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# Recircumscription of *Utricularia leptorhyncha* and *U. lasiocaulis* and three related new species for northern Australia

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## Abstract

The *Utricularia lasiocaulis* F.Muell. complex (subg. *Polypompholyx*; sect. *Lasiocaules*) is a morphologically and ecologically variable group of closely related taxa with a mostly tropical distribution across northern Australia. A recent molecular phylogenetic study placed the recognised species *U. kamienskii* F.Muell. sister to a clade of accessions relegated to either *U. leptorhyncha* O. Schwarz or *U. lasiocaulis*, with the latter previously circumscribed as an assemblage of highly variable morphological forms. We have expanded the previous study to include populations representing the known distributions of all three species and have attempted to include all morphological variants; 55 ingroup accessions were used in the full phylogenetic analysis based on two non-coding chloroplast regions (*rps*16, *trn*D–T) and the nuclear ribosomal internal transcribed spacer (ITS). We found that the pink corolla form of the usually white flowered *U. kamienskii* is not sufficiently different, and we retain it under that species. We also found strong support for a paraphyletic *U. leptorhyncha*, with the smaller flowered accessions matching the type material placed sister to all other *U. lasiocaulis* forms, including a grouping previously assigned as a larger flowered *U. leptorhyncha*. Within the *U. lasiocaulis* clade we found that much of the variation sorts into well-supported clades that we find are sufficiently morphologically and genetically differentiated from the type clade for recognition at the specific rank, namely *Utricularia brennanii* R.W.Jobson & Baleeiro from Northern Territory and Queensland, *Utricularia cowiei* R.W.Jobson & Baleeiro from the Kimberley region of Western Australia, and *U. disjuncta* R.W.Jobson & Baleeiro restricted to the Darwin and Gulf region of the Northern Territory.

## Introduction

Taylor (1989) placed *U. leptorhyncha O.Schwarz* and *Utricularia lasiocaulis* F.Muell within section *Pleiochasia* Kamienski of subgen. *Polypompholyx* sensu Muller *et al.* (2005), with Jobson et al. (2017) designating the phylogenetic clade containing these two species sect. *Lasiocaules* R.W.Jobson & Baleeiro. Jobson et al. 2017 assigned as Clade D the *U. kamienskii-U. leptorhyncha-U. lasiocaulis* group that was estimated to have diverged from its most recent common ancestor at ~10 Ma in the late Miocene. The same study estimated the

divergence of *U. kamienskii* from sister species *U. leptorhyncha-U. lasiocaulis* at ~5 Ma and *U. leptorhyncha* from *U. lasiocaulis* at ~2 Ma - both in the Pliocene.

Under Taylor's circumscription of *U. leptorhyncha* the distribution extended from the Kimberley, WA to Top End, NT (Fig. 1). Subsequent removal of two taxa from under *U. leptorhyncha*, namely *U. bidentata* R.W.Jobson & Baleeiro and *U. papilliscapa* R.W.Jobson & M.D.Barrett (Jobson et al. 2018), limited the distribution of the here redescribed species to the Top End, NT (Fig. 1). The holotype representing *U. leptorhyncha* collected by Florenz Bleeser (*F.A.K.Bleeser 145*) 4 miles NE of Port Darwin, was destroyed in the Berlin Herbarium (B). Subsequently, Peter Taylor (1989) selected a neotype apparently matching the protolog that was collected near Berry Springs, c. 32 km SSE of Darwin by Laurance Adams (Fig. 5; *L.G.Adams 1722* (K)).

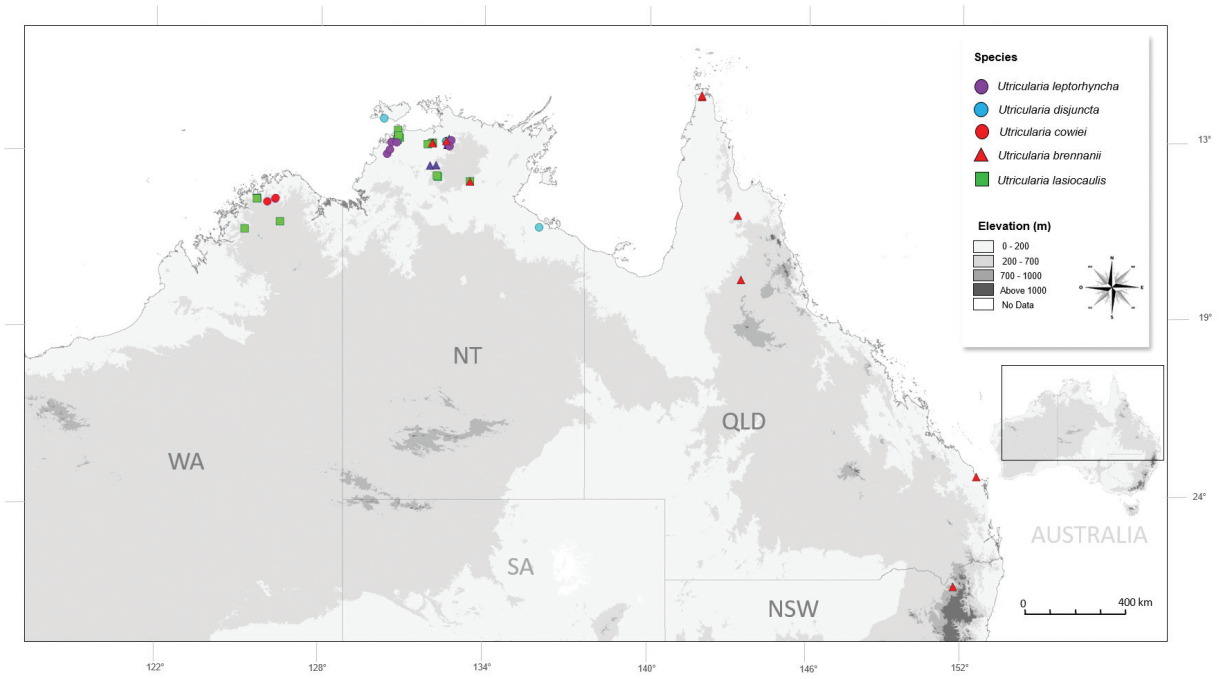


**Fig. 1.** Distribution map showing accessions used in the molecular phylogeny of *Utricularia lasiocaulis* and allied species: *U. kamienskii* (blue triangle), *U. leptorhyncha* (purple circle), *U. lasiocaulis* (green square), *U. brennanii* (red triangle), *U. cowiei* (red circle), *U. disjuncta* (light-blue circle). For accession details refer to Table 1.

Taylor's (1989) description and illustration were based on a combination of *U. leptorhyncha* and the superficially similar and recently described species *U. papilliscapa* R.WJobson & M.D.Barrett from the northern Kimberley region of Western Australia (Jobson et al. 2018). *Utricularia papilliscapa* was partially illustrated and described in Taylor (1989) within the description of *U. leptorhyncha*: *Utricularia papilliscapa* = (fig. 27: 2–6, 8, 10–14 from *Dunlop 5319*); *U. leptorhyncha* = (fig. 27: 1, 7, 9, 15, 16 from *Craven 2493* – fitting the neotype *Adams 1722*).

Taylor's (1989) concept of *U. lasiocaulis* involved a large assemblage of highly variable morphological forms that differed mainly in corolla shape and size and hairiness of the peduncle ranging from basal to complete indumentum. The holotype representing *Utricularia lasiocaulis* F.Muell. was collected by Maurice Holtz at the Port of Darwin in 1885 (Fig. 7; *Holtz 477*, MEL1513419), and was recently assigned as type for section *Lasiocaules* (Jobson et al. 2017). In the notes of the attached protologue (originally published by Holtz in *Aust. Druggist and Chemist*, pp. 50, Oct. 1885), the major characteristic appears to be the downy indumentum of the peduncle and the bracts and bracteoles with ciliated margin (Figs 4, 5).

The current study assesses taxonomic limits within the *U. lasiocaulis* species complex (as circumscribed by Taylor (1989)) and closely allied species, with wide sampling across the geographic distribution of the complex (Table 1; Fig. 1). Phylogenetic relationships are assessed using Bayesian inference analyses of DNA sequences representing the plastid *rps*16 and *trn*D–T introns, and the nuclear ribosomal internal transcribed spacer (ITS) (Table 1; Fig. 2). Using the phylogenetic hypothesis, we examine whether a pink corolla form of *U. kamienskii* that occupies creeks on sandstone outcrops and plateaus of Arnhem Land is genetically distinct from the common white flowered form that occupies lowland sand flats and grasslands across the Top End.

**Table 1. Accessions used in the ITS and cpDNA matrices. Secondary collectors are not included. Locality abbreviations: NSW, New South Wales; NT, Northern Territory; Qld, Queensland; WA, Western Australia. GenBank accession numbers for each sequence are shown. NS indicates sequence that either failed or were not included in the study. Genbank numbers preceded by "KY" were used in Jobson et al. (2017).**

| Code | Taxon | Voucher | Locality | rps16 | trnD-T | ITS |
|---|---|---|---|---|---|---|
| 434 | *U. kamienskii* F.Muell. | I.D Cowie 9126 (DNA) | Howard River, NT | KY243477 | KY243770 | OP442582 |
| 435 | *U. kamienskii* F.Muell. | R.W. Jobson 2242 (NSW) | Girraween, NT | KY243478 | KY243771 | NS |
| 436 | *U. kamienskii* F.Muell. | D.E. Murfet 5964 (AD) | Girraween, NT | KY243479 | KY243772 | NS |
| 1078 | *U. kamienskii* F.Muell. | R.W. Jobson 3953 (NSW) | Girraween, NT | OP437429 | OP437459 | NS |
| 1083 | *U. kamienskii* F.Muell. | R.W. Jobson 3961 (NSW) | Howard River Floodplain, NT | OP437433 | OP437463 | NS |
| 1091 | *U. kamienskii* F.Muell. | R.W. Jobson 2200 (NSW) | Near Koymarrwa Lookout, NT | OP437438 | OP437468 | NS |
| 1096 | *U. kamienskii* F.Muell. | M. Lazarides 8998 (CANB) | NE Jabiru, NT | OP437442 | OP437472 | NS |
| 1097 | *U. kamienskii* F.Muell. | L.A. Craven 6579 (CANB) | SE Jabiru, NT | OP437443 | OP437473 | NS |
| 1098 | *U. kamienskii* F.Muell. | J. McAuliffe 2109 (CANB) | Mt Brockman, NT | OP437444 | OP437474 | NS |
| 1120 | *U. kamienskii* F.Muell. | L.A. Craven 6579A (CANB) | 17km SE Jabiru, NT | OP437446 | OP437476 | NS |
| 1124 | *U. kamienskii* F.Muell. | I.D. Cowie 2833 (DNA) | Kurundie Creek, NT | OP437448 | OP437478 | NS |
| 921 | *U. leptorhyncha* O.Schwartz | R.W. Jobson 3198 (NSW) | Finnis River, NT | KY243578 | KY243872 | OP442596 |
| 963 | *U. leptorhyncha* O.Schwartz | I.D. Cowie 9706 (DNA) | Wangi Falls, NT | NS | OP902896 | NS |
| 964 | *U. leptorhyncha* O.Schwartz | I.D. Cowie 9695 (DNA) | Cox Peninsula, NT | NS | OP902897 | NS |
| 966 | *U. leptorhyncha* O.Schwartz | J.L. Egan 4585 (DNA) | Mount Brockman, NT | NS | OP902899 | NS |
| 969 | *U. leptorhyncha* O.Schwartz | G.J. Leach 2553 (DNA) | Mt Howship, NT | OP437454 | OP437484 | NS |
| 1079 | *U. leptorhyncha* O.Schwartz | R.W. Jobson 3955 (NSW) | Berry Springs, NT | OP437430 | OP437460 | OP442573 |
| 1088 | *U. leptorhyncha* O.Schwartz | R.W. Jobson 3977 (NSW) | Finnis River, NT | OP437436 | OP437466 | OP442577 |
| 1099 | *U. leptorhyncha* O.Schwartz | K.G. Brennan 3022 (DNA) | Jabiru airstrip, NT | OP437445 | OP437475 | NS |
| 447 | *U. lasiocaulis* F.Muell. | R. Gilliland 66 (NEU) | Howard Springs, NT | KY243488 | KY243781 | NS |
| 450 | *U. lasiocaulis* F.Muell. | R.W. Jobson 2225 (NSW) | Flying Fox Ck, NT | KY243490 | KY243783 | NS |
| 452 | *U. lasiocaulis* F.Muell. | R.W. Jobson 2261 (NSW) | Mitchell Plateau, WA | NS | NS | OP442584 |
| 544 | *U. lasiocaulis* F.Muell. | R.W. Jobson 3292 (NSW) | Girraween, NT | KY243521 | NS | NS |
| 891 | *U. lasiocaulis* F.Muell. | R.W. Jobson 2690 (NSW) | Mt Bundey, NT | KY243562 | KY243856 | OP442591 |
| 894 | *U. lasiocaulis* F.Muell. | R.W. Jobson 2703 (NSW) | Gunn Peninsula, NT | KY243565 | KY243859 | OP442593 |
| 919 | *U. lasiocaulis* F.Muell. | R.W. Jobson 3188 (NSW) | Darwin, NT | KY243576 | KY243870 | NS |
| 920 | *U. lasiocaulis* F.Muell. | R.W. Jobson 3197 (NSW) | Finnis River, NT | KY243577 | KY243871 | OP442595 |
| 958 | *U. lasiocaulis* F.Muell. | C.R. Michell 4115 (DNA) | Murrawal Plateau, NT | OP437450 | OP437481 | NS |
| 959 | *U. lasiocaulis* F.Muell. | K.G. Brennan 6325 (DNA) | Ellenbrae Station, WA. | OP437451 | OP437482 | OP442597 |
| 961 | *U. lasiocaulis* F.Muell. | I.D. Cowie 9534 (DNA) | Fergusson River, NT | OP437452 | OP437483 | NS |
| 998 | *U. lasiocaulis* F.Muell. | C. Bugden CDT12 (PERTH) | Bachsten Creek, WA | OP437457 | OP437486 | NS |
| 1004 | *U. lasiocaulis* F.Muell. | G.J. Keighery 1687 (PERTH) | Mitchell Plateau, WA | NS | NS | OP442571 |
| 1081 | *U. lasiocaulis* F.Muell. | R.W. Jobson 3958 (NSW) | Noonamah, NT | OP437431 | OP437461 | OP442574 |
| 1082 | *U. lasiocaulis* F.Muell. | R.W. Jobson 3960 (NSW) | Gunn Point Rd., NT | OP437432 | OP437462 | NS |
| 1089 | *U. lasiocaulis* F.Muell. | R.W. Jobson 3978 (NSW) | Finnis River, NT | OP437437 | OP437467 | OP442578 |
| 1094 | *U. lasiocaulis* F.Muell. | R.W. Jobson 4021 (NSW) | Flying Fox Creek, NT | OP437440 | OP437470 | OP442580 |
| 1122 | *U. lasiocaulis* F.Muell. | K.G. Brennan 3183 (CANB) | West Alligator River, NT | OP437447 | OP437477 | NS |
| 449 | *U. brennanii* R.W.Jobson & Baleeiro | R.W. Jobson 2036 (NSW) | Bundaberg, Qld | KY243489 | KY243782 | NS |
| 451 | *U. brennanii* R.W.Jobson & Baleeiro | R.W. Jobson 2226 (NSW) | Flying Fox Ck, NT | KY243491 | KY243784 | OP442583 |
| 456 | *U. brennanii* R.W.Jobson & Baleeiro | R. Fensham 4506 (BRI) | Einasleigh River, Qld | KY243493 | KY243786 | NS |
| 679 | *U. brennanii* R.W.Jobson & Baleeiro | G. Bourke 112 (NSW) | Jackey Jackey Creek, Qld | KY243544 | KY243841 | OP442588 |
| 892 | *U. brennanii* R.W.Jobson & Baleeiro | R.W. Jobson 2691 (NSW) | Mt bundey, NT | KY243563 | KY243857 | OP442592 |
| 909 | *U. brennanii* R.W.Jobson & Baleeiro | R.W. Jobson 2845 (NSW) | Laura, Qld | KY243571 | KY243865 | OP442594 |
| 1077 | *U. brennanii* R.W.Jobson & Baleeiro | R.W. Jobson 3777 (NSW) | Bamaga, Qld | OP437428 | OP437458 | OP442572 |

| Code | Taxon | Voucher | Locality | rps16 | trnD-T | ITS |
|---|---|---|---|---|---|---|
| 1092 | *U. brennanii* R.W.Jobson & Baleeiro | R.W. Jobson 4019 (NSW) | Jabiru Aerodrome, NT | OP437439 | OP437469 | OP442579 |
| 1095 | *U. brennanii* R.W.Jobson & Baleeiro | R.W. Jobson 4022 (NSW) | Flying Fox Creek, NT | OP437441 | OP437471 | OP442581 |
| 1128 | *U. brennanii* R.W.Jobson & Baleeiro | R.W. Jobson 4188 (NSW) | Fruitbat Falls, Qld | OP437449 | OP437479 | NS |
| 453 | *U. cowiei* R.W.Jobson & Baleeiro | M.D. Barrett 2775 (PERTH) | Harding Range, WA | KY243492 | KY243785 | OP442585 |
| 874 | *U. cowiei* R.W.Jobson & Baleeiro | R.W. Jobson 2658 (NSW) | King Edward River, WA | KY243552 | KY243847 | OP442589 |
| 878 | *U. cowiei* R.W.Jobson & Baleeiro | R.W. Jobson 2668 (NSW) | Theda Station, WA | KY243554 | KY243849 | OP442590 |
| 458 | *U. disjuncta* R.W.Jobson & Baleeiro | R.K. Harwood 1046 (DNA) | Girraween, NT | GQ478684 | KY243787 | OP442586 |
| 462 | *U. disjuncta* R.W.Jobson & Baleeiro | D.E. Murfet 5641 (AD) | Noonamah Jenkins Rd., NT | NS | OP437480 | OP442587 |
| 965 | *U. disjuncta* R.W.Jobson & Baleeiro | K.G. Brennan 9063 (DNA) | Bathurst Island, NT | OP437453 | OP902898 | NS |
| 970 | *U. disjuncta* R.W.Jobson & Baleeiro | I.D. Cowie 9061 (DNA) | Gunn Point Rd., NT | OP437455 | OP902900 | OP442598 |
| 994 | *U. disjuncta* R.W.Jobson & Baleeiro | R.W. Jobson 3438 (NSW) | Bing Bong, NT | OP437456 | OP437485 | OP442599 |
| 1084 | *U. disjuncta* R.W.Jobson & Baleeiro | R.W. Jobson 3962 (NSW) | Howard River Floodplain, NT | OP437434 | OP437464 | OP442575 |
| 1085 | *U. disjuncta* R.W.Jobson & Baleeiro | R.W. Jobson 3965 (NSW) | Girraween, NT | OP437435 | OP437465 | OP442576 |
| 911 | *U calycifida* Benj. | R.W. Jobson 3119 (NSW) | Brazil (ex situ) | MH036231 | MH030265 | MH030211 |
| 564 | *U. tubulata* F.Muell. | R.W.Jobson 2315 (NSW) | Dampier Penninsula, WA | KY243533 | KY243829 | MK259942 |
| 884 | *U. minutissima* Vahl | R.W.Jobson 2676 (NSW) | Mitchell Plataeu, WA | KY243502 | KY243796 | NS |

We also provide an updated taxonomic description for *U. leptorhyncha* now restricted to the Darwin and Jabiru regions of Northern Territory, and *U. lasiocaulis* that is distributed from the Kimberly region of Western Australia to Darwin and Jabiru regions of Northern Territory (Fig. 1, 3). These descriptions involve accessions best fitting the respective type material (Figs 5, 7).

Based on morphology and the above mentioned phylogenetic hypothesis, we here describe the new species *Utricularia brennanii* R.W.Jobson & Baleeiro from Northern Territory and Queensland, *U. cowiei* R.W.Jobson & Baleeiro from the North Kimberly region of Western Australia, and *U. disjuncta* R.W.Jobson & Baleeiro restricted to the Darwin, Bathurst Island, and Gulf region of the Northern Territory (Fig. 3). Morphological differences are compared between the newly described entities and their closely allied species, with notes on distribution, ecology and conservation status provided. An identification key representing the related species of section *Lasiocaules* is provided.

## Methods

*Taxon sampling and DNA extraction*

We sampled from 58 accessions comprising silica-dried and herbarium-sheet material, including three outgroup and 55 ingroup samples from across the distribution of the study group, representing *U. kamienskii* ($n$ = 11), *U. leptorhyncha* ($n$ = 8), and *U. lasiocaulis* and all known forms and variants ($n$ = 36) (Table 1).

DNA isolation was performed as for Jobson *et al.* (2017). Outgroup taxa were selected based on Jobson *et al.* (2017). The final dataset contained 55 ingroup accessions, of which 23 were used in Jobson *et al.* (2017; Fig. 2, Table 1). Location details of all accessions were used to create a distribution map (Fig. 1). Scientific collection permits were obtained from relevant State and Federal Government agencies.

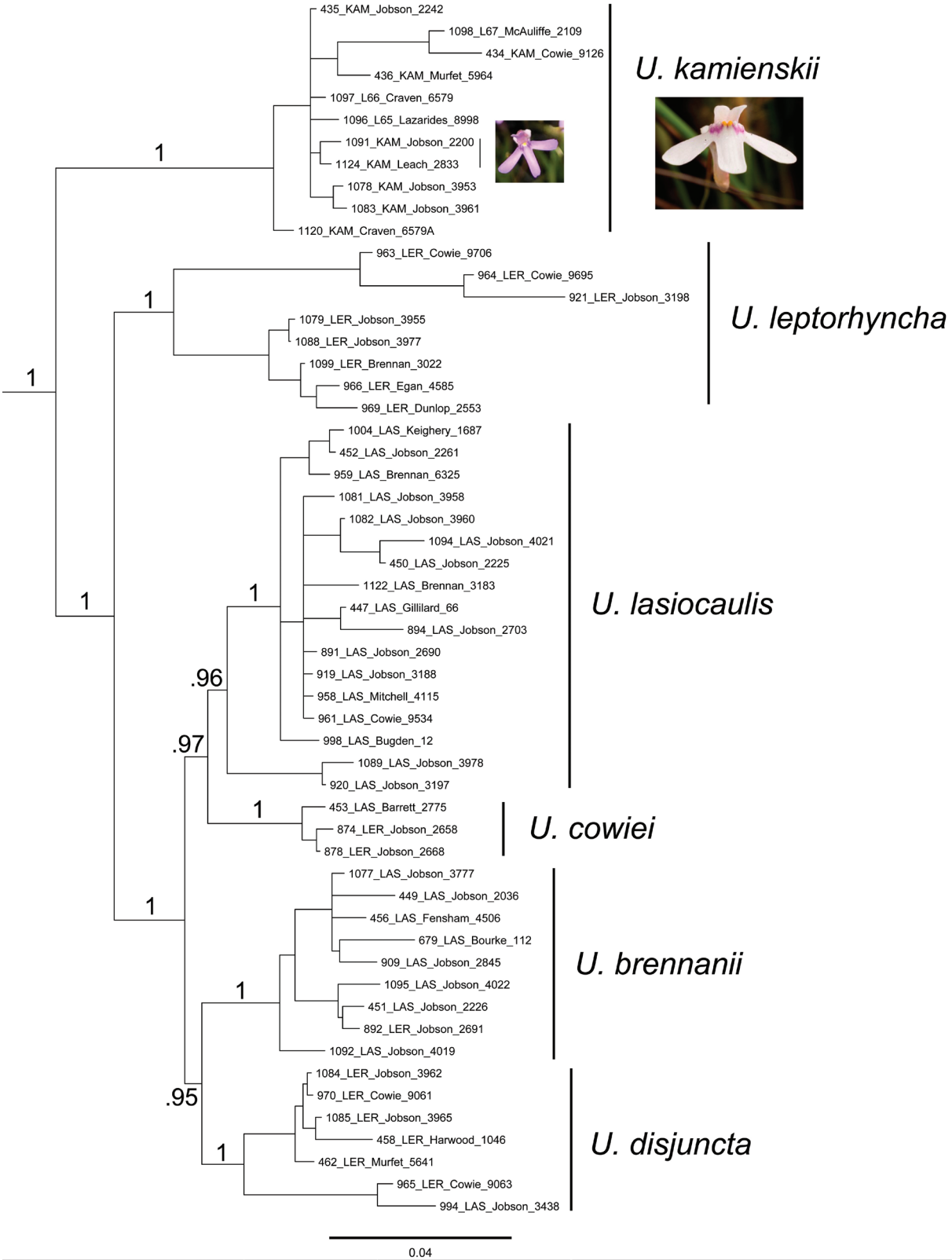


**Fig. 2.** 50% majority-rule Bayesian inference consensus tree for the concatenated plastid/nuclear (Cp/Nu) DNA matrix. Posterior probability (PP) support values for Cp/Nu analysis are shown above important branches. PP = 1–0.95: strong support; 0.94–0.85: weak support (not shown); unsupported (not shown). Thin bar shows two accessions and representative image of the pink form of *U. kamienskii* with an image of typical white form shown at bar representing *U. kamienskii* clade.

*Amplification and sequencing*

Amplifications were performed as for Jobson *et al.* (2017), using two non-coding plastid (cpDNA) and the nuclear (nuDNA) ribosomal gene marker. The cpDNA markers included the *rps*16 intron amplified using parameters described in Oxelman *et al.* (1997), whereas the *trn*D–*trn*T intron spacer (*trn*D–T) was amplified using parameters described in Shaw *et al.* (2005).

These cpDNA markers have been shown to provide enough information to resolve relationships at the species and intraspecific level across *Utricularia* (Jobson *et al.* 2017). The nuclear ribosomal ITS region was amplified using the forward primer ITS5A (Stanford et al. 2000) and the universal internal reverse primer ITS2, and reverse primer ITS4 (White *et al.* 1990). Polymerase chain reaction (PCR) conditions for ITS were performed as described in White *et al.* (1990). Forward and reverse sequences were assembled and edited as for Jobson & Davies-Colley (2020).

*Phylogenetic analyses*

Phylogenetic analyses were performed on (1) the three individual datasets, (2) the combined cpDNA and (3) a concatenated matrix comprising all three markers. The most suitable nucleotide substitution model for each of the three markers was assessed using the Akaike information criterion (AIC) implemented in jModelTest (ver. 2.1.7, see https://en.bio-soft.net/tree/MODELTEST.html, accessed 12 July 2022; Guindon and Gascuel 2003; Posada 2008). The best fit was GTR+ I+G and GTR+G for the cpDNA and nuDNA markers, respectively.

With a burn-in involving the first 25% of the samples, we estimated Bayesian posterior probability with five independent runs of 10 million generations, using four chains with sampling of trees every 1000 generations. All parameters were set as Dirichlet; with all other priors unlinked with a flat multinomial distribution. Stationarity was assessed by examining plots of the –lnL across generations in Tracer (ver. 1.6, A. Rambaut, M. A. Suchard, D. Xie and A. J. Drummond, see http://beast.bio.ed.ac.uk/Trace, accessed 20 19 July 2022). The effective sample size (ESS) was set to >1000, and the remaining trees were used to construct a 50% majority-rule consensus tree, visualised using FigTree (ver. 1.4.0).

*Specimen examination*

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), State Herbarium of South Australia (AD), and Queensland Herbarium (BRI) were examined.

## Results

*Sequences and alignment*

The *rps16* matrix was 937 bp long, of which 104 characters (11%) were parsimony informative, *trnD-T* matrix was 941 bp long, of which 78 characters (8.3%) were parsimony informative, and the ITS matrix was 855 bp long of which 316 characters (37%) were parsimony informative. All three datasets included members of all ingroup taxa; *rps16* ($n$ = 51), *trnD-T* ($n$ = 53), ITS ($n$ = 29) (Table 1). The concatenated three gene matrix contained 55 ingroup and three outgroup taxa and was 2647 bp long with 498 parsimony informative characters (19%).

*Phylogenetic relationships*

The separately analysed ITS and the combined *rps16/trnD-T* trees were largely topologically congruent, and both datasets were concatenated and analysed together as a single matrix (Fig. 2). The 50% consensus tree showed strongly supported monophyletic major clades (posterior probability (PP) = 1) representing *U. kamienskii*, *U. leptorhyncha* and *U. lasiocaulis* (Fig. 2). Figure 2 also shows that the pink-corolla form of *U. kamienskii* is nested within a strongly supported assemblage of typical white-corolla forms that match the type material for this species. Three additional clades were observed within the *U. lasiocaulis* assemblage, namely *U. cowiei* which was sister to *U. lasiocaulis* sensu str., and together these were sister to a clade containing the strongly supported groupings of *U. brennanii* and *U. disjuncta* (Fig. 2).

## Taxonomy

***Utricularia leptorhyncha*** O.Schwarz*, Feddes Repert*. 24: 97 (1927)

Type: 4 miles NE of Port Darwin, N.T., *F.A.K.Bleeser 145*; holo: B (destroyed); neo: near Berry Springs, c. 32 km SSE of Darwin, *L.G.Adams 1722* (K), designated by P.Taylor, *Kew Bull. Add. Ser.* 14: 148 (1989).

Small to medium sized annual, terrestrial herb. *Rhizoides* capillary, simple, up to 3 mm long, 0.1 mm thick at base tapering to 0.05 mm near the apex, numerous from the peduncle base, 1 or 2 from stolon nodes. *Stolons* few, branched, filiform, 0.1–0.12 mm thick, internodes 4–5 mm long. *Leaves* numerous, few at peduncle base and 2–3 on stolon nodes, petiolate, lamina spatulate, 1.5–3 mm long, 0.6–1.5 mm wide, single nerve, apex rounded, total length up to 5.5 mm long. *Traps* stalked, ovoid, 0.8–1.1 mm long; 1 at nodes and on internodes; uniform, mouth lateral with a simple dorsal appendage 0.15 mm long, and two lateral appendages c. 0.15 mm long, ventral wings 0.1 mm long with shallowly dentate margin. *Inflorescence* solitary, 70–160 mm long; flower solitary, paired, or rarely three in a whorl, arising in succession; peduncle erect, solid, terete, hirsute for 1/5 from base of peduncle then glabrous, 0.2–0.3 mm thick. *Scales* absent; *bract and bracteoles* equal, basifixed, gibbous at base, lanceolate, 0.5–0.7 mm long, c. 0.3 mm wide, entire margin, apex acute. *Pedicel* erect, filiform, tapering apically 14–40 mm long. *Calyx* lobes unequal; upper lobe ovate, 1.6–1.8 mm long, 1.4–1.7 mm wide; lower lobe shorter, narrowly ovate, with apex bilobed 1.3–1.5 mm long, 1.2–1.4 mm wide. *Corolla* 5–7 mm long, upper side light violet, underside white; *upper lip limb* constricted near the middle where bent upwards at c. 90°, 1.5–2.1 mm long, superior part obovate with apex emarginate or bilobed, inferior part ovate with margin ciliate; *lower lip limb*, narrowly obovate in outline with apex rounded or acute, 7–9 mm long, 4.5–5.5 mm wide, deeply to shallowly 3-lobed; base of lower lip with two white, slightly raised ridges, with 2 longer dark violet rimmed white streaks either side; *spur* usually projecting c. 90°–110° to the lower lip, conical in cross-section at the base, subulate, tapering to an acute apex, 4.2–5.0 mm long, c. 1.1 mm wide near middle, shorter or slightly longer than the length of lower lip. *Capsule* globose, c. 2.1 mm in diameter, dehiscing from a longitudinal, ventral, marginally thickened slit. *Seeds* obovoid, c. 0.3 mm long. *Pistil* c. 1.2 mm long; *Filaments* curved c. 1.1 mm long. *Pollen* 3-colporate. Figures 3a–b, 4, 5.

**Additional specimens examined:** AUSTRALIA: Northern Territory: 15 km SW of Mount Howship, Arnhem Land, *Leach G.J. 2553*, 18 Apr 1989 (DNA); 24.5 km SSE Jabiru airstrip, *Brennan K. 3022*, 18 Mar 1995 (DNA); Kakadu NP, Mount Brockman, *Egan J.L. 4585*, 29 Mar 1995 (DNA); Kakadu Fire Plot 140, *Brennan K. 3840*, 24 Apr 1999 (DNA); Cox Peninsula Rd, near upper Charlotte R., *Cowie I.D. 9695*, 25 Mar 2003 (DNA); Litchfield NP, N of Wangi Falls TO, Cowie I.D. 9706, 27 Mar 2003 (DNA); S of Hwy on Hopewell Rd, Berry Springs, *Jobson R.W. 3955*, 19 Mar 2021 (NSW1119729); Finnis River along Litchfield Park Rd, *Jobson R.W. 3977*, 22 Mar 2021 (NSW1119728).

**Distribution, Ecology & Phenology:** Widespread across the Top End, Northern Territory (Fig. 1). Grows in wet sand in seasonal swamps and creeks. Flowers and fruit were observed from February–September.

**Conservation Status:** Widespread across the Top End, and populations appear to be locally common. It is, therefore, recommended that this species be listed in Northern Territory as Least Concern.

**Notes:** When observed in the field *U. leptorhyncha* resembles *U. disjuncta* in having a white lower corolla under-side and upper corolla-lip but differs in the size of the corolla 5–7 mm vs. 10–14 mm long, and the lack of ciliate margin on ventral bladder-trap wings make it unlikely to be confused with it or any related species (Fig. 3 c–d, 6, 7). *Utricularia leptorhyncha* was illustrated and described in Taylor (1989) (= fig. 27: 1, 7, 9, 15, 16 from *Craven 2493* fitting the type *Adams 1722*), although much of the description and illustration involved accessions from WA (= fig. 27: 2–6, 8, 10–14 from *Dunlop 5319*) that was recently shown in the molecular phylogeny of Jobson et al. (2017) to be a novel taxon that was subsequently described as *U. papilliscapa* R.W.Jobson & M.D.Barrett in Jobson et al. (2018).

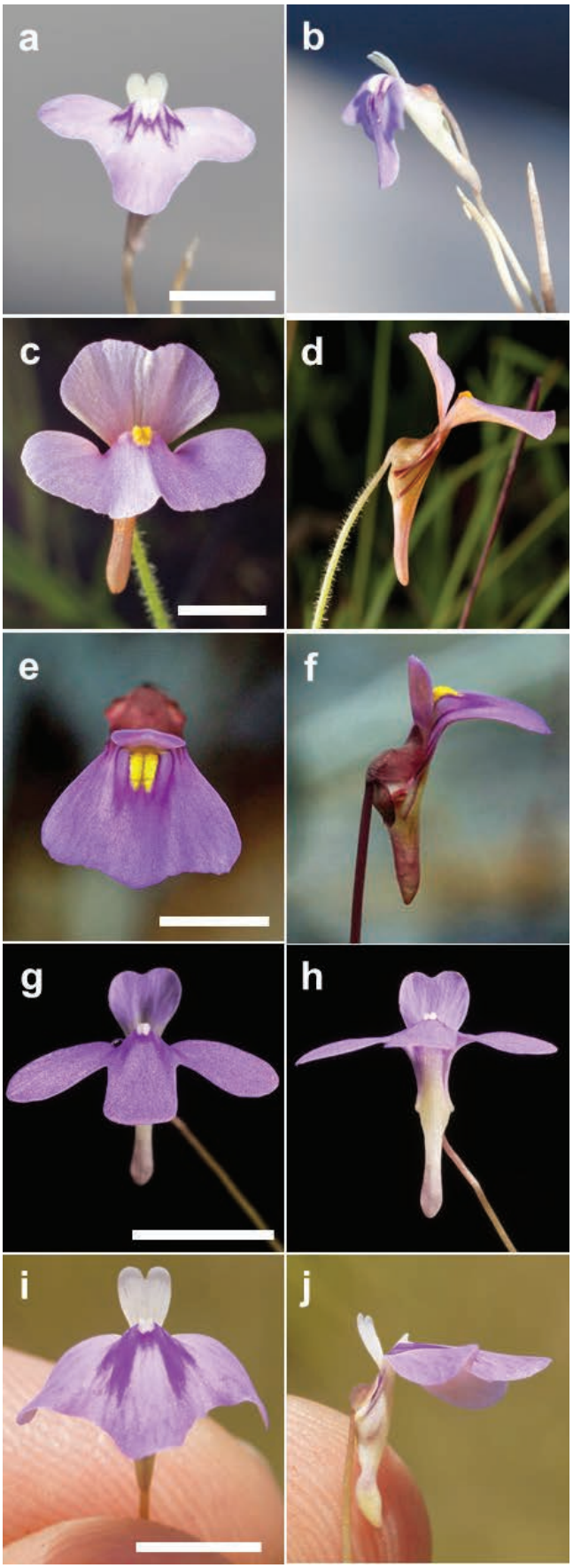


**Fig. 3.** *Utricularia leptorhyncha* (a, b), *U. lasiocaulis* (c, d), *U. brennanii* (e, f), *U. cowiei* (g, h) and *U. disjuncta* (i, j): a, c, e, g, i, corolla frontal view; b, d, f, j, corolla lateral view; h, spur frontal view. Scale bars: a–j = 5 mm. Images: c, d, g & h by W. Cherry; e, f by G. Bourke; a,b, i & j by R.W. Jobson.

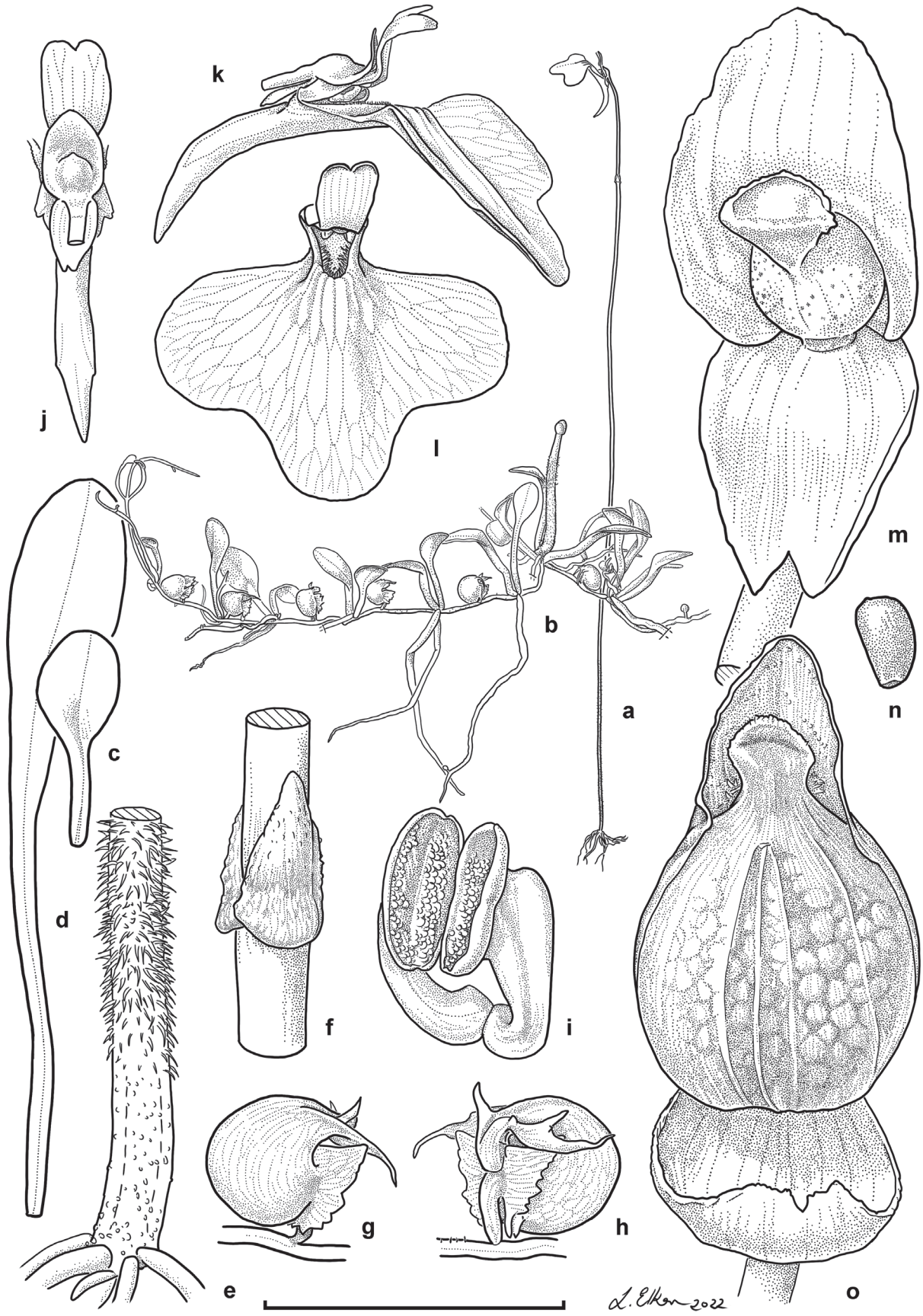


**Fig. 4.** *Utricularia leptorhyncha*. a, habit; b, stolon with vegetative parts and peduncle base in situ; c, leaf adaxial surface; d, large leaf adaxial surface; e, peduncle base; f, bract and bracteoles; g, bladder-trap lateral view; h, bladder-trap dorsal view; i, stamen frontal view; j, flower dorsal view; k, flower lateral view; l, flower frontal view; m, calyx with ovary; n, seed; o, fruit ventral view. Scale bar: a = 33.3 mm; b = 10 mm; c & d = 3.3 mm; e & i = 1.67 mm; f-h, m & o = 2 mm; j-l = 7 mm; n = 1 mm. Material used: *Jobson 3977 & Baleeiro* (NSW834756).

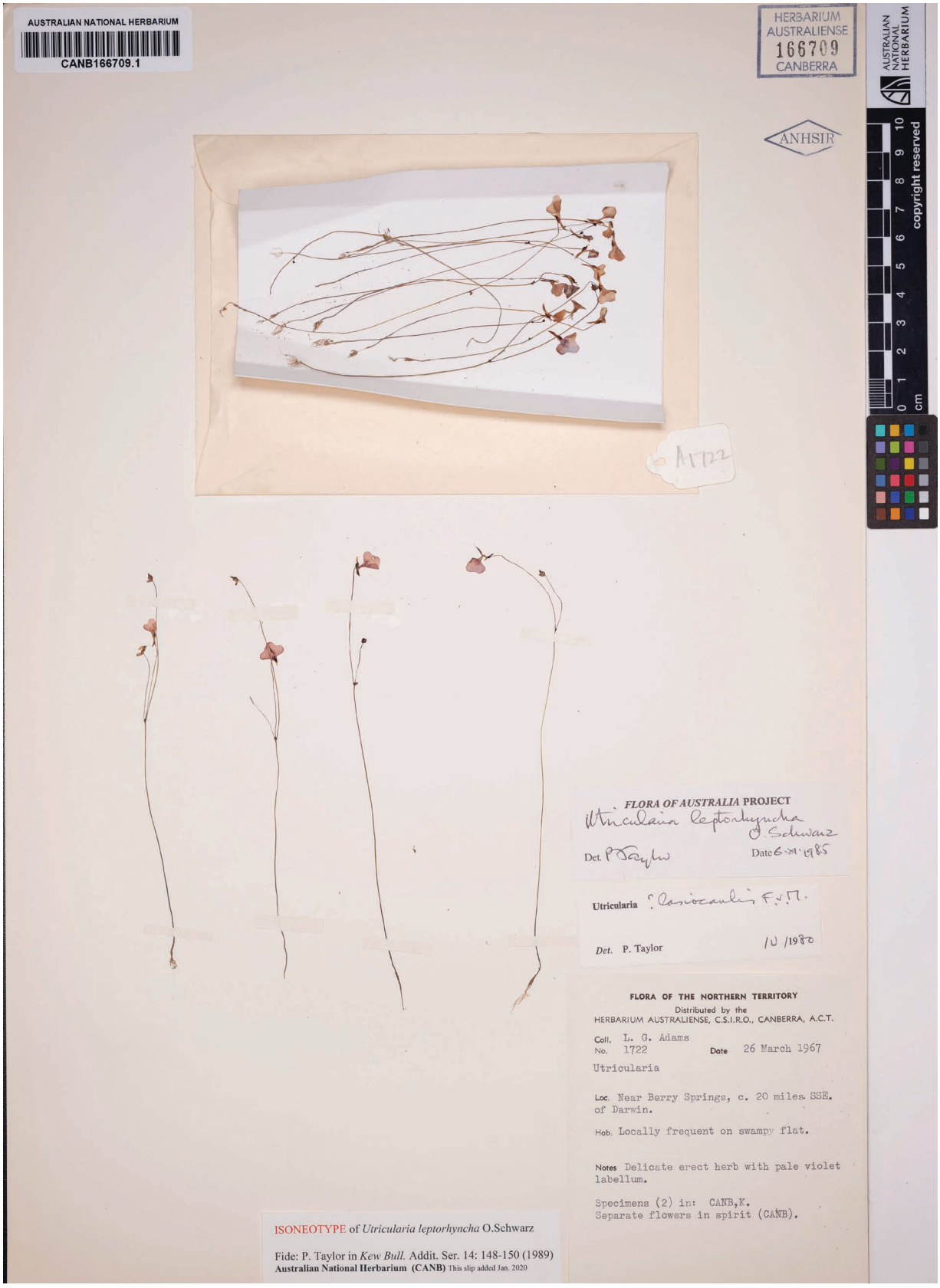


**Fig. 5.** Isoneotype of *Utricularia leptorhyncha* O.Schwarz (*L.G. Adams 1722*; CANB166709)

***Utricularia lasiocaulis*** F.Muell., *Australas. Chem. Druggist*, *Oct. 1885*: 50 (1885), & *Bot. Centralbl.* 24: 338 (1885)

Type: near Darwin, N.T., *M. Holtze 477*; holo: MEL1513419, iso: AD97705125,

Small to medium sized annual, terrestrial herb. *Rhizoides* capillary, simple, up to 8 mm long, 0.12 mm thick at base tapering to 0.05 mm near the apex, numerous from the peduncle base, 1 or 2 from stolon nodes. *Stolons* few, branched, filiform, c. 20 mm long, 0.16–0.21 mm thick, internodes 2–2.5 mm long. *Leaves* numerous, several at peduncle base and 1 on stolon nodes, petiolate, lamina spathulate, 1–1.2 mm long, 0.4–0.6 mm wide, single nerve, apex rounded, total length up to 2–12 mm long. *Traps* stalked, ovoid, 0.5–2 mm long; 1 at nodes and on internodes; dimorphic, either small and subsessile or large and stalked, mouth lateral with single dorsal and two lateral appendages similar, deltoid, 0.7 mm long, ventral wings larger, broadly deltoid, c. 1.2 mm long, all appendages with ciliate margin. *Inflorescence* solitary, 70–180 mm long; flower solitary, or with two or three pedicles arising in succession; peduncle erect, solid, terete, entirely hirsute or near the base, 0.8–1.1 mm thick. *Scales* absent; *Bract and bracteoles* unequal, basifixed, gibbous at base, bracteoles narrowly lanceolate, 1–1.1 mm long, c. 0.1 mm wide, bract ovate, 0.5–0.6 mm long, c. 0.4 mm wide, ciliate margin around base and apex. *Pedicel* erect or deflexed near apex, filiform, tapering apically 25–42 mm long. *Calyx* lobes unequal; upper lobe ovate, 2.2–2.8 mm long, 2.0–2.5 mm wide; lower lobe shorter, ovate, with apex bilobed 1.4–1.7 mm long, 1.3–1.7 mm wide. *Corolla* 12–18 mm long, upper side pink to dark mauve, underside light to dark orange; *upper lip limb* constricted near the base, 4.8–6.1 mm long, 2.5–5.1 mm wide, superior part transversely elliptic to broadly obcordate with apex entire or bilobed, inferior part ovate with margin ciliate; *lower lip limb*, reniform to obcordate in outline with apex entire, rounded, 10–13 mm long, 10–14 mm wide; base of lower lip with two raised orange or yellow claw-like ridges; *spur* projecting c. 90° to the lower lip, conical in cross-section at the base, subulate, tapering to an acute or rounded apex, 7–11 mm long, c. 2.8 mm wide near base, equal to or slightly longer than the length of lower lip. *Capsule* globose, c. 3.1 mm in diameter, dehiscing from a longitudinal, ventral, marginally thickened slit. *Seeds* cylindrical, c. 0.45 mm long. *Pistil* c. 1.2 mm long; *Filaments* curved c. 1.5 mm long. *Pollen* 3-colporate. Figures 3c–d, 6, 7.

**Additional specimens examined:** AUSTRALIA: Western Australia: Airfield Swamp, Mitchell Plateau, *G.J. Keighery 1687 & J.J. Alford*, 16 Jun 1987 (PERTH); Ellenbrae Station, *K.G. Brennan 6325 & C.C. Done*, 20 Jul 2004 (DNA); Bachsten Creek, *C. Bugden CDT 12 & al.* 11 Jul 2005 (PERTH); Mitchell Plateau, *R.W. Jobson 2261 & P.C. Baleeiro*, 25 Apr 2014 (NSW852502). NORTHERN TERRITORY: West Alligator River, *K. Brennan 3183*, 28 Apr 1995 (DNA); Nitmiluk NP, *C.R. Michell 4115*, 13 Apr 2002 (DNA); Fergusson River, *I.D. Cowie 9534 & A.K. Gibbons*, 27 Mar 2002 (DNA); Flying Fox Ck, *R.W. Jobson 2225 & P.C. Baleeiro*, 20 Apr 2014 (NSW924481); Mount Bundey, *R.W. Jobson 2690 & W.A. Cherry*, 18 Apr 2015 (NSW927133); Gunn Peninsula, *R.W. Jobson 2703 & W.A. Cherry*, 19 Apr 2015 (NSW927150); Humpty Doo, *R.W. Jobson 3188 & P.C. Baleeiro*, 20 Apr 2016 (NSW927198); Noonamah, *R.W. Jobson 3958*, 19 Mar 2021 (NSW834736); Gunn Point Road, *R.W. Jobson 3960*, 20 Mar 2021 (NSW834738).

**Distribution, Ecology & Phenology:** Known from across northern WA from the west Kimberley region to Kununurra. Also widespread across the Top End of the NT (Fig. 1). Grows in wet sand or clay in seasonal swamps and near creeks. Flowers and fruit observed in February–September.

**Conservation Status**. Although widespread across the Kimberley and Top End regions, populations appear to be patchy, but it is also possible that the populations are highly localised. It is therefore recommended that this species be listed in WA and NT as Data Deficient, requiring further study to assess conservation status and determine potential threats.

**Notes.** When observed in the field the morphologically distinct *U. lasiocaulis* is unlikely to be confused with any other species (Fig. 3 c–d, 5, 6). Collections from NT tend to be more hirsute (entire indumentum) than those from WA (1/5 from near base). Taylor (1989) illustrated most of the floral forms, although those of the currently circumscribed entity are only represented by fig. 24a 1, 10 (*Taylor 17102, 17174*; habit & hairs on peduncle), and 24b 1–2 (*Taylor 17174*; dorsal view of corolla).

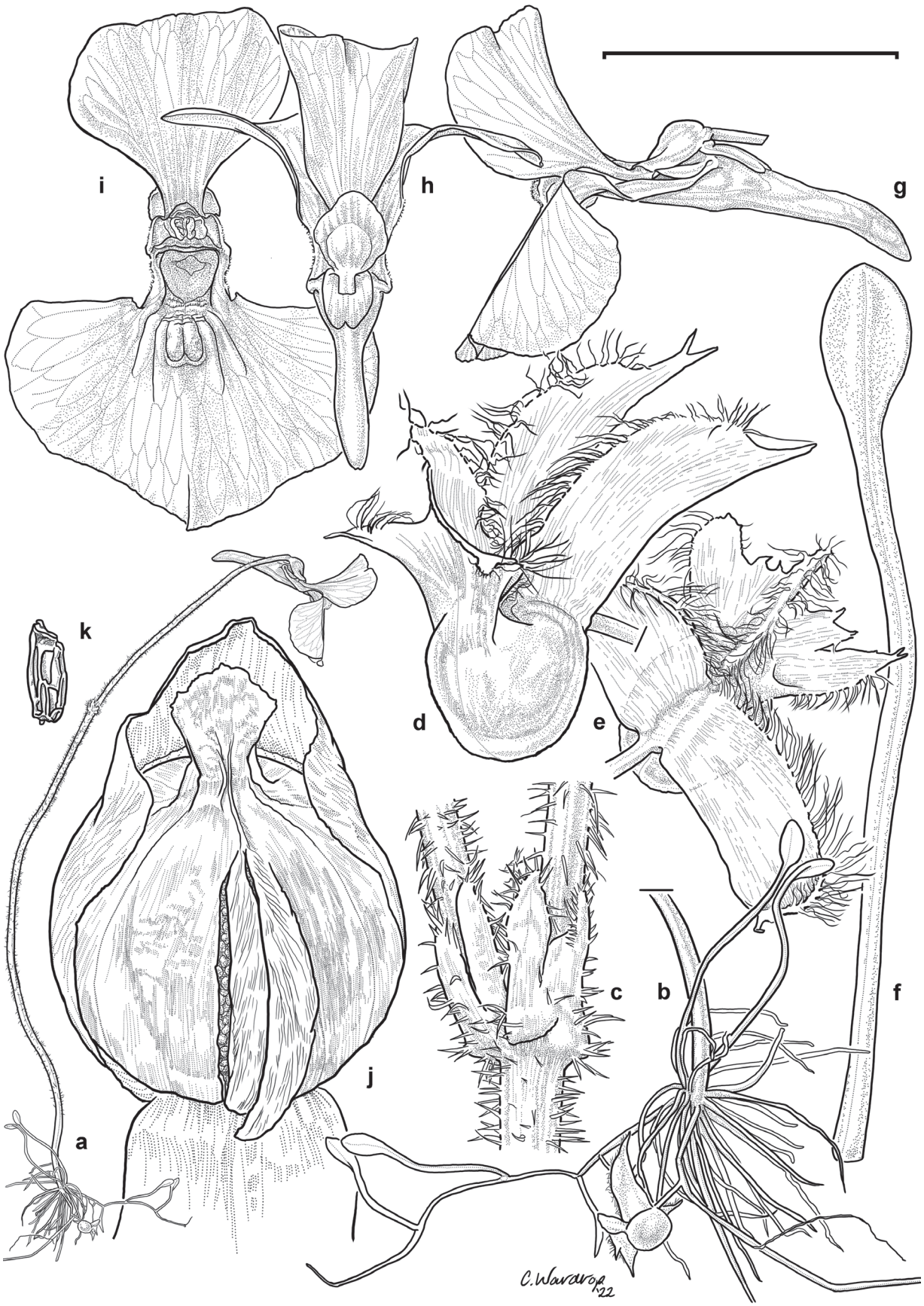


**Fig. 6.** *Utricularia lasiocaulis*. a, habit; b, stolon with vegetative parts and peduncle base in situ; c, bract and bracteoles; d, bladder-trap frontal view; e, bladder-trap ventral view; f, leaf adaxial surface; g, flower lateral view; h, flower dorsal view; i, flower frontal view showing stamens and ovary; j, fruit ventral view; k, seed. Scale bar: a = 33 mm; b, g–i = 10 mm; c, f = 3.3 mm; d, e & j = 3.3 mm; g–i, q = 2.5 mm; k, = 1 mm. Material used: a–j = *Jobson 2690 & Cherry* (NSW927133); k = *Jobson 3960* (NSW834738).

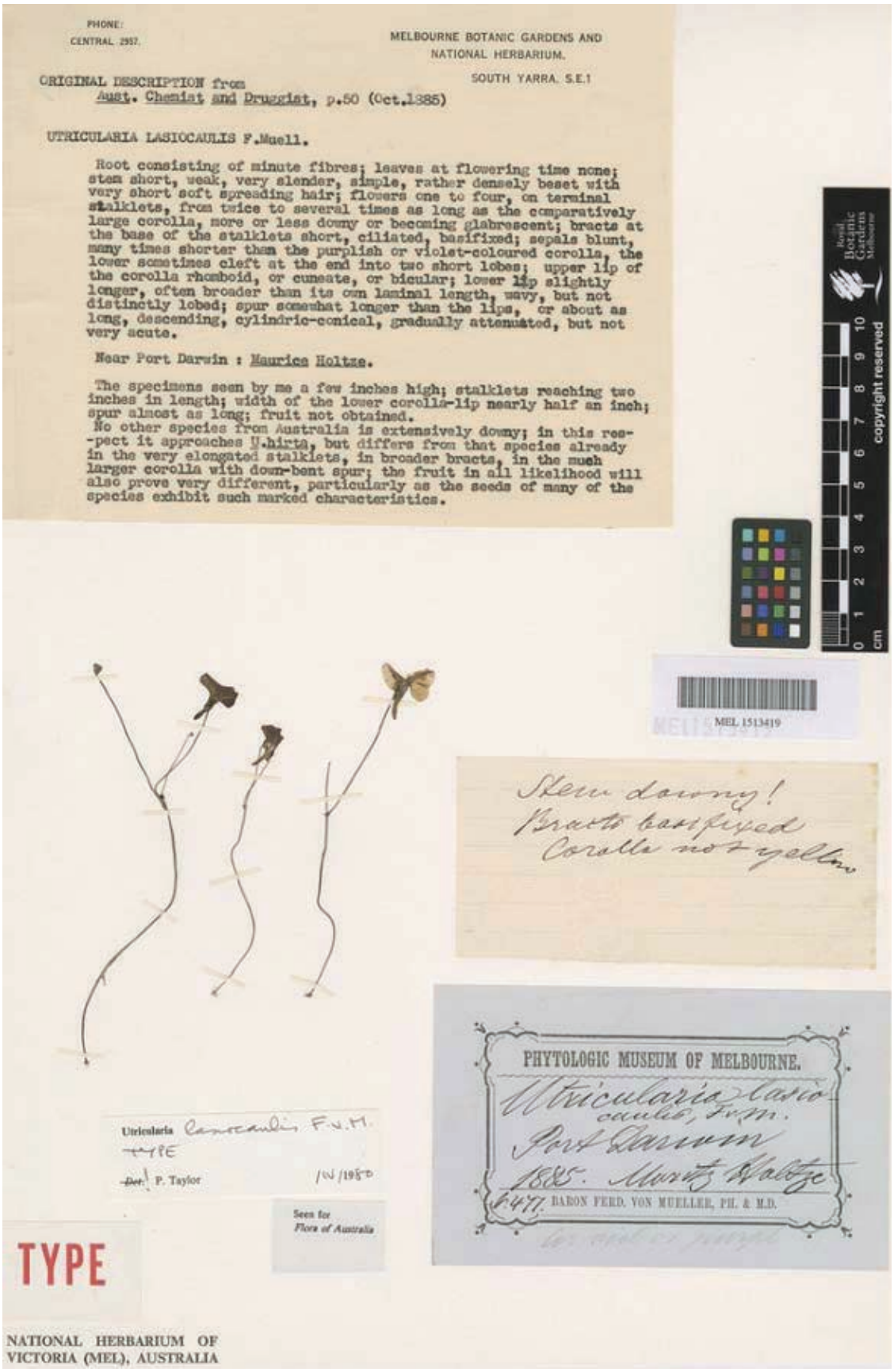


**Fig. 7.** Holotype of *Utricularia lasiocaulis* F.Muell. (*M. Holtze 477*; MEL 1513419)

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

**Diagnosis**: Similar to *U. lasiocaulis* in having two raised orange ridges at the base of the lower lip but differs in possessing ridges with claw-like apices, corolla lower lip three lobed, superior part of upper lip obovate or obcordate, and peduncle hairy on lower 1/3.

**Type**: AUSTRALIA: Northern Territory: Jabiru [precise location withheld], *R.W. Jobson 4019*, 27 March 2021 (holo: NSW1119364; Iso: NSW834766 – spirit, DNA).

Small to medium sized annual, terrestrial herb. *Rhizoides* capillary, simple, up to 7 mm long, 0.15 mm thick at base tapering to 0.1 mm near the apex, numerous from the peduncle base, 1 from stolon nodes. *Stolons* numerous, branched, filiform, 0.15–0.2 mm thick, internodes 3–5 mm long. *Leaves* numerous, rarely at peduncle base and 1 on stolon nodes, petiolate, lamina spathulate, 1–1.5 mm long, 0.6–1 mm wide, single nerve, apex rounded, total length up to 2–3.5 mm long. *Traps* stalked, ovoid, 0.6–1.4 mm long; 1 at nodes and on internodes; uniform, mouth lateral with a 3-lobed dorsal appendage, central lobe 0.5 mm long, two lateral lobes c. 0.2 mm long, ciliate margin, two lateral appendages 0.7 mm long with ciliate margin, ventral wings absent. *Inflorescence* solitary, 60–180 mm long; flower solitary or with two or three pedicles arising in succession; peduncle erect, solid, terete, hirsute for 1/3 from base of peduncle then glabrous, 0.3–0.4 mm thick. *Scales* absent; *Bract and bracteoles* equal, basifixed, gibbous at base, lanceolate, 1–1.2 mm long, c. 0.2 mm wide, ciliate margin around base and apex, apex rounded. *Pedicel* erect or deflexed near apex, filiform, tapering and apically 20–33 mm long. *Calyx* lobes unequal; upper lobe ovate, 1.8–2.1 mm long, 1.2–1.5 mm wide; lower lobe shorter, narrowly ovate, with apex emarginate 1–1.2 mm long, 0.7–0.8 mm wide. *Corolla* 8–14 mm long, upper side dark purple, mauve, or light violet, underside orange; *upper lip limb* constricted near the middle, 4.1–4.8 mm long, superior part obovate or obcordate with apex entire or rarely emarginate, inferior part ovate with margin ciliate; *lower lip limb*, obovate in outline with apex rounded, 4–12 mm long, 5–14 mm wide, deeply to shallowly 3-lobed; base of lower lip with two orange claw-like ridges, with 3 longer dark violet streaks either side; *spur* projecting c. 90°–110° to the lower lip, conical in cross-section at the base, subulate, tapering to an acute apex, 3.2–5.5 mm long, 1–2.1 mm wide near base, equal or slightly longer than the length of lower lip. *Capsule* globose, c. 2.1 mm in diameter, dehiscing from a longitudinal, ventral, marginally thickened slit. *Seeds* 0.3–4 mm long. *Pistil* c. 1.4 mm long; *Filaments* curved c. 1.2 mm long. *Pollen* 3-colporate. Figures 3e–f, 8.

**Additional specimens examined**: AUSTRALIA: Queensland: Dingo Spring, *Fensham R. 4506*, 1 Jun 2001 (BRI); Maroochy airfield, *Taylor P. 17075* (K); Near Bundaberg, *Jobson R.W. 2036*, 13 Jul 2013 (NSW922764); N of Mt Surprise, *Fensham R. 4506*, 1 Jun 2001 (BRI); Jungle Creek swamp, *Jobson R.W. 2845*, 18 Jul 2015 (NSW1056740); Unnamed swamp 8 km S of Bamaga, *Jobson R.W. 3777 & Baleeiro P.C.*, 21 Jul 2019 (NSW945287). NORTHERN TERRITORY: Flying Fox Ck, Central Arnhem Road, *Jobson R.W. 2226 & Baleeiro P.C.*, 20 Apr 2014 (NSW852283); 3.2 km E of Jabiru Aerodrome, *Jobson R.W. 4019 & Baleeiro P.C.,* 27 Mar 2021 (NSW); 10 km NE of Mount Bundey, *Jobson R.W. 2691 & Baleeiro P.C.*, 18 Apr 2015 (NSW927135), Nhulumbuy, *Brennan K. 6967*, 11 May 2006.

**Etymology:** The specific epithet honours Kym Brennan of the Northern Territory Herbarium (DNA). Kym has made many of the important botanical collections essential for understanding the flora of the Northern Territory, including the taxa of the *Utricularia lasiocaulis* complex.

**Distribution, Ecology & Phenology:** In the Northern Territory, known from the Darwin area to Arnhem Land. In Queensland, collected from the Cook region south to the Moreton region (Fig. 1). In NSW, known only from a single site in Torrington State Conservation Area, Northern Tablelands (Boaz Ng, pers. comm.). Grows in seasonally wet grassland, swampland, and heathland on sandy substrate or in seepage on sandstone or granite outcrops. Flowers all months.

**Conservation Status:** Although it is the most widespread species of the *Lasiocaulis* complex from across the Top End to Cape York and south to Northern Tablelands of NSW, it is often locally very patchy and infrequent. We, therefore, recommended that this species be listed in NT, Qld and NSW as Data Deficient, requiring further study to assess conservation status and determine potential threats.

**Notes:** Although the corolla of *U. brennanii* is quite variable in colour and shape, it can be easily differentiated from *U. disjuncta* by its dark yellow vs. white ridges at the base of the lower lip, and its corolla abaxial surface orange vs. white. Even though *U. lasiocaulis* was observed to grow near *U. brennanii* at several sites in the NT there was no evidence of hybridization, and some evidence they each occupy different microhabitats.

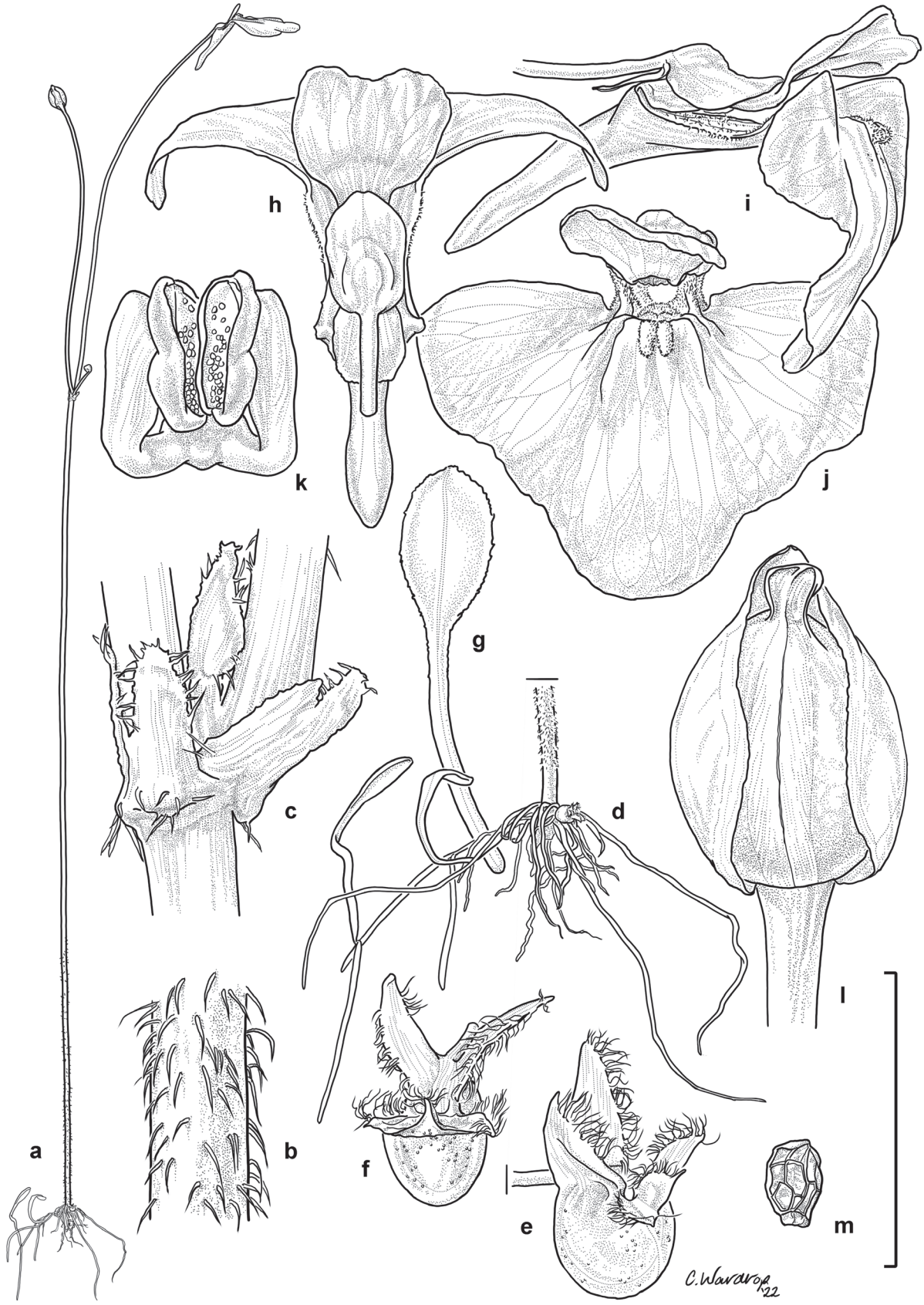


**Fig. 8.** *Utricularia brennanii*. a, habit; b, peduncle base; c, bract and bracteoles; d, stolon with vegetative parts and peduncle base in situ; e, bladder-trap lateral view; f, bladder-trap ventral view; g, leaf adaxial surface; h, flower dorsal view; i, flower lateral view; j, flower frontal view; k, stamens frontal view; l, fruit ventral view; m, seed. Scale bar: a = 33.3 mm; b, c, k = 1.6 mm; d = 10 mm; e, f = 2 mm; g = 3.3 mm; h-j = 7.1 mm; l = 2.5 mm; m = 1 mm. Material used: a-g, k, l = *Jobson 4019 & Baleeiro* (NSW834766 – spirit & sheet); h-j = *Jobson 4022 & Baleeiro* (NSW962501 – spirit); m = *Jobson 3777 & Baleeiro* (NSW945287 – spirit)

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

**Diagnosis**: Similar to *U. lasiocaulis* in having peduncle hairy near the base but differs in having a deep purple vs. light mauve corolla with no orange tinge on the under surface, two raised white vs. yellow ridges at base of lower lip, and lower corolla lip deeply three lobed vs. margin entire.

Type: WESTERN AUSTRALIA: North Kimberley: King Edward River [precise location withheld], *Dunlop C.R. 5366*, 29 February 1980 (holo: DNA D0016726, iso: DNA, PERTH, MEL, K – all spirit).

Small to medium sized annual, terrestrial herb. *Rhizoides* capillary, simple, up to 4 mm long, 0.15 mm thick at base tapering to 0.05 mm near the apex, numerous from the peduncle base, 1 or 2 from stolon nodes. *Stolons* few, branched, filiform, 0.15–0. 2 mm thick, internodes 2–3 mm long. *Leaves* numerous, few at peduncle base and 1–2 on stolon nodes, petiolate, lamina spatulate, 1.2–2 mm long, 0.5–1.0 mm wide, single nerve, apex rounded, total length up to 3.7 mm long. *Traps* stalked, ovoid, 0.9–1.5 mm long; 1 or 2 at base of peduncle, and on internodes; uniform, mouth lateral with a simple dorsal appendage c. 0.1 mm long, and two lateral appendages c. 0.1 mm long, ventral wings with scattered course hairs on margin. *Inflorescence* solitary, 70–120 mm long; flower solitary or rarely with two or three pedicles arising in succession; peduncle erect, solid, terete, hirsute for 1/5 from base of peduncle then glabrous, 0.35–0.4 mm thick. *Scales* absent; *Bract and bracteoles* equal, basifixed, slightly gibbous at base, ovate, 0.8–1.0 mm long, c. 0.3 mm wide, ciliate on margin and course hairs scattered on upper surface, apex rounded or acute. *Pedicel* erect, filiform, tapering apically, 15–60 mm long. *Calyx* lobes unequal; upper lobe ovate, 1.9–2.1 mm long, 1.5–1.6 mm wide; lower lobe shorter, oblong with apex bifid, 1.5–1.6 mm long, 1.3–1.4 mm wide. *Corolla* 7–11 mm long, upper side violet, underside light violet with white spur; *upper lip limb* constricted below the middle where bent upwards at c. 90°, 5.5–7.5 mm long, 4.1–5.0 mm wide, superior part broadly obovate with apex truncate or slightly bilobed, inferior part ovate with margin ciliate; *lower lip limb*, transversely elliptic in outline with apex rounded, 7–9 mm long, 11–13 mm wide, deeply 3-lobed, base of lower lip with two white, prominently raised ridges, with 2 longer dark violet rimmed white streaks either side; *spur* usually projecting c. 90° to the lower lip, conical in cross-section at the base, tapering then slightly bulbous towards apex, 4.8–5.2 mm long, c. 1.4 mm wide near middle, shorter than the length of lower lip. *Capsule* globose, c. 2.2 mm in diameter, dehiscing from a longitudinal, ventral, marginally thickened slit. *Seeds* obovoid, 0.25–0.45 mm long. *Pistil* c. 1.5 mm long; *Filaments* curved c. 1.0 mm long. *Pollen* 3-colporate. Figures 3g–h, 9.

**Additional specimens:** AUSTRALIA: Western Australia: North Kimberley: King Edward River, *Jobson R.W. 2658 & Cherry W.*, 14 Apr 2015 (NSW 924822 - spirit); Harding Range, *Barrett M.D. 2775*, 25 Mar 2010 (PERTH); Theda Station, *Jobson R.W. 2668 & Cherry W.*, 16 Apr 2015 (NSW 909477).

**Etymology:** The specific epithet honours Dr Ian Cowie, former (retired) Chief Botanist of the Northern Territory Herbarium (DNA), who has made many important collections and provided essential information for understanding the taxonomy of Australian *Utricularia*.

**Distribution, Ecology & Phenology:** Known from three sites in the north Kimberley region of Western Australia (Fig. 1); King Edward River area of Mitchell Plateau, c. 90 km to the east on Theda Station and c. 250 km to the SW in the Harding Range. Found in seasonally wet grassland on sandstone pavement in sandy substrate with fine grasses and sedges. Collected in Flower in February and April.

**Conservation status:** Although only know from four collections at three sites, the disjunction between the sites suggests it is likely to have a broader distribution across north Kimberley. We recommend that this species is Data Deficient, requiring further study to assess distribution and conservation status and determine potential threats.

**Notes:** The deeply three-lobed corolla of *U. cowiei* is similar to the Kimberley endemics *U. tridactyla* P.Taylor and *U. papilliscapa* R.W.Jobson & M.D.Barrett but in both latter cases the ridges at the base of the corolla lower lip are yellow vs. white, and the base of the peduncle is papillose vs. hirsute.

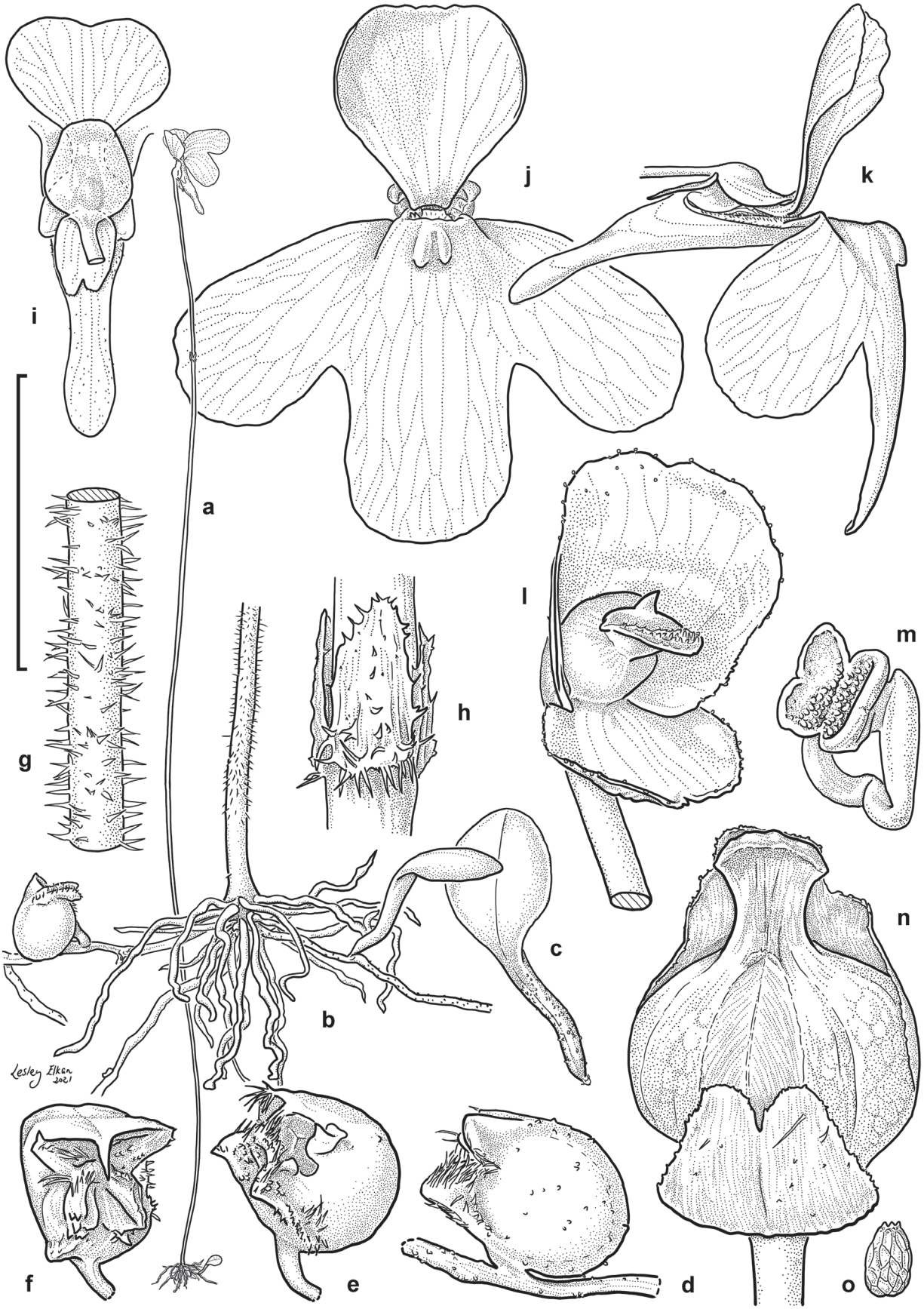


**Fig. 9.** *Utricularia cowie*. a, habit; b, stolon with vegetative parts and peduncle base in situ; c, leaf adaxial surface; d, bladder-trap lateral view; e, bladder-trap ¾ frontal view; f, bladder-trap ventral view; g, peduncle base; h, bract and bracteoles; i, flower dorsal view; j, flower frontal view; k, flower lateral view; l, calyx with ovary; m, stamen lateral view; n, fruit ventral view; o, seed. Scale bar: a = 33.3 mm; b = 5 mm; c = 3.3 mm; d–f, h, l & n = 2 mm; g & m = 1.7 mm; i-k, = 7 mm; o = 1 mm. Material used: *Jobson 2658 & Cherry* (NSW924822 - spirit).

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

**Diagnosis**: Similar to *U. leptorhyncha* in having corolla lower lip three-lobed with lower surface and whole upper lip white but differs in having long lanceolate vs. short broad bladder-trap ventral wings, a violet vs. light mauve corolla, single strongly raised white ridge with bifurcating apex vs. two slightly raised ridges at the base of the lower lip, and lower corolla lip broadly transversely elliptic vs. flabellate in outline; upper lip emarginate vs. bilobed.

**Type**: AUSTRALIA: Northern Territory: Howard River Floodplain, Gunn Point Rd. [precise location withheld], *R.W. Jobson 3962*, 20 March 2021 (holo: NSW1119360, iso: DNA, NSW834742 – spirit).

Small to medium sized annual, terrestrial herb. *Rhizoids* capillary, simple, up to 6 mm long, 0.2 mm thick at base tapering to 0.1 mm near the apex, numerous from peduncle base, 2–3 from the stolon nodes. *Stolons* few, c. 12 mm long, branched. *Leaves* few, 1 on stolon nodes, petiolate, lamina obovate or spatulate, 1–2.5 mm long, c. 0.5 mm wide, single nerve, apex rounded, total length up to 2–10.5 mm long. *Traps* stalked, ovoid, 0.6–1.0 mm long; few on internodes; uniform, mouth lateral with a 3-parted rostrum-like dorsal appendage 0.9–1.1 mm long, and two longer, lanceolate ventral wings c. 1.9–2.1 mm long with ciliate margin. *Inflorescence* solitary, 60–150 mm long; flowers solitary or with two pedicles; peduncle erect, solid, terete, hirsute for 1/3 from base of peduncle then glabrous, 0.2–0.3 mm thick. *Pedicel* erect or deflexed near apex, filiform, tapering and dorsiventrally compressed near apex 10–32 mm long. *Scales* absent; *Bract and bracteoles* unequal, basifixed, slightly gibbous at base, narrowly ovate, bracts 1–1.2 mm long, c. 0.2 mm wide, bracteoles c. 0.7 mm long, ciliate margin, apex acute. *Calyx* lobes unequal; upper lobe ovate, 1.1–1.5 mm long, 0.8–1 mm wide; lower lobe shorter, narrowly ovate, with apex truncate or bifid 1–1.2 mm long, 0.4–0.6 mm wide. *Corolla* 10–14 mm long, upper side of lower lip light violet, underside white; *upper lip limb* white, constricted near the middle, 3.2–4.5 mm long, 1.9–2.2 mm wide, superior part obovate with apex bilobed or emarginate, inferior part ovate with margin glabrous; *lower lip limb*, broadly transversely elliptic in outline with apex rounded, 3.2–8 mm long, 3.4–9 mm wide, deeply 3-lobed; base of lower lip with raised white or light yellow claw-like ridge with shortly bifurcating apex; with 2 longer white streaks with dark violet margin either side; *spur* projecting c. 90° to the lower lip, conical in cross-section at the base, subulate, tapering to an acute apex, 3.9–5 mm long, 0.9–1.2 mm wide near base, slightly shorter or equal the length of lower lip. *Capsule* globose, c. 1.8 mm in diameter, dehiscing from a longitudinal, ventral, marginally thickened slit. *Seeds* cylindrical, 0.7–0.9 mm long. *Pistil* c. 1.0 mm long; *Filaments* curved c. 1.0 mm long. *Pollen* 3-colporate. Figures 3i–j, 10.

**Additional specimens:** AUSTRALIA: Northern Territory: Girraween road, Darwin, *Harwood R.K. 1046*, 7 Mar 2001 (DNA); Howard River Floodplain, E side at Gunn Point Rd., *Cowie I.D. 9061*, 11 Mar 2001; Bathurst Island, *Cowie 9063 I.D. & Brennan K.G.*, 12 Mar 2001 (DNA); Noonamah, Jenkins road, *Murfet D.E. 5641 & Lowrie, A.*, 9 Mar 2007 (AD); Jabiru, *Jobson R.W. 2208*, 19 Apr 2014 (NSW852220); Bing Bong, *Jobson R.W. 3438*, 20 May 2017 (NSW934856); SE of Girraween and Anglesey Rd junction, *Jobson R.W. 3965*, 20 March 2021 (NSW834744).

**Etymology:** The specific epithet *disjuncta* refers to the sporadic geographic distribution of the known locally restricted populations.

**Distribution, Ecology & Phenology:** Known from several sites on the Howard River Floodplain near Darwin, Bathurst Island, and a single known collection (*Jobson 3438)* from Bing Bong in the Gulf region of the Northern Territory. Grows in seasonally wet grassland and woodland on sandy substrate. Collected in flower from March and May.

**Conservation status:** Although only known from few collections from near Darwin, Bathurst Island, and Bing Bong in the Gulf region, the disjunction between these sites suggests it is likely to have a broader distribution across the Top End, NT. At these sites it was observed to be locally infrequent which may indicate that it has often been overlooked during surveys. We recommend that this species be considered Data Deficient, requiring further study to assess distribution and conservation status and determine potential threats.

**Notes:** The molecular phylogeny (Fig. 2) shows a sister relationship between *U. disjuncta* and *U. brennanii*, although these two are unlikely to be confused in the field (see *U. brennanii* notes above for differences). It instead resembles most closely *U. leptorhyncha* in having the corolla lower-surface and upper-lip white. Despite this similarity, these two species can be easily differentiated by the smaller size of the *U. leptorhyncha* corolla 5–7 mm vs. 10–14 mm long, and bladder trap appendages non-ciliate vs. ciliate.


**Fig. 10.** *Utricularia disjuncta*. a, habit; b, stolon with vegetative parts and peduncle base in situ; c, peduncle base; d, leaf adaxial surface; e, bract and bracteoles; f, flower frontal view; g, flower lateral view; h, flower dorsal view; i, stamens frontal view; j, bladder-trap frontal view; k, bladder-trap ¾ rear view; l, bladder-trap rear view; m, fruit ventral view; n, seed (immature). Scale bar: a = 33.3 mm; b = 10 mm; c = 3.3 mm; c, e, i = 2 mm; g & m = 1.6 mm; d, = 3.3 mm; f-h = 7.1 mm; j-m = 2 mm; n = 1 mm. Material used: = *Jobson 3962 & Baleeiro* (NSW834742 & spirit).

**Key to species of the *U. lasiocaulis* complex and allied species (sect. *Lasiocaules*).**

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

1a. Corolla white or pink; bract and bracteole basisolute ..... ***U. kamienskii*** (N.T.)

1b. Corolla light mauve to purple; bract and bracteole basifixed ..... 2

2a. Corolla lower lip spur apex acute; bladder trap appendages non-ciliate ..... ***U. leptorhyncha*** (N.T.)

2b. Corolla lower lip spur apex usually rounded; bladder trap appendages ciliate ..... 3

3a. Peduncle densely hirsute usually along 1/5 to entire length; underside of the lower lip of corolla orange to dark orange ..... ***U. lasiocaulis*** (N.T., W.A.)

3b. Peduncle pubescent/hirsute from near the base up from 1/6 to 1/4 of total length; underside of lower lip of corolla white, light purple or light orange ..... 4

4a. Lower corolla lip deeply three-lobed; bladder-trap ventral wings shorter than the bladder-body ..... ***U. cowiei*** (W.A.)

4b. Lower corolla lip entire or shallowly three lobed; bladder-trap ventral wings longer than the bladder-body ..... 5

5a. Underside of corolla lower lip light orange, upper lip mauve or purple ..... ***U. brennanii*** (N.T., Qld)

5b. Underside of corolla lower lip white, upper lip white ..... ***U. disjuncta*** (N.T.)

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