylogenetic relationship is distant (Jobson *et al.* 2017). Despite the superficial floral similarity, the inflorescence of *U. baliboongarnang* is longer (120–370 mm long) than those of *U. byrneana* (60–170 mm long), the peduncle is solid (vs. hollow), and the traps bear three long simple appendages and an absence of the ventral wings in *U. byrneana* (Jobson *et al.* (2015).

Key to related species (sect. *Pleiochasia*) from northern Australia, modified from Jobson (2012)

(Abbreviations: N.T. = Northern Territory; Qld = Queensland; W.A. = Western Australia)

- 1a. Peduncle solid; lower lip of corolla mauve with conspicuous ridges at base, central ridges yellow *U. byrneana* (W.A.)
- 1b. Peduncle hollow 2
- 2a. Freely suspended aquatic; leaves verticillate, narrowly linear; peduncle inflated; corolla very pale pink with a very slender spur, 1.5–2 cm long..... *U. tubulata* (W.A., N.T., Qld)
- 2b. Terrestrial, affixed- or sub-aquatic; leaves not verticillate 3
- 3a. Inflorescence 1.6–5 cm long 4
- 3b. Inflorescence 9–50 cm long 5
- 4a. Corolla white/yellow, spur straight, shorter or slightly longer than the lower-lip..... *U. albiflora* (Qld)
- 4b. Corolla pale violet, spur curved, 1.3–2 times longer than the lower lip *U. limmenensis* (N.T.)
- 5a. Leaf apex acuminate 6
- 5b. Leaf apex acute to rounded..... 8
- 6b. Corolla white or very pale violet *U. terrae-reginae* (Qld)
- 6b. Corolla violet or pale violet-blue..... 7
- 7a. Corolla upper-lip apex emarginate or shallowly bilobed, lobes apically rounded; lower lip transversely elliptic *U. baliboongarnang* (W.A.)
- 7b. Corolla upper lip apex deeply bilobed, lobes apically acute; lower lip quadrate *U. hamiltonii* (N.T.)
- 8a. Spur of corolla subulate, with apex acute..... 9
- 8b. Spur of corolla conical or tetragonal in cross section, with apex obtuse 10
- 9a. Corolla mauve with slightly raised white 5-lined blotches at base of lower lip *U. triflora* (N.T.)
- 9b. Corolla light violet with five prominently raised white ridges at base of lower lip *U. blackmanii* (Qld)
- 10a. Corolla purple-violet; lower lip equal length or shorter than spur *U. singeriana* (N.T.)
- 10b. Corolla white; subaquatic emergent habit 11
- 11a. Flowers solitary; corolla upper lip with four vertical purple streaks..... *U. hamata* (W.A.)
- 11b. Flowers usually 2–5; corolla upper lip entirely white..... 12
- 12a. Corolla lower lip with yellow patch at the base..... *U. linearis* (N.T.)
- 12b. Corolla lower lip with 5–7 slightly raised yellow ridges at the base *U. fistulosa* (W.A.)

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