LENTIBULARIACEAE (P. Taylor, Kew)

A small family of annual or perennial herbs, all of which are variously adapted for the capture and digestion of small animals (insects, Crustacea, etc.). Only one genus (Utricularia) occurs in Malesia.

The family is cosmopolitan, including arctic regions, but is more or less absent from Polynesia. It includes 4 genera with c. 250 spp.

The largest and most widely spread is the cosmopolitan genus Utricularia L. with c. 180 spp., almost half of which occur in the New World, the rest being more or less equally distributed between tropical Africa, Asia, and Australia, with a few in the north temperate zone, 22 spp. occurring in Malesia.

Pinguicula L., with some 50 spp., has a curious distribution, with a few circum-boreal species and concentrations in the Mediterranean region and in North, but especially in Central and in South America, as far south as Patagonia.

Genlisea St.Hil., with c. 16 spp., is confined to the tropics of South America and Africa.

Polypondholyx Lehms, with 2 spp., occurs only in Australia.

All genera are associated with damp or wet habitats and most frequently found on sterile mineral soils where they are often associated with other carnivorous plants (as e.g. Drosera).

Unfortunately no fossils are known with certainty, apart from some Quaternary pollen.

The affinities of the family have been the subject of considerable discussion and opinions are divided between a relationship with Scrophulariaceae and Primulaceae. The combination of free basal (or free central) placentation, a spurred personate corolla (the spur is always present but occasionally reduced), two stamens and the carnivorous habit is diagnostic for the family. In favour of affinity with Scrophulariaceae are the morphology of the corolla, the structure and number of the stamens, the bilobed stigma, and such cytological evidence as is available. The pollen of Lentibulariaceae is similar to that of both of the families in question. The placentation (and no doubt the mode of dehiscence of the probably most derived aquatic European species, i.e. those most usually studied) is certainly the reason for a suggested alliance with Primulaceae but the two families have little else in common. The transition from axile to free central (or basal) placentation by the loss of the septum is quite feasible and the mode of dehiscence of at least what are presumably the most primitive Utricularia species could support such a hypothesis.

Within the family the combination of two-lobed calyx and trap structure is diagnostic for the genus Utricularia. Polypondholyx is very close to Utricularia but with 4 calyx lobes in two whorls. Genlisea and Pinguicula both have true leaves and a 5-lobed calyx, the traps of the former genus being extremely complex but quite different from those of Utricularia. Genlisea has also a unique type of fruit dehiscence — likening the fruit to a globe it splits at the equator and at least partially at both tropics. Pinguicula has an apparently much less complex trapping mechanism consisting of two types of superficial glands on the leaves while the dehiscence is constantly valvate. Theories have been advanced as to how the various trapping mechanisms could be derived one from the other but they are on the whole unconvincing.

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UTRICULARIA


Annual or perennial aquatic terrestrial or epiphytic herbs always of damp places, without true roots or leaves but with stems modified in various ways to function as rhizoids, stolons and foliar organs, all species bearing small complex bladder-like traps for the capture and digestion of small aquatic organisms. Inflorescence racemose, peduncled, usually simple, bracteate; sterile bracts (scales) often present on the peduncle and sometimes also on the inflorescence axis; two bracteoles often present, almost always at the base of the pedicel, usually free, rarely ± connate with the bract. Bracts very varied, basifixed, medifixed or variously produced below the point of attachment. Calyx 2-lobed, usually ± accrescent, the lobes ± equal or variously dissimilar, usually free, sometimes ± connate at the base. Corolla bilabiate, yellow, various shades of violet or purple, white or rarely blue or red; upper lip entire or 2- or more-lobed; lower lip with an entire or 2-5-lobed limb, a ± raised, often gibbous palate and a usually subulate or conical spur, in a few species reduced to a short sac. Stamens 2 inserted at the base of the upper lip; filaments usually short, linear, often curved and often ± flattened and dilated above; anthers dorsifixed, ± ellipsoid, theca ± confluent. Ovary globose or ovoid, ovules 2-many on a free basal or free central ± fleshy placenta; style usually short; stigma bilabiate, the lower lip usually much larger. Capsule globose or ovoid, dehiscent very variously by longitudinal slits, dorsiventral or rarely lateral valves, pores or circumscissile or rarely indehiscent. Seeds 1-many, very variously shaped and sculptured.

Distr. Cosmopolitan but mostly in the tropical zone. About 180 spp., almost half of which occur in the New World, the rest more or less equally distributed between tropical Africa, Asia and Australia with a few in the north temperate zone; in Malesia 22 spp.

The geographical relationships of the Malesian spp. are of some interest. Twelve species are more or less widespread throughout tropical Asia and Australia and four of these occur also in tropical Africa. U. subulata is widespread in tropical America and Africa, apparently absent from India, but present in Thailand, Malaya and Borneo. U. pulchra, which is allied to the very widespread U. striatula, appears to be endemic in New Guinea while U. salwinensis of the same affinity is known only from the Gajo mountains of North Sumatra and from SW. China (Yunnan). U. vitellina is apparently local-endemic in Malaya while the allied U. involvens is known from that country, adjacent Burma, Thailand, and N. Australia. U. heterosepala, a slightly anomalous species in the same group (which is predominantly Asian but with representatives in tropical Africa and to a lesser extent in America) appears to be endemic in the Philippines. The circumboreal species U. minor occurs at high altitudes in New Guinea and U. australis, which is widely distributed in the Old World north temperate zone, occurs, mostly at high altitudes, in a number of places in Malesia; it is known also in the mountains of tropical Africa and at lower altitudes in SE. Australia. Two species known otherwise only from northern Australia occur in SE. New Guinea: U. chrysantha and U. muelleri. One strange apparent absence from the Malesian region is U. stellartis which is known from tropical Africa and Asia as far as Indo-China and reappears in northern Australia. It is included in the key to the species as it seems very probable that it does occur in the area.
Ecol. Marshes, wet grassfields, swamps, swamp-forest, streams and rivers and open damp sandy ground, a few species epiphytic among moss on trees (and rocks), occurring in Malesia from sea-level to 3660 m.

Pollination. The flowers often secrete nectar and in some species are fragrant. Pollination by Diptera and Hymenoptera has been observed and the flowers are sometimes visited by Lepidoptera. However, self pollination is probably usual and cleistogamous forms are frequent and in some species inflorescences normally bear both cleistogamous and chasmogamous flowers.

Dispersal. Dispersal over short distances can easily take place in aquatic species by floating of entire plants or parts thereof, or by dispersal of buds (turions), according to Ridley (Disp. 1930).

Seeds are mostly very small and sometimes winged and therefore perhaps sometimes dispersed by wind, although gravity is probably the most normal agent. In some of the aquatic species the seeds do not float, or they do so only for a time (Ridley. Disp. 1930. 220). A few (not Mal. spp.) growing in swiftly flowing water have seeds with a mucilaginous testa and in the epiphytic species the seeds are either very small (orchid-like) or winged or (U. striatula) beset with gladiolate processes. Fig. 13t.

The occurrence of some species which are epiphytic among moss on tree-trunks in dense primary rain-forest where there is hardly any wind might point to very short-distance dispersal by ants or other insects. Fig. 14.

In open terrain the seed qualities would point to wider exozoic dispersal by migrating waterfowl and waders for aquatic species, and by wind. This might induce dispersal enthusiasts to explain the enormous disjunct gaps in the range of U. minor between Burma and New Guinea, and that of U. stellaris between Indo-China and Australia by erratic long-distance dispersal.

Several terrestrial species show similar disjunctions, e.g. U. salwinensis between Yunnan and North Sumatra, U. scandens and U. limosa between the Malay Peninsula and New Guinea, and U. baouleensis between Luzon and Java. Though the present revision is based upon some 2000 collections, the latter two species may have escaped attention of collectors in intermediate stations. However, the disjunct range of the subalpine U. salwinensis is certainly a real gap, as high mountains are at present absent between Yunnan and N. Sumatra. A similar disjunction is found in the ranges of other high mountain plants, such as for example Sverthia bimaculata and Vioila biflora which are certainly not overlooked.

It should be admitted, though, that Utricularia must often have escaped attention of collectors, especially in seasonal areas where flowering is of short duration and ephemeral. On the other hand in a thoroughly explored island as Java, U. baouleensis is known only from Madura I. in one collection. This leads to the conclusion that it is most unlikely that the gaps mentioned above will be reasonably filled by later exploration, especially these of the high altitude species. This argument is strengthened by the fact that these disjunctions are by no means unique: the gap of U. salwinensis is matched by that of Viola biflora, Hedytis verticalis, etc., the gap of U. minor by that of Drosera rotundifolia and several Carices, but also by that found in Fagoidae. Even an extraordinary range as that of U. livida, which is found in East Africa and Madagascar but also in Mexico, is matched by a few other taxa or affinities with similar disjunction, in tropical America, e.g. tribe Ravenalae (Musaceae) and Rheedia (Guttiferae).

Then there are some Indo-Australian species showing a huge disjunction: U. involvens, Burma, Thailand, Malaya and N. Australia, and a closely related one, U. odorata, Thailand, Indo-China and N. Australia.

It gives thought to the assumption that these disjunctions cannot simply be explained by erratic long-distance dispersal. Also the occurrence of three local-endemic species makes such a correlation with dispersal capacity highly dubious and does not plead for easy dispersal. Neither does the fact that the ecology of many Utricularia spp. is very wide; they are not particular to soil, many are found in the tropics under both everwet and seasonal climatic conditions, and a far number have a very large altitudinal range.

On the other hand it must be realized that the very widely distributed U. australis, which ranges all over the Old World with isolated sporadic localities on the southern hemisphere, is not known to produce fruit and seed, which forces to assume dispersal of small particles of its vegetative parts by migrating birds. This implies that such parts should be capable to withstand desiccation which will certainly happen during such migratory flight. Experiments could add some evidence. It is e.g. shown by V. A. Wager (Trans. R. Soc. S. Afr. 16, 1928, 204, pl. 24) that U. australis (under the erroneous name U. stellaris) forms resting buds towards the end of the season which may carry the plant over until the following spring. These resting buds are not damaged by exposure to drought; buds taken from a herbarium specimen six months old put into an aquarium slowly swelled and developed into healthy plants.

Chromosomes. Relatively few (about 15%) of the species of Utricularia have been examined; the chromosomes are apparently small and not easily observed. Basic numbers of x = 7 and 9 seem to predominate but x = 6, 8, 10, 11 and 15 are recorded. An American species, U. inflata WALT., has 2n = 18 and 36, the latter being morphologically gigantic whereas the closely allied U. radiata SMALL has 2n = 28. The common Australian species U. dichotoma LABILL. has 2n = 28 while conversely a morphologically small variant of this, U. uniflora R. BR., has 2n = 56. Cf. J. Caspar in Fedde, Rep. 86 (1975) 211–232.

Morph. The most remarkable feature of the genus are the traps. They are minute vesicles provided with a convoluted spiral. The narrow opening leading to the water-filled cavity is formed by a ventral lip, and a dorsal valve which enables the prey to enter, but prevents it from escaping, in which it is also hampered by glandular papillae of striking structure. The inner wall of the trap is densely glandular-papillose and exudes proteolytic enzymes.

The functioning of the trap, by the opening of the valve, is caused by irritation of the sensitive hairs on this lid by which small crustacea or other matter is 'sucked' in. See E. Merl (Flora: Alg. Bot. Z. 115, 1977] LENTIBULARIACEAE (Taylor) 277

Pal. Pollen grains are tricolporate or stephanocolporate with up to 28 colpi. Tetrad occurs in two species of Utricularia. Size ranges from 17 µm in U. neotiioides to 51 µm in U. humboldtii. Shape varies from oblong to prolate. Sculpture is generally smooth in Utricularia or finely reticulate as in Pinguicula (ERDTMAN, Pollen morphology and plant taxonomy. Angiosperms. Almquist & Wiksell, Stockholm, 1952, 233-234).

In Utricularia HUYNH (Étude de la morphologie du pollen du genre Utricularia L., Pollen et Spores 10, 1968, 11-55) has described a considerable amount of pollen-morphological variability. Tricolporate types with long or very short colpi and stephanocolporate types with equatorially fused endoapertures occur. In some types the apocolpia are dissected by interconnections between colpi.

A remarkable similarity exists between the stephanocolporate grains in Utricularia and the pollen of Polygalaceae. — J. MULLER.

Notes. The study of Utricularia has always been hampered by badly collected and inadequate material. Of the aquatic species the vegetative parts be suitably supported by a (rigid) sheet of paper and thus be raised out of the water in their natural position and then dried as rapidly as possible. Additional inflorescences and infructescences should be added. Terrestrial species have often not very obvious vegetative parts which are usually beneath or in the substrate. They must be carefully 'unearthed', or dried with the adhering mud.

Specimens in liquid are of course excellent. FAA is not so suitable; the best solution is a mixture of 50-55% alcohol, 40% water and 5-10% glycerine; the latter may be omitted or even added later; it is important that the receptacle is entirely filled with liquid.

It is important to take many flowers but see that also fruit and seed are represented.

As two or more terrestrial species are frequently growing together, with their vegetative parts intimately mixed in the substrate, care is needed in collecting. It is important to note the flower colour; this is in several species very variable.

Hardly any Utricularia spp. have been collected in the Lesser Sunda Islands. Though this archipelago is subject to a dry season, collecting at the the end of the wet season in rice-fields, shallow swamps and damp grassland may yield interesting results, as several species have been found in the adjacent Madura & Kangean Islands which have the same climatic regime.

KEY TO THE SPECIES

1. Foliar organs conspicuous and numerous at anthesis, divided into narrowly linear to capillary segments, the ultimate segments bearing apical and often lateral solitary or fasciculate setulæ.

2. Turions (winter buds) of tightly clustered modified foliar segments present at the apex of some of the stolons.

3. Turions glabrous or almost so. Ultimate foliar segments with minute apical but with or without microscopic lateral setulæ

4. Turions densely setulose. Ultimate foliar segments with + numerous lateral setulæ

21. U. australis

2. Turions not present.

4. Primary foliar segments 3 or more semi-verticillate on the stolons usually with hyaline or folioso setulose stipule-like segments at the base. Scales on peduncle absent.

5. Peduncle with a whorl of inflated ellipsoid floats some distance above the base. Basal segments of foliar organs hyaline.

6. Floats shortly stipitate with capillary foliar segments at the base. Capsule much longer than the calyx lobes. Seeds thinly lenticular with a single marginal wing


5. Peduncle without floats or with a whorl of narrowly fusiform floats at the base. Basal segments of foliar organs folioso

4. Primary foliar segments 1 or 2 usually without stipule-like segments at the base. Scales (or at least one) present on the peduncle.

7. Foliar organs less than 10 mm long with few (2-10) ultimate segments with few or no lateral setulæ.

8. Ultimate segments distinctly flattened with microscopic or no lateral setulæ. Bracts and scales auriculate, the scales few but dispersed through the length of the peduncle. Spur of the corolla very short, saccate. Capsule circumsessile. Seeds prismatic

22. U. minor

8. Ultimate segments terete, sometimes with a few lateral setulæ. Bracts and scales not auriculate, scales usually only one near the middle of the peduncle. Spur of the corolla narrowly conical. Capsule laterally bivalvate. Seeds lenticular, winged

18. U. exoleta

7. Foliar organs more than 20 mm long with very numerous ultimate segments bearing + numerous lateral setulæ.

9. Ultimate segments terete. Traps absent from the lowermost part of the foliar organs. Bracts and scales medifixed, the scales disposed through the length of the peduncle. Corolla mauve or white.

17. U. punctata
1. Foliar organs simple, orbicular to linear, never setulose, often not present or conspicuous at anthesis.
2. Bracts basifixed or produced below the point of attachment.

12. Lower lip of corolla deeply 2-lobed, corolla pink or white. Pedicel minutely papillose. Seeds globose with distinct coarse isodiametric reticulation.
16. U. subulata

6. U. heterosepala
16. Bracteoles present. Calyx lobes ± equal or upper longer.
17. Bracteoles not much narrower (at least half as wide) than the bract.
18. Calyx, peduncle and pedicels ± densely covered with often long sepaloid hairs.
19. Calyx glabrous. Peduncle glabrous or with a few short sepaloid hairs.
9. U. minutissima
17. Bracteoles much narrower (less than one quarter as wide) than the bract.
8. U. c'vrysantha
19. Lower lip of corolla entire, emarginate or ± 3-lobed.
20. Corolla yellow.
22. Corolla (11–)15–20 mm long, upper lip orbicular, much wider than the calyx lobes.
2. U. involvens
22. Corolla 5–10 mm long, upper lip oblong, narrower than the calyx lobes.
5. U. scandens
23. Lower lip of corolla 3-lobed, corolla 15–22 mm long.
1. U. vitellina
23. Lower lip of corolla entire or emarginate, corolla 6–10 mm. Pedicels strongly recurved in fruit.
3. U. bifida
20. Corolla mauve or white.
7. U. baouleensis
4. U. uliginosa

Terrestrial. Rhizoids capillary, simple. Stolons capillary, sparsely branched. Foliar organs present at anthesis, sparsely rosetulate, narrowly linear, membranous, 1–2 cm long, 0.5–1 mm wide, 1-nerved, apex rounded. Traps few on the stolons and foliar organs, globose, 0.5–1 mm long, shortly stalked, mouth basal, upper lip with 2 short subulate reflexed appendages. Inflorescence erect, 2.5–5 cm long; peduncle filiform, terete, glabrous; flowers 1–2; scales few in the lower third of the peduncle, the lowermost usually at its very base, similar to the bracts; bracts basifixed, ovate-deltoid, acute, slightly shorter than the bract; pedicels spreading, usually curved, 4–8 mm long, dorsiventrally flattened, very narrowly winged. Calyx lobes unequal, upper narrowly ovate, c. 4.5 mm long, apex obtuse, lower similar but c. 3 mm long, apex obscurely bidentate. Corolla yellow streaked with brown, 15–22 mm long, upper lip obovate-oblong to ± orbicular, slightly longer than the upper calyx lobe, apex rounded or emarginate, lower lip much larger, up to 10 mm wide, ± orbicular, apex distinctly 3-lobed, palate scarcely prominent, spur subulate, about as long as the lower lip but widely diverging from it, usually strongly curved. Filaments filiform, ± straight, c. 1 mm long, anther thecae distinct. Ovary ovoid, style short, distinct, stigma lower lip orbicular, upper obsolete. Capsule and seeds not known.

Distr. Malesia: Malay Peninsula (Pahang: G. Tahan and G. Kerbau only).

2. Utricularia involvens RIDL. J. Bot. 33 (1895) 11; PRAIN, J. As. Soc. Beng. 74, ii (1905) 371; RIDL. Fl. Mal. Pen. 2 (1923) 493, f. 121; SPARE, Mal. Nat. J. 1 (1940) 89. — Fig. 3.
Terrestrial. Rhizoids few, capillary, basally
thickened, with numerous papillose branches 0.5–1 mm long. Stolons few, capillary, branched. Foliar organs usually conspicuous at anthesis, rosetate and on the stolons, obovate to narrowly obleng, membranous, up to 2.5 cm long, 2–4 mm wide, multinnerved, apex rounded. Traps on the vegetative organs, globose, 0.5–1 mm long, shortly stalked, mouth basal, upper lip with 2 simple subulate appendages, lower lip with 1 short obtuse appendage. Inflorescence twining, up to 30 cm long; peduncle filiform, terete, glabrous; flowers 2–6, distant; scales numerous, similar to the bracts; bracteoles basifixed, ovate, acute, 2–3 mm long; bracteoles subulate, shorter than the branch; pedicels erect or spreading, filiform, 10–15 mm long, narrowly winged. Calyx lobes subequal, ovate to

Fig. 1. Utricularia vitellina Ridl. a. Flowering plant, × 4, b. trap, × 24, c. bract & bracteoles, × 12, d. corolla, the two lips from inside, × 4, e. stamen, × 12, f. pistil, × 12, g. calyx, × 6 (all after Ridley, type, except b SPARE S4/41).

broadly ovate, 4–5 mm long at anthesis, up to 7 mm long in fruit, upper slightly larger, apex obtuse or subacute, lower shortly bidentate. Corolla yellow, 11–20 mm long, upper lip orbicular, longer than the upper calyx lobe, 7–12 mm wide, apex rounded, lower lip ± orbicular, up to 15 mm wide, apex emarginate, palate very conspicuously raised, gibbous, extending almost to the apex of lower lip, spur subulate, straight or slightly curved, about as long as but widely diverging from the lower lip. Filaments linear, curved, c. 1.5 mm long, anther thecae subdistinct. Ovary ovoid, style relatively long, stigma lower lip orbicular, deflexed, upper lip obsolete. Capsule broadly ovoid, dorsiventrally compressed, uniformly membranous, 4–5 mm long, dehiscing by dorsal and ventral longitudinal slits. Seeds numerous, ovoid, c. 0.4 mm long, testa conspicuously coarsely reticulate, reticulations elongate.

Distr. S. Burma (Tenasserim), Thailand, N. Australia, and Malesia: Malay Peninsula (Kedah Peak, G. Jerai).


Terrestrial. Rhizoids few, capillary, basally thickened, with numerous papillose branches 0.5–1 mm long. Stolons few, capillary, branched. Foliar organs usually ± conspicuous at anthesis on the stolons, narrowly linear, membranous, 1–2 cm long, up to 1 mm wide, 1-nerved, apex rounded. Traps on the vegetative organs, globose, 0.6–1 mm long, stalked, mouth basal, upper lip with 2 simple subulate appendages, lower lip with a ± well developed obtuse swelling at the distal end of the stalk. Inflorescence erect, 5–20 cm long; peduncle filiform, terete, glabrous above, minutely glandular.

Fig. 3. Utricularia involvens RIDL. a. Trap, × 24, b. bract & bracteoles, × 12, c. corolla, the two lips from inside, × 2, d. pistil, × 12, e. stamen, × 12, f. fruiting calyx, × 2, g. dehisced capsule, × 4, h. seed, × 24 (a, b, h DING HOU 783, the others after RIDLEY, type).

Fig. 4. Utricularia bifida L. a. Foliar organ, × 6, b. trap, × 24, c. bract & bracteoles, × 15, d. flower, × 6, e. upper lip of corolla, × 6, f. stamen, × 12, g. pistil, × 12, h. fruiting calyx, × 6, i. capsule, × 6, j. seed, × 45, k. testa, × 75 (all after LARSEN 5121).
below; flowers 1–10, distant; scales few, similar to the bracts; bracts basifixed, broadly ovate-oblong, obtuse, c. 1 mm long; bracteoles linear-subulate, c. 0.5 mm long; pedicels erect at anthesis strongly recurved in fruit, filiform, distinctly winged, 20 mm long. Calyx lobes subequal, the upper slightly larger, broadly ovate, base ± broadly connate and decurrent, apex obtuse, c. 3 mm long at anthesis, up to 6 mm long in fruit. Corolla yellow, 6–10 mm long, upper lip narrowly oblong, 1–2 mm wide, apex rounded, slightly longer than upper calyx lobe, lower lip ± orbicular, up to 4 mm wide, apex rounded, palate conspicuously raised, gibbous, spur subulate, acute, curved, longer than and widely diverging from the lower lip. Filaments oblong, straight, c. 1 mm long, c. 0.5 mm wide, anther thecae subdistinct. Ovary ovoid, style short but distinct, stigma lower lip quadrate, deflexed, upper lip much shorter, entire or bidenticulate. Capsule broadly elliptic, dorsiventrally compressed, uniformly membranous, 2.5–3 mm long, dehiscing by a single ventral longitudinal slit. Seeds numerous, ± ovoid, c. 0.4 mm long, testa rugose, reticulate, reticulations relatively large, elongate.

Distr. India to China and Japan, Indo-China, Malesia to northern Australia; in Malesia not recorded from the Lesser Sunda Is. (but present in Kangean Is.) or Moluccas, but common elsewhere.

Ecol. Swamps and marshes, sometimes as a weed in rice-fields, on moist sandy plains, floating in lakes, in Sphenagham swamps, on edge of Mela-leuca swamp and in moist Eucalypt savannahs, mainly at low altitude, but up to at least 2000 m (in Java and New Guinea). Fl. Jan.–Dec.


Terrestrial. Rhizoids few capillary, basally thickened, with numerous papillose branches c. 1 mm long. Stolons few, capillary, branched, up to 6 cm long or more. Foliar organs often not conspicuous at anthesis, on the stolons, ovate to linear, narrowed to a 2 mm long, 1.5–3 mm wide, multinerved, apex obtuse to subacute. Traps on the stolons and foliar organs, globose, 1–2 mm long, shortly stalked, mouth basal, upper lip with 2 simple subulate appendages. Inflorescence erect, up to 30 cm long; peduncle filiform, terete, glabrous; flowers 2–10, rather distant; scales few, similar to the bracts; bracts basifixed, ovate, acuminate, 2–3 mm long, 3-nerved; bracteoles subulate, about half as long as the bract, 1-nerved; pedicels erect 1.5–2 mm long at anthesis, often spreading and up to 3 mm long in fruit, filiform distinctly winged. Calyx lobes subequal, very broadly ovate to almost orbicular, c. 2.5 mm long at anthesis, up to 5 mm long in fruit, surface minutely papillose, margin usually minutely denticulate, upper lobe slightly larger, apex very shortly acuminate, lower with apex shortly bifid. Corolla blue, violet, mauve or white, 3–7 mm long, upper lip ± orbicular scarcely longer than upper calyx lobe, apex rounded, emarginate or ± bifid, lower lip larger, ± orbicular, apex rounded, entire or ± obscurely 3-crenate, palate raised, gibbous, spur conical-subulate, acute, curved or ± straight, longer than and widely diverging from the lower lip. Filaments linear, curved, c. 1.5 mm long, anther thecae distinct. Ovary ovoid, style short but distinct, stigma lower lip quadrate, upper lip obsolete. Capsule broadly ellipsoid, dorsiventrally compressed, 2–4 mm long uniformly membranous, dehiscing by dorsal and ventral longitudinal slits. Seeds numerous, ± globose or very broadly ellipsoid, c. 0.3–0.4 mm long, testa thin, conspicuously reticulate, reticulations ± regularly hexagonal isodiametric or very slightly elongate, hilum not prominent.

Distr. India to Japan and Australia, also in New Caledonia; in Malesia: Sumatra (also Banks & RIOW IS.), Malaya, Java, Borneo, and New Guinea.


Terrestrial.Rhizoids numerous, capillary, with papillose branches c. 0.5 mm long. Stolons few capillary branched. Foliar organs on the stolons, linear, membranous, up to 1 cm long, c. 1 mm wide, 1-nerved, apex rounded or subacute. Traps on the vegetative organs, globose, 0.6–1 mm long, shortly stalked, mouth basal, upper lip with 2 simple subulate recurved appendages, lower lip with 1 shorter truncate or shortly bifid usually apically glandular appendage. Inflorescence twining, 3–35 cm long; peduncle filiform, terete, glabrous; flowers 1–8, distant, with 1 or 2 sterile bracts on the internodes; scales few, similar to the bracts; bracts broadly ovate-deltoid, acute or acuminate, 1–1.5 mm long, nerveless; bracteoles linear-lanceolate, about as long as the bract nerveless; pedicels erect, filiform, narrowly winged, about as long as the flowering calyx. Calyx lobes subequal, ovate or broadly ovate, 2.5–3 mm long at anthesis, up to 5 mm long in fruit, upper slightly larger, apex shortly acuminate, lower with apex shortly bi- or tridentate. Corolla yellow, 5–10 mm long, upper lip oblong, usually shorter and narrower than upper calyx lobe, apex rounded, entire or emarginate or ± bifid, lower lip larger, 2–3–5-lobed, apex rounded, entire or 2–3–5-crenate, palate ± raised, smooth or 2–4-gibbous, spur subulate, acute, curved, longer than and widely diverging from the lower lip. Filaments linear, ± straight, anther theca ± confluent. Ovary ovoid, style short, indistinct, stigma lower lip semi-orbicular, upper lip similar, smaller. Capsule oblong-ovoid, dorsiventrally compressed, membranous, 2–2.5 mm long, dehiscing by a single ventral longitudinal marginally thickened slit. Seeds numerous, broadly ellipsoid or ovoid, c. 0.2 mm long, testa thin, smooth, reticulate, reticulations elongate, hilum lateral, prominent.

Distr. Tropical Africa, South Africa, Madagascar, India, Indo-China, through Malesia to N. Australia; in Malesia: a single record from Malay Peninsula (G. Ledang) and more widespread in New Guinea and the adjacent Aru Is.

Ecol. Damp places twining up grasses, in Malaya at 1200 m, ascending in New Guinea from the lowland to 2700 m. Fl. April–Aug.

6. Utricularia heterosepala BENJ. Linnaea 20 (1847) 310; MIQ. Fl. Ind. Bat. 2 (1859) 1000; VIDAL, Rev. Pl. Vasc. Filip. (1886) 200; MERR. En. Filipp. 3 (1923) 466. — Fig. 7.

Terrestrial. Rhizoids few, capillary, basally thickened, with numerous papillose branches c. 0.5 mm long. Stolons numerous capillary, much branched and mat-forming, up to 15 cm long or more. Foliar organs very numerous and conspicuous at anthesis, on the stolons, narrowly ovate or linear, membranous, 1.5–2 mm long, 2–3–5-nerved, apex rounded, multinerved. Traps numerous on the vegetative organs, globose, 1–2 mm long, shortly stalked, mouth basal, upper lip with 2 long simple subulate appendages, lower lip sometimes

Fig. 6. Utricularia scandens BENJ. a. Base of peduncle with rhizoids, foliar organ and traps, × 4, b. trap, × 30, c. bract & bracteoles, × 15, d. calyx, × 6, e. a large flower, × 4, f. two small flowers, × 4, g. upper lip, × 6, h. stamens, × 15, i. pistil, × 15, j. fruit concealed by calyx, × 4, k. fruiting calyx, × 6, l. seeds, × 45 (all after LARSEN 6195, except a and e MILNE-REDHEAD & TAYLOR 8008B).
with a small ± obscure lamelliform projection at the distal end of the stalk. Inflorescence erect, 4–15 cm long; peduncle filiform, terete, glabrous; flowers 3–12, distant; scales few, similar to the bracts; bracts basifixed, ovate-deltoid, acute, 2–3 mm long, 3-nerved; bracteoles absent; pedicels erect, filiform, very narrowly winged. Calyx lobes subequal at anthesis, very unequal in fruit, narrowly ovate, both c. 4 mm long at anthesis, apex of upper acute, of lower obscurely bidentate, lower conspicuously accrescent and up to 6 mm long and 2.5 mm wide in fruit. Corolla pink or white, 8–11 mm long, upper lip narrowly oblong or oblong-ovate, about 1 1/2 times as long as upper lobe, apex rounded or truncate, lower lip larger, ± orbicular, apex rounded, entire or emarginate, palate conspicuously raised, gibbous, spur subulate, acute, curved, longer than and widely diverging from the lower lip. Filaments linear, straight, c. 1 mm long, anther thecae ± confluent. Ovary ovoid, style short, stigma lower lip quadrato, deflexed, upper lip much smaller, rounded. Capsule very narrowly ovoid, membranous, c. 3 mm long, dehiscing by a ventral longitudinal marginally thickened slit. Seeds few, globose, c. 0.5 mm long, testa thin, reticulate, reticulations distinct, isodiametric or slightly elongate.


Ecol. In wet places on stones in the forest and along streams and creeks at medium and low altitudes (MERRILL). Fl. Febr.–May.

Note. Specimens of this very distinct species (ELMER 13127, Palawan) were distributed bearing the manuscript name *U. elmeri* STAPF. I can find no evidence of this name ever being published.

Back. Onkr. Suiker. (1931) 635; Bakh. f. in Back. Bekn. Fl. Java (em. ed.) 8 (1949) fam. 194, p. 3. — Fig. 2a, b.

Terrestrial. Rhizoids few, capillary, with numerous papillose branches c. 0.5 mm long. Stolons few, capillary branched, up to 5 cm long. Foliar organs usually not conspicuous at anthesis, on the stolons, linear, membranous, up to 3 cm long, 0.4–1 mm wide, apex acute or rounded, 1-nerved. Traps few on the stolons and foliar organs, globose, 0.8–1.2 mm long, shortly stalked, mouth basal, upper lip with 2 filiform-subulate sparsely branched appendages. Inflorescence twining, up to 20 cm long; peduncle capillary, terete, glabrous; flowers 2–5, very distant; scales few, similar to the bracts; bracts ovate to ovate-oblong, c. 1.2 mm long, nerveless, apex obtuse to shortly acuminate; bracteoles linear-lanceolate, acute, ± straight, about half as long as the bract, nerveless; pedicels erect at anthesis, sharply reflexed in fruit, about as long as the calyx, filiform, dorsiventrally flattened and narrowly winged. Calyx lobes subequal, ovate, obtuse to subacute, c. 2 mm long at anthesis, 3.5–4 mm long in fruit. Corolla pale blue or mauve, 3–4 mm long, upper lip oblong, apex truncate, slightly longer than the upper calyx lobe, lower lip larger, ± orbicular, apex obscurely 3-crenate, palate scarcely raised, spur narrowly conical, obtuse, longer than and ± diverging from the lower lip. Filaments linear, ± straight, anthers c. 0.3 mm long, thecae subdistinct. Ovary ovoid, style short, distinct, stigma lower lip orbicular, upper much shorter, truncate. Capsule broadly ovoid, dorsiventrally compressed, membranous, dehiscent by a longitudinal ventral marginally thickened slit. Seeds numerous, ovoid or ellipsoid, c. 0.3 mm long, testa loose, corky, distinctly reticulate, reticulations elongate.

Distr. Scattered in tropical Africa from Mali to Mozambique, in Madagascar, India, China (Hainan), Thailand, and Malesia to Queensland; in Malesia: E. Java (Madura: Lampey), Philippines (Luzon).


Note. This extremely widespread and distinct but very inconspicuous species is probably much commoner than the few specimens seen (less than 20) would suggest. Despite the wide geographical range the Queensland examples (and all from intermediate localities) are identical in every respect with those from West Africa.


Terrestrial. Rhizoids numerous, capillary, with numerous short papillose branches. Stolons few, capillary, sparsely branched. Foliar organs not usually conspicuous at anthesis, on the stolons, narrowly linear, up to 3 cm long and 0.7 mm wide, 1-nerved. Traps few on the stolons and foliar organs, obliquely ovoid, 0.4–0.7 mm long, sessile, mouth lateral, upper lip with a prominent dorsiventrally flattened, apically rounded appendage fringed with long unicellular setae, lower lip with a shorter appendage fringed with shorter setae.

Inflorescence erect, up to 55 cm long (–63 sile Pulleen); peduncle filiform, terete, glabrous throughout or minutely papillose at the base; flowers 1–15, distant; scales simple, especially above, similar to the bracts; bracts basifixed, ovate-deltoid, 1–1.5 mm long, base shortly auriculate, apex acute or acuminate, 1–3-nerved; bracteoles linear-subulate, acute, 0.6–1 mm long; pedicels erect, c. 1.5 mm long, terete. Calyx lobes unequal, upper broadly ovate, cucullate, c. 2.5 mm long, apex rounded, scarcely accrescent, nerves c. 9, plicate, lower narrowly ovate, about as long, apex emarginate, 5-nerved. Corolla bright yellow with an orange palate and externally tinged with reddish brown, c. 10 mm long, upper lip ± orbicular, apex retuse, longer than upper calyx lobe, lower lip much larger, ± orbicular in outline, apex ± deeply 4-lobed, palate prominent, bigibbous, spur subulate, curved, acute, about as long as the lower lip and diverging from it at an angle of c. 90°. Filaments linear, c. 1.5 mm long, anthers c. 1 mm long, c. 0.3 mm wide, thecae distinct. Ovary ovoid, style short but distinct, stigma lower lip orbicular, upper minute, deltoid. Capsule globose, c. 2 mm long, firm and relatively thick, dehiscent by a ventral narrowly linear lanceolate pore. Seeds numer-
ous, obovoid, c. 0.25 mm long, hilum terminal, distinct, testa thin, reticulate, reticulations slightly elongate.

Distr. Australia (northern W. Australia, Northern Territory and Queensland) and Malesia: New Guinea (Papua).


Note. This well known Australian species has been discovered (as has U. muelleri) in a number of localities in Papua relatively recently. It is possible that other smaller and less conspicuous Australian species may yet be found in the same region.


Terrestrial. Rhizoids few, capillary, simple. Stolons capillary, sparsely branched. Foliar organs sparsely rosulate and on the stolons, narrowly linear to narrowly obovate-spathulate, up to 2 cm by 0.5-1 mm, apex obtuse, 1-nerved. Traps numerous on the vegetative organs, broadly ovoid, c. 0.2 mm long, stalked, mouth lateral, upper lip with a solitary multicellular subulate appendage, lower lip with radiating rows of basally conuate obliquely gland-tipped processes. Inflorescence erect, 3-12 cm long, glabrous or with a few short sepalate hairs on the peduncle; peduncle terete, filiform; flowers 1-10, distant; scales numerous, similar to the bracts; bracts basifixed, narrowly ovate, acute, 0.8-1 mm long; bracteoles similar or less acute; additional bracts subtending dormant (inflorescence branch) buds usually present on inflorescence axis a short distance above each or most of those subtending flowers; pedicels erect, capillary terete, c. 1 mm long. Calyx lobes subequal, broadly ovate, 1-2 mm long, apex of upper obtuse, of lower emarginate, nerves obscure, not raised. Corolla mauve or white, 2.5-7 mm long, upper lip narrowly oblong, much longer than upper calyx lobe, apex emarginate or rounded, lower lip larger, ± orbicular, obscurely to distinctly 3-lobed, palate raised, spur subulate, obtuse, straight, usually much longer than and parallel with the lower lip. Filaments linear curved, anther thecae ± confluent. Ovary ovoid, style short, stigma lower lip orbicular, upper lip much smaller, deltoid.

Fig. 10. Utricularia minutissima VAHL. a. Stolon with traps and foliar organ, × 12, b. trap, × 75, c. ditto, dorsal view, × 75, d. bract & bracteoles, × 12, e. flower, lateral view, × 6, f. ditto, frontal view, × 6, g. pistil, × 12, h. stamen, × 12, i. capsule, asymmetric in lateral view, × 12, j. fruiting calyx, × 12, k. dehisced capsule, × 12, l. seeds, × 45, m. dehisced capsule, × 12, n. flowering (left) and fruiting calyces, × 6, o. seed, × 45 (a-c MEIJER 26395, d–l. RAYNAL.17295, m–o MEIJER 26395).
Capsule obliquely oblong-ovoid, 1.5–2 mm long, membranous in texture, translucent, dehiscing by a longitudinal ventral slit which is marginally scarcely thickened. Seeds few globose, 0.17–0.2 mm long, testa smooth, reticulate, reticulations relatively large, ± isodiametric.

Dist. India to China and Japan, Indo-China, Malesia, and Australia (Northern Territory and Queensland); in Malesia: Sumatra, Malaya, Borneo, Philippines, and New Guinea.

Ecol. Damp open sandy or rocky places and peaty swamps, also found on wet limestone, mostly at low altitude but ascending to 2100 m on G. Tahan (Malaya). Fl. March–Dec.

Note. This species is very variable in overall and in flower size, and the degree to which the lower corolla lip is lobed. The peduncle varies from quite glabrous to sparingly hairy or the hairs when present do not extend to the calyx as in *U. hirta*. The rigid patent bristly hairs' mentioned by Prain and often present are in fact not hairs but fungal growths.

10. *Utricularia hirta* Klein ex Link, Jahrb. 1, 3 (1820) 55; Oliver, J. Linn. Soc. Lond. Bot. 3 (1859) 183; Clarke, Fl. Br. Ind. 4 (1884) 332;


Terrestrial. Rhizoids few, capillary, simple. Stolons capillary, sparsely branched. Foliar organs sparsely rosulate and on the stolons, narrowly obovate-spathulate, up to 2 cm by 0.5–1 mm, apex obtuse, 1-nerved. Traps numerous on the vegetative organs, broadly ovoid, c. 0.2 mm long, stalked, mouth lateral, upper lip with a solitary multicellular subulate appendage, lower lip with radiating rows of basally connate obliquely gland-tipped processes. Inflorescence erect, 8–30 cm long, ± densely covered throughout (including the calyx and at least the spur of the corolla) with short to long sepalate petals; peduncle filiform, terete; flowers 1–5, distant.; scales numerous, similar to the bracts; bracts basifixed, narrowly ovate, acute, 1–1.2 mm long; bracteoles slightly narrower and longer; additional bracts subtending dormant inflorescence branch) buds usually present on inflorescence axis a short or very short distance above each or most of those subtending flowers; pedicels erect, capillary, terete, 1–2 mm long. Calyx lobes subequal, broadly ovate, 2–3.5 mm long, upper slightly smaller, apex obtuse, nerves raised, lower relatively broader, apex emarginate or obscurely tridentate. Corolla mauve or white, 8–10 mm long, upper lip narrowly oblong, much longer than and upper calyx lobe, apex emarginate, lower lip larger, ± orbicular, distinctly 3-lobed, palate raised, spur subulate, acute apically curved, usually longer than and ± parallel with the lower lip. Filaments linear, curved, anther thecae distinct. Ovary ovoid, style short but distinct, stigma lower lip orbicular, upper lip much smaller, del- toid. Capsule oblong-ovoid to globose, 1.5–2.5 mm long, firm in texture, opaque, dehiscing by a longi- tudinal ventral marginally thickened slit. Seeds few, ± globose, c. 0.25 mm long, testa smooth, reticulate, reticulations relatively large, slightly elongate.

Distr. India, Indo-China, Thailand and Malesia: Borneo (Bako National Park).

Ecol. Damp open sandy or muddy places at low altitude. Fl. Febr., July.

Note. Very similar to *U. minutissima* (with which it sometimes occurs) but distinguished by its larger size, larger flowers and hairy calyx.


Terrestrial. Rhizoids few to very numerous, capillary, simple. Stolons capillary, sparsely branched. Foliar organs not always conspicuous at anthesis, rosulate and on the stolons, narrowly obovate-spathulate, up to 7 mm long and 1.5 mm wide, apex rounded, 1-nerved. Traps rather few on the vegetative organs, ± dimorphic, ovoid, shortly stalked, mouth terminal, oblique, the larger traps up to 1.5 mm long including a long carinate beak on the upper lip, the smaller traps about half as long with a relatively shorter beak, mouth and base of both types densely stipitate-glandular. Inflorescence erect, 5–30 cm long; peduncle filiform to relatively stout, 0.3–1.5 mm thick, terete, glabrous; flowers 1–20 or more very variably disposed, distant to quite densely congested and sub capititate; scales numerous, similar to the bracts; bracts mediatrix, variously attached above or below the middle, narrowly rhombic, acuminate at both extremities, 2–2.5 mm long; bracteoles similar but of shorter and narrower; pedicels erect at anthesis, spreading or reflected in fruit, filiform, terete, 0.5–1 mm long. Calyx lobes unequal, usually minutely papillose, upper ovate-oblong, cucullate, 2–3 mm long, apex rounded, lower shorter, transversely elliptic with conspicuously

inrolled margins. Corolla pink, mauve, purple or blue, often white and sometimes yellow, 4–10 mm long, externally minutely papillose, upper lip narrowly ovate-oblong, longer than upper calyx lobe, apex rounded or truncate, lower lip larger, ± orbicular, apex retuse, palate raised, ± conspicuously transversely crenated, spur narrowly conical or cylindrical from a broader conical base, straight or curved, usually longer than and ± parallel with the lower lip. Filaments filiform, straight, c. 1 mm long, anther thecae distinct, minutely papillose. Owary ovoid, style variably in length, usually distinct, stigma lower lip orbicular, upper

Fig. 12. Utricularia caerulea L. a. Foliar organ, × 6, b. large and small trap, × 24, c. bract & bracteoles, all petiolate attached, × 6, detail of surface papillae, × 24, d. calyx in flower, × 6, detail of surface papillae, × 24, e. flower, lateral view, and upper lip from front, f. flower, front view, g. small flower, all × 6, h. stamen, × 12, i. pistil, × 12, j. calyx with fruit, × 6, k. fruit exposed, × 6, l. seed, × 45, with detail of testa enlarged, × 75 (all after J. RAYNAL 17069, large form, except a–d, g LARSEN 5160, small form).
lip minute, deltoid. *Capsule* globose, c. 2 mm long, firm, opaque, dehiscing by a ventral longitudinal slit. *Seeds* numerous, obliquely oblong-ellipsoid, c. 0.5 mm long, testa thin, smooth to distinctly papillose, obscurely reticulate, reticulations elongated.

Distr. India to China and Japan and Australia; in *Malesia*; not recorded from the Lesser Sunda Is. (but present in Kangean Is.) or Celebes, but otherwise widespread and common.

Ecol. Damp or wet open situations on sand (also on kerangas and in heath-forest) or mud both under everwet and seasonal climatic conditions, from sea-level to 2700 m. *Fl.* Jan.-Dec.

Note. This is an excessively variable plant in which the extreme forms, often of quite distinct appearance, are linked by intermediates.


Epiphytic or terrestrial. *Rhizoids* few, capillary, simple. Inflorescence numerous and conspicuous at anthesis, roseulate and on the stolons, obovate, orbiculate or reniform with a ± distinct pseudopetiole, membranous, 3-10 mm long, up to 6 mm wide, with numerous dichotomously branched nerves. *Traps* numerous on the stolons, obliquely globose or ovoid, 0.6-0.8 mm long, long stalked, mouth lateral, upper lip projecting with 2 divergent stipitate-glandular appendages. *Inflorescence* erect, 1-13 cm long; peduncle filiform, glabrous, usually less than 1 cm long; whorl persistent; scales few, similar to the bracts; bracts medifixed, lanceolate, apex obtuse or acute, base truncate to acute; bracteoles similar; pedicels spreading at anthesis, ± reflexed in fruit, capillary, usually less than 0.2 mm thick. *Calyx lobes* very unequal, papillose, upper orbiculare-obcordate, 1.5-2.5 mm long at anthesis, apex emarginate, lower very much smaller, ovate-oblong, apex truncate or retuse. *Corolla* white, pink or mauve with a yellow spot on the palate, 3-10 mm long, upper lip minute, semi-ovaricle, apex bifid, very much shorter than the upper calyx lobe, lower lip orbiculate or transversely elliptic, 3-10 mm wide, apex ± distinctly 3-5-lobed, palate slightly raised, spur subulate,

![Fig. 13. *Utricularia striatula* J.SM. a. Foliar organ, × 6, b-c. trap, lateral & ventral views, × 24, d. insertion of pedicel, with bract & bracteoles in situ, × 6, e. the latter enlarged, × 12, f. calyx in flower, × 6, g. flower calyx lobe bent back to show upper corolla lip, × 5, h. ditto, in lateral view, × 5, i. upper & lower lip flattened, × 6, j-k. two flowers, × 5, l-o. four ditto, × 5, p. stamens, × 12, q. pistil, × 12, r. dehisced fruit, × 6, s. fruit in lateral view, × 6, t. seed, × 45 (a–c, g–h, i–t ALLEN s.n., Borneo, f-i q J. RAYNAL 16843, d–e, i–k CRUTTWELL 201).]
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13. Utricularia pulchra P. TAYLOR, sp. nov. — Fig. 15.

Affinis U. striatulae J.Sm. sed floribus duplo majoribus, paucioribus in inflorescentia crassiore congestis differt. — Type: New Guinea, Irian Jaya, Tembagapura (southern slopes of Mt Carstensz), alt. 2400 m, 30 April 1973, RAYNAL 17440 (K, P).
— U. striatula (non J.Sm.) RIDL. Trans. Linn. Soc.

usually curved, 1–4 mm long, shorter than and ± parallel with or somewhat divergent from the lower lip. Filaments filiform, c. 0.6 mm long, anther thecae subdistinct. Ovary globose, style short but distinct, stigma lower lip semi-ornicular, upper obsolete. Capsule ± globose, obliquely dorsiventrally compressed, membranous, obscurely ventrally keeled, dehiscing by a ventral longitudinal slit. Seeds few, pyriform or obovoid, c. 0.25 mm long, hilum terminal, prominent, testa smooth, bearing, especially distally, numerous unicellular apically glochidiate processes.

Distr. Tropical Africa (but apparently absent from Madagascar), widespread from India to China, Indo-China and throughout Malesia.

Ecol. Rocks or trees or less commonly damp soil among moss in somewhat shady permanently moist conditions, on mossy tree trunks, on stones in rivers, near waterfalls, on wet talus, from sea-level up to 3300 m. Fl. Jan.–Dec.


Fig. 14. Utricularia striatula J.Sm. Epiphytic on a tree trunk in primary forest on sandstone at Lubuk Bangko, 20 km E of Pajakumbuh, Central West Sumatra, Febr. 2, 1957. Photogr. W. MEIJER. Note orbicular foliar organs at right margin.

Fig. 15. Utricularia pulchra P. TAYLOR. a. Habit of vegetative parts, × 4, b–c. trap, lateral & dorsal views, × 24, d. bract & bracteoles, × 8, e. their insertion, × 6, f. calyx, × 4, g. (large) flower, × 3, h. upper lip, ventral & lateral views, × 6, detail of hairs, × 24, i. stamens, × 12, j. pistil with circular adnation to calyx at base, × 12 (all after J. RAYNAL 17440, type).
Terrestrial. Rhizoids few, capillary, simple. Stolons few, capillary, up to 5 cm long. Foliar organs present at anthesis, rosulate and on the stolons, reniform, fleshy, ± pseudopetiolate, 2-4 mm long. Traps numerous on the stolons, globose, 0.6-1 mm long, stalked, mouth lateral, upper lip projecting, with 2 short divergent stipitate-glandular appendages. Inflorescence erect, 4-6 cm long; peduncle filiform, glabrous, 0.5-0.7 mm thick; flowers 1-3, congested; scales 1 or 0, similar to the bracts; bracts medifixed, ovate, 1.5-2 mm long, apex obtuse, base truncate or bidenticate; bracteoles similar; pedicels erect, filiform, dorsiventrally flattened, 4-5 mm long, c. 0.5 mm wide. Calyx lobes very unequal, papilllose, upper orbicular or broadly reniform, apex rounded or retuse, 3-4 mm long, 3.5-5 mm wide, lower much smaller, orbicular or broadly ovate, 2-2.5 mm long. Corolla mauve or violet with a yellow spot on the palate, 17-20 mm long, upper lip about as long as upper calyx lobe, oblong, cuculate, apex emarginate, lower lip lobellate, 5-lobed, up to 20 mm wide, palate slightly raised, spur subulate, ± straight, 10-12 mm long, as long as or longer than the lower lip and diverging from it at a very obtuse angle. Filaments linear, c. 1.2 mm long, anther thecae distinct. Ovary obliquely ovoid, c. 1.5 mm long, style very short, stigma lower lip semi-orbicular, upper lip obsolete. Capsule and seeds not known.


Ecol. Wet cliffs and damp leached sand or among moss, 2400-3000 m. Fl. March-April, Oct.

Note. U. pulchra is very close to U. striatula but differs constantly in its fewer, much larger flowers and its shorter stouter habit.

14. Utricularia salwinensis Hand.-Mazz. Symb. Sin. 7 (1936) 873. — Fig. 16.

Terrestrial. Rhizoids few, capillary, simple. Stolons capillary, sparsely branched, up to 5 cm long. Foliar organs present at anthesis, sparsely rosulate and on the stolons, flabellate, cuneate or obovate-spathulate, to orbicular, with a distinct pseudopetiole, 1.5-3.6 mm wide, up to 2.5 cm long. Traps rather few on the stolons, ovoid, long stalked, c. 0.8 mm long, mouth lateral, upper lip with a relatively large flabellate appendage c. 1 mm long and 2 mm wide including c. 8 marginal subulate multicellular gland-tipped processes. Inflorescence erect, up to 8 cm long; peduncle filiform, terete, glabrous; flowers 1-3, ± distant; scales 0 or 1 in the upper part of the peduncle, similar to the bracts; bracts medifixed, ovate, membranous, sparsely glandular, 1.2-1.5 mm long, apex acute, base truncate, apiculate; bracteoles similar but base obliquely truncate; pedicels erect at anthesis, strongly recurved in fruit, 2-4 mm long. Calyx lobes very unequal, papilllose, upper ± orbicular, c. 1.5 mm long at anthesis, up to 3 mm long in fruit, apex emarginate, lower much smaller, ovate-oblong. Lip, 1.5 mm long, apex obtuse or rounded. Corolla white (in Mal.) with a yellow (fade de Wilde) or brown (fade van Steenis) spot on the palate or pale (in Yunnan, fade Handel-Mazzetti), 4-6 mm long, upper lip transversely oblong, cuculate, apex emarginate, much shorter than upper calyx lobe, lower lip flabellate, 4-5 mm wide, 3-lobed, midlobe quadrate or semi-orbicular, side lobes smaller, obliquely and obscurely unequally 2-lobed, palate scarcely raised, shortly fimbriate, spur narrowly cylindrical, apex obtuse, much shorter than the lower lip. Filaments filiform, c. 1 mm long, anther thecae distinct. Ovary globose, c. 0.6 mm long, style very short, stigma lower lip orbicular, upper lip minute, deltoid. Capsule globose, obliquely dorsiventrally compressed, c. 2 mm long, dehiscent by a longitudinal ventral slit. Seeds few, ovoid, c. 0.5 mm long, shortly densely echinate.
Distr. China (Yunnan) and Malesia: N. Sumatra (Gajo Lands: Ms Goh Lembuh, Kemiri, Bandahara, Mamas, and Losir).

Ecol. Moist sandy rocky or mossy places in open or low scrub, 2500–3300 m. Fl. Febr.–May.

Note. The only difference between the Yunnan and Sumatra plants is the recorded corolla colour and this is not considered significant. Similarly distribution of mountain plants are not unknown.


Terrestrial. Rhizoids few, filiform, basally thickened, with numerous, often geminate, papilllose branches c. 0.5 mm long. Stolons capillary, branched. Foliar organs often not present or conspicuous at anthesis, on the stolons, narrowly linear, 1.5–2.5 cm long, c. 0.3 mm wide, 1-nerved, apex acute. Traps few on the stolons and foliar organs, obliquely ovoid, 0.5–1 mm long, stalked, stalk 2–3 times as long as trap, mouth lateral, upper lip with 2 long densely hairy setiform appendages. Inflorescence erect, up to 25 cm long; peduncle filiform, glabrous or basally glabrous, 0.5–0.8 mm thick; flowers 2–10, rather distant; scales few, similar to the bracts; bracts medifixed, narrowly elliptic, 1.5–2 mm long, apex acute, base acute or obliquely truncate; bracteoles absent; pedicels filiform, slightly dorsiventrally flattened, minutely papilllose, distinctively curved, erect at base and apex, spreading in the middle part, up to 6 mm long in fruit. Calyx lobes unequal, upper transversely elliptic, apex rounded, up to 1.5 mm long in fruit, lower ovobate-oblong, apex rounded or obscurely crenululate, up to 2 mm long in fruit. Corolla violet, pink or white, 4.5–6 mm long, upper lip broadly ovate, about twice as long as upper calyx lobe, apex rounded; lower lip larger, quadrate, bilobed to half its length, lobes ovate-oblong, curved upward half palate raised, spur narrowly cylindrical from a conical base, apex obtuse, somewhat longer than lower lip. Filaments linear, strongly curved, flattened and apically dilated, c. 0.6 mm long, anthers c. 0.3 mm long, thecae confluent. Ovary globose, style short, stigma lower lip orbicular, upper lip obsolete. Capsule globose, c. 2 mm long, membranous, dehiscing by a longitudinal central marginally thickened slit, the thickened area before dehiscence apically acute, broader and emarginate at the base. Seeds numerous, globose or slightly angular, c. 0.25 mm long, testa thin, coarsely reticulate, reticulation ± isodiametric.

Distr. Indo-China, Thailand, and Australia; in Malesia: Malay Peninsula and New Guinea.


Note. U. limosa belongs to a small, very distinct group of species, the others in the group being apparently confined to Australia.


Terrestrial. Rhizoids few, capillary, basally thickened and rigid, with numerous papilllose branches c. 0.5 mm long. Stolons capillary, much branched. Foliar organs often not conspicuous at anthesis, narrowly linear, 1–2 cm long, c. 0.5 mm wide, apex acute, 1-nerved. Traps very numerous on the vegetative organs, ovoid, stalked, 0.2–0.5 mm long, mouth lateral, upper lip projecting with 2 spreading curved subulate sparsely branched appendages. Inflorescence erect, up to 25 cm long; flowers 1–25, moderately distant; peduncle capillary, glabrous above, usually minutely papilllose below; scales few, similar to the bracts but larger; flower at 16–30 and apex; often papilllose; bracts medifixed, petalate, broadly elliptic to orbicular, membranous, 0.75–1 mm long, obtuse or subacute at base and apex; bracteoles absent; pedicels ascending, capillary, terete, 2–10 mm long. Calyx lobes subequal, broadly ovate to orbicular.
c. 1 mm long at anthesis, slightly accrescent, apex rounded or truncate. **Corolla** yellow, 6–10 mm long, upper lip broadly ovate to orbicular, 2–3 times as long as upper calyx lobe, apex rounded, lower lip longer, ± flabellate, deeply 3-lobed, midlobe larger than side lobes, apex of lobes rounded to truncate, palate much raised, bigibbous, spur subulate from a short conical base, parallel with and about as long as lower lip, apex usually obtuse, sometimes acute or 2–4-denticulate. **Filaments** filiform, curved, anther thecae confluent. **Ovary** globose, style very short, stigma lower lip orbicular, upper lip obsolete. **Capsule** globose, 1–1.5 mm long, membranous, dehiscing by a small ventral ovate pore. **Seeds** numerous, ovate, 0.2–0.25 mm long, testa thin, obscurely longitudinally striate.

**Distr.** Eastern North America, throughout Central and South America to Argentina, throughout tropical Africa and in S. Africa and Madagascar, also in Portugal (possibly introduced); in Thailand and in *Malesia: Malaya* (Selangor) and Borneo (Bako National Park, Kalabit Highlands, and once in Central Borneo).

Ecol. Damp open sandy or boggy ground at low altitude. Fl. Sept.

Note. It is curious that this species, which is widespread and abundant in the New World, Africa and Madagascar, should never have been found in India. There can be no doubt that the Malesian plant is the same as the African ones.


Aquatic. **Rhizoids** apparently absent. **Stolons** filiform, terete, sparsely branched, up to 20 cm long, 0.5–1 mm thick, glabrous. **Foliar organs** numerous on the stolons, 2–6 cm long, the primary segment divided in 2 or 3 just above the base, then repeatedly divided into very numerous segments, the secondary pinnae ± reflexed, the lowermost somewhat remote from the base which may or may not be provided with sparse stipulate-like segments resembling the ultimate segments, the latter capillary, terete, sparsely minutely setulose; the primary segments of the foliar organ basal to the inflorescence often longer, inflated, ± fusiform and bearing fewer shorter ultimate segments. **Traps** not numerous, lateral on the penultimate and ultimate segments, broadly obliquely ovoid, 1–2 mm long, shortly stalked, mouth lateral with short marginal setae, upper lip with 2 long, branched semitorn appendages. **Inflorescence** erect, 8–50 cm long; peduncle filiform, terete; flowers 6–12, ± distant; scales few, similar to the bracts; bracts medifixed, petalate, inserted shortly above the base of the pedicle, ovate, apex acute, base rounded, membranous, c. 2 mm long, attached below the middle; bracteoles absent; pedicels capillary, terete, erect or ascending, c. 6 mm long at anthesis, up to 15 mm long in fruit. **Calyx** lobes subequal, the lower slightly smaller, orbicular, membranous, c. 1.5 mm long, scarcely accrescent. **Corolla** lilac, violet, pink or rarely white, with a yellow spot on the palate, 6–10(–15) mm long, externally glabrous, upper lip transversely elliptic or orbicular, cuculate, apex rounded, lower lip larger, transversely oblong-elliptic, up to 12 mm wide, base auriculate, apex rounded, lateral margins incurved, palate raised, gibbous, spur conical, slightly curved, apex obtuse, about as long as and ± parallel with the lower lip. **Filaments** falcate, considerably expanded above, c. 1.5 mm long, anther thecae confluent. **Ovary** ovoid, style about as long as ovary,
stigma lower lip orbicular, upper lip much smaller, deltoid. Capsule ellipsoid, membranous, c. 3 mm long, laterally bivalvate. Seeds few, lenticular, 1.5–2 mm wide, margin winged, deeply irregularly dentate.


Note. U. punctata is anomalous in the ‘aquatic’ group of the genus (i.e. those with dissected setulose foliar organs) in both the mode of dehiscence of the fruit and the medifixed bracts. RIDLEY stated that the corolla of his U. fluitans was 25 mm wide but that preserved on the type specimen is less than half this dimension.


Aquatic. Rhizoids few, filiform with short botryoid-form branches. Stolons filiform, terete, up to 20 cm long or more, up to 1 mm thick, much branched and often mat-forming. Foliar organs numerous on the stolons, up to 15 mm long, sparsely dichotomously divided, ultimate segments few, capillary, terete, glabrous or very sparsely setulose. Traps numerous, lateral on the foliar segments, obliquely ovoid, stalked, 1–1.5 mm long, mouth lateral,

Fig. 19. Utricularia punctata Wall. ex A.D.C. a. Stolon with part of a branched foliar organ, at the base with stipule-like basal segments, × 5, b. trap, × 24, c. bract in situ, × 4, d. bract, × 71/2, e. flowering calyx, × 4, f. flower, lateral view, × 4, detail of glands inside spur, × 75, g. corolla, front view, × 4, h. stamen, × 15, i. pistil, × 15, detail of glands on ovary × 75, j. fruiting calyx, × 6, k. fruit, × 4, l. placenta, × 4, m. dehisced fruit, abaxial ventral view, × 6, n. seed, × 71/2 (all after Larsen 82, except b CASTLE 88, f, m FLIENLEY 134).
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sometimes with short marginal setae, upper lip with 2 long, much branched setiform appendages. Inflorescence erect, 2-15 cm long, solitary or fasciculate; peduncle filiform, terete, glabrous; scales usually 1 near the middle of the peduncle, similar to the bracts; bracts basifixed, transversely oblong or semi-orbicular, c. 1 mm long, apex truncate or obscurely crenulate; bracteoles absent; pedicels filiform, terete, suberect, 2-12 mm long. Calyx lobes subequal, ± orbicular, apex rounded. Corolla yellow, 4-8 mm long, upper lip orbicular or broadly ovate, about twice as long as upper calyx lobe, 3-4 mm wide, apex rounded or truncate, lower lip similar, palated raised, gibbose, spur narrowly cylindrical from a conical base, straight, apex obtuse, slightly longer than and ± parallel with the lower lip. Filaments linear, curved, anther thecae ± confluent. Ovary globose, style short but distinct, stigma lower lip semi-orbicular, upper lip much shorter or obsolete. Capsule globose, 2-3 mm long, firm in texture, laterally bivalvate. Seeds few, lenticular, 1-1.6 mm wide, with a broad irregular corky wing, testa smooth or slightly verrucose, hilum prominent.

Distr. Tropical Africa, Portugal, India to China and Japan and N. Australia; in Malesia common and widespread but not recorded from the Lesser Sunda Is.

Ecol. Shallow still water in lakes, swamps and marshes, also in Pandanus swamp forest, largely at low altitude, occasionally ascending to 1600, and even to 2100 m. Fl. Febr.—March, July—Dec.


Fig. 20. Utricularia exoleta R.BR. a–b. Foliar organs on stolon, × 4, c. bract in situ, × 6, d. ditto, flattened, × 15, e–g. flower, in adaxial, lateral and frontal views respectively, × 4, h. glands on spur outside, × 75, i. ditto inside, × 75, j. stamen, × 15, k. pistil, × 15, l. fruiting calyx, × 6, m. fruit, × 6, n. ditto, dehisced, × 6, o–p. seeds, × 15 (a, e–l JONES 310, b–d, j–l JONES 386, m–n, p ADAMES 201, o JORDAN 2096).

Fig. 21. Utricularia aurea LOUR. a. Foliar organ with traps, × 4, b. foliose stipule-like segments at base of foliar organs, × 6, c. small and large trap, × 6, d. bract, flattened, × 6, e. flowering calyx, × 4, f. flower in lateral view, × 4, g. ditto, frontal view, × 4, h. stamen, × 12, i. pistil, × 12, j. young fruit, with swollen pedicel, × 4, k. circumscissile upper half of dehisced capsule, × 4, l. seed, left to right in abaxial, adaxial view, × 12, and in section, × 24 (a, d–e, g, j–k LARSEN & WARNCKE 1663, b–c, f, h–l DARBYSHIRE 605, l HAVILAND 2177A).

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Fig. 22. *Utricularia aurea* Lour. Habit, about nat. size, a fruit in natural poise separately (Docters van Leeuwen 2281).

Aquatic. Rhizoids usually present, verticillate at or near the base of the peduncle, fusiform, inflated, 2–6 cm long, 1–3 mm thick (fig. 23), with filiform branches bearing botryform clusters of ellipsoid segments 0.1–0.2 mm long. Stolons filiform to relatively thick, up to 50 cm long, terete, branched, glabrous or ± densely covered with short simple hairs. Foliar organs numerous and conspicuous 2–6 cm long, primary segments 3–4, semi-verticillate, filiform or sometimes thick and inflated, each pinnately repeatedly divided from near the base into numerous segments, ultimate segments capillary, terete, setulose; stipule-like clusters of short capillary setulose segments usually present at the base of the primary segments. Traps usually numerous, lateral on the foliar segments and sometimes also in the angle between segments, obliquely ovoid, shortly stalked, 1–4 mm long, mouth lateral, upper lip usually with 2 short sparsely branched setiform appendages or without appendages. Inflorescence erect, 5–25 cm long; peduncle filiform, terete, glabrous; flowers 5–10, initially congested becoming ± distant; scales always absent; bracts basifixed, ± orbicular, 1.5–2 mm long, apex rounded or subacute; bracteoles absent; pedicels filiform, dorsiventrally flattened, elliptic in cross section, 4–20 mm long, erect at anthesis, usually sharply reflexed and thickened, especially apically, in fruit. Calyx lobes subequal, the upper slightly longer, ovate, 3–4 mm long at anthesis, rather fleshy, apex obtuse, margins strongly incurved, very accrescent, up to 9 mm long and spreading or reflexed in fruit. Corolla yellow, externally glabrous or sparsely hairy, 10–15 mm long, upper lip broadly ovate, about twice as long as the upper calyx lobe, apex rounded, lower lip larger, transversely elliptic, apex rounded, entire or retuse palate raised, gibbous, spur cylindrical from a conical base, often constricted at the middle, apex obtuse, slightly shorter than and ± parallel with the lower lip. Filaments linear, expanded above, ±. 2 mm long, anther thecae confluent. Ovary globose, glandular, style relatively long, stigma lower lip orbicular, margin hyaline, ciliate, upper lip much shorter, margin glabrous. Capsule globose up to 5 mm long, relatively thick and fleshy, circumscissile, style usually greatly enlarged and elongated, often equalling or exceeding the capsule. Seeds numerous, lenticular-prismatic, 3-angled, 1.5–2 mm wide, very narrowly winged on all the angles, testa thin, obscurely reticulate, reticulations slightly elongate.

Distr. India to China and Japan to Australia, throughout Malesia, common and widespread. Ecol. Deep or shallow still water in lakes and
Flora Malesiana

rice-fields, also in pandan swamp forest at low and medium altitude, ascending to 1200 and occasionally to 1500 m. Fl. Jan.–Dec.


Note. This very common species is very variable in size. The inflated rhizoids at the base of the peduncle (fig. 23) are sometimes very conspicuous but often absent.


Aquatic. Rhizoids apparently absent. Stolons filiform, terete, glabrous, up to 60 cm long, unbranched. Foliar organs numerous and conspicuous, 2–3 cm long, primary segments 3 or more, semi-verticillate, filiform, each dichotomously repeatedly divided from near the base into numerous segments, ultimate segments capillary, terete, minutely setulose; stipule-like clusters of short hyaline flattened densely setulose segments usually present at the base of the primary segments. Traps usually numerous, lateral on the intermediate segments, obliquely void, 1–3 mm long, shortly stalked, mouth lateral, apparently without appendages. Inflorescence erect, 4–15 cm long, peduncle filiform, terete with a whorl of 4–6 spongy floats approximately midway, floats ellipsoid, 10–20 mm long, shortly stipitate, with capillary foliar segments at the apex and laterally and more numerous at the base; flowers 2–14, rather congested; scales absent; bracts transversely elliptic when flattened, cucullate, amplexicaule, hyaline, nerveless, 2.5–3 mm long, apex ± deeply denticulate-laciniate; bracteoles absent. Calyx lobes unequal, connate, scarcely accrescent, upper broadly ovate, c. 2 mm long, cucullate, apex rounded, lower about as long but broader ± orbicular, apex emarginate. Corolla yellow with pink nerves on the palate and spur, 6–9 mm long, glabrous, upper lip oblong, cucullate, much longer than upper calyx lobe, lower lip shorter, transversely oblong, apex emarginate, palate raised, gibbous, spur broadly conical, slightly curved, apex rounded, about as long as lower lip. Filaments falcate, c. 2 mm long, somewhat expanded above, another thecae subdistinct. Ovary globose, style distinct, stigma lower lip quadrate, reflexed, upper lip very short, emarginate. Capsule globose, 3–4 mm long, circumscissile. Seeds few, thinly lenticular, 1.5–2 mm Ø including a distinct narrow hyaline wing, tests thin with small conspicuous reticulation.

Distr. N. Australia (Northern Territory and Queensland) and Malesia: New Guinea (Papua).


Note. U. muelleri is superficially very similar to the more widespread U. stellaris L.f. which occurs from tropical Africa to Indo-China and reappears in northern Australia, but is apparently absent from Malesia. For differences see the key to the species.

Fig. 24. Utricularia muelleri KAMIENSKI. a. Whorl of five floats showing stipites and segments at or near their bases (+ ‘air shoot’), × 5, b. hyaline stipule-like segments from base of primary segments, × 12, c. secondary to ultimate segments of foliar organs with traps, × 5, d. apex of foliar segments on floats, × 24, e. part of deflorated inflorescence, × 4, f. bract, flattened, × 6, g. flowering calyx, × 6, h. corolla, front view, × 4, and below it spur apex, with internal sessile and external stipitate glands, × 24, i. stamen, × 12, j. pistil, × 12, k. capsule, with circumscissile line for later dehiscence, × 5, l. seed, × 12, and below it in section filled with embryo, × 24, m. testa, × 24, n. apex of air shoot (a–c, n BYRNEs 2381, d–j LATZ 3697, k PARKER 1117, l–m PULLEN 7058).

Aquatic. Rhizoids 2–4 near base of peduncle, capillary, 1–2 cm long with a few short botryiform segments. Stolons filiform, up to 50 cm long, terete, branched, glabrous. Foliage organs numerous, 1.5–4 cm long, primary segments 2, filiform or sometimes ± inflated, each repeatedly pinnately divided from very near the base into numerous segments, ultimate segments capillary, distinctly flattened, marginally setulose. Globose or ovoid turions (winter buds) 0.5–1.5 cm long of reduced densely setulose foliar segments often present at apex of stolons or stolon branches. Traps usually numerous, lateral, sometimes on the same or at the base of the primary segments, obliquely ovoid, 1–2 mm long, shortly stalked, mouth lateral, with simple marginal setae, upper lip with two long branched setiform appendages. Inflorescence erect, up to 40 cm long; peduncle at first straight becoming flexuose post anthesis, relatively stout, 1–2 mm thick terete, glabrous; flowers 4–10, initially congested becoming ± distant; scales 2–3 always present in the upper half of the peduncle, similar to the bracts; bracts basifixed, ± orbicular, 3–5 mm long, base auriculate, apex rounded or obscurely tridentate; bracteoles, absent; pedicels filiform, 1.5–2.5 cm long, erect at anthesis, later ± spreading. Calyx lobes subequal, ovate-oblong, c. 3 mm long, apex of upper rounded, of lower emarginate. Corolla yellow, c. 15 mm long, externally glabrous, upper lip ovate orbicular, 3–5 times as long as upper calyx lobe, lower lip much larger, transversely elliptic, up to 16 mm wide, apex rounded or retuse, palate raised, gibbose, spur cylindrical or broadly conical, obtuse, slightly curved, shorter than the lower lip. Filaments linear, curved, anther thecae confluent. Ovary globose, style distinct, about as long as ovary, stigma lower lip semi-orbicular, margin denticulate, upper lip very short. Capsule and seeds not known.

Distr. W. Europe to China and Japan, tropical and S. Africa, India (south to Ceylon) to SE. Australia; in Malesia: Sumatra, Java, Philippines, and New Guinea.

Ecol. Pools in swamps, in Malesia at high altitudes, 1300–2500 m, often not flowering. Fl. April–July, Nov.

Note. This widespread temperate Eurasian species apparently never sets seed and its somewhat sporadic occurrence, mostly at high altitude, in the African and Asian tropics is probably due to transmission of small particles of its vegetative parts by migrating birds. It has been much confused with U. aurea but is easily distinguished by its 1 or 2 (not 3 or more) primary foliar segments without basal stipule-like segments and when in flower by the presence of scales on the peduncle.


Aquatic. Rhizoids not clearly differentiated. Stolons filiform, terete, up to 20 cm long, 0.1–0.3 mm thick, sparsely branched, glabrous, ± dimorphic, organs greenish floating others without chlorophyll and buried in the substrate. Foliage organs numerous, polymorphic, ± circular in outline, 0.2–1.5 cm long, ± palmately divided into rather few segments, the ultimate
segments flattened, capillary to narrowly linear, 0.1–0.5 mm wide, the margin sometimes sparsely denticate but not or only microscopically setulose, the apex acute with or without a microscopic seta. Globose turions (winter buds) 1.5–4 mm Ø of reduced glabrous foliar segments often present at apex of stolons or stolon branches. Traps rather few on the narrower foliar segments, usually absent on the broader ones and most numerous on reduced segments on the subterranean stolons, obliquely ovoid, shortly stalked, 0.8–2.5 mm long, mouth lateral with marginal simple hairs, upper lip with two long much branched setiform appendages. Inflorescence erect, 5–20 cm long; peduncle filiform, terete, straight; flowers 2–8 somewhat distant, scales 2–4, ± equally spaced on the peduncle, similar to the bracts; bracts basifixed, broadly ovate-deltoid 1.5–2 mm long, 1-nerved, apex obtuse, base conspicuously auriculate; bracteoles absent; pedicels erect at anthesis, spreading and apically reflexing in fruit, filiform, terete, 4–7 mm long. Calyx lobes subequal, the upper somewhat larger, broadly ovate, c. 2 mm long, apex obtuse, cuculate. Corolla pale yellow, 8–10 mm long, upper lip ovate, apex obtuse, lower lip larger, obovate, apex retuse, palate raised, elongate, distally narrowed, spur saccate, c. 1.5 mm long, internally densely glandular. Filaments linear, curved, dilated above, anther thecae confluent. Ovary globose, style distinct, stigma lower lip orbicular, reflexed, upper lip narrowly deltoid, both fimbriate. Capsule globose, c. 3 mm long, circumscissile. Seeds lenticular-prismatic, c. 0.6 mm Ø, very narrowly winged on the angles.


Ecol. Shallow water in high mountain swamps, 2500–3660 m.

Note. The three Malesian specimens seen are without inflorescences but there can be little doubt that they are the same as the circumboreal plant. The small, almost glabrous, turions distinguish it from all other species in the genus. Like U. australis it is probably distributed by migratory birds.

Fig. 26. Utricularia minor L. a. Narrow foliar segments, from stolon, with one trap, × 6. b. ditto, apex of segment, × 12. c. narrow foliar segments, × 5. d. apex, × 12. e. broad foliar segments, with stolon, × 6. e'. apex of broad segment, × 12. f. turion, × 6. g. scale in situ, × 12. h–i'. bract in situ, and flattened, × 6. i. flowering calyx, × 6. j. flower, lateral view, × 4. k. ditto, upper and lower lip flattened, and below it lateral view of spur, × 5. l. stamen, × 12. m. pistil, × 12, with flattened lower lip of stigma, × 12. n. fruiting calyx, × 6. o. fruit on pedicel, × 6. p. capsule, dehisced, × 6. q. seed, from lateral (lat), apical (ap) and basal (bas) views, × 12. (a–d, e–f ANU 667, e–d, g, n–q P. Taylor s.n., n–m R. B. Drummond s.n.).

Doubtful