

17. *U. simulans* Pilger

This species has been collected in a number of localities in southern Florida (I have seen specimens from 10 counties), where it is (or was), said to grow in damp sandy flats. Elsewhere it has a wide distribution in Central and South America from Cuba to Paraguay, and also in various parts of tropical Africa. Don Schnell has recently located it in Florida, although many or perhaps most of the localities as recorded on herbarium specimens have now been destroyed by urban development and drainage. The fimbriate calyx lobes and bracts are unique among north American species, and although it is not likely to be noticed when not flowering, the traps (which measure only 0.2-0.3 mm long) are similarly unique.

18. *U. striata* Le Conte ex Torrey

Endemic in the United States, where it is restricted to the eastern coastal plain from Massachusetts to Texas and Oklahoma. It grows in shallow water in bogs and marshes, or sometimes in deeper water, supported by floating mats of other vegetation. This species (which goes under the name of *U. fibrosa* Walt. in most north American floristic works) is quite similar to the larger forms of *U. gibba*, but in the field at least it is distinguished by the two very different types of leaves, which are invariably present, although they are not always obvious in badly prepared herbarium specimens. It is probably more closely allied to *U. floridana*, which grows in deeper water and has a flexuose submerged peduncle and much longer leaf-segments. Plants which appear to be in some ways intermediate, which I observed in SE N. Carolina, should be investigated.

19. *U. subulata* L.

This species is recorded from Canada (Nova Scotia) and all the coastal plain states from Massachusetts to Texas and also Tennessee and Arkansas. Elsewhere it is almost pan-tropical, and I have personally collected it in America (both north and south), Africa and Australia. It grows in wet sand in a variety of open vegetation types—roadside borrow-pits are often quite yellow with it in NW Florida. The peltate bracts distinguish it from all other North American species. *U. subulata* is a common weed of glasshouses in which carnivorous plants are cultivated. It commonly occurs in such situations (and in the field) as a cleistogamous form, with the whole plant, and especially the corolla, much reduced in size and forming fruits and seeds without opening.

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## The Genus *Genlisea*

By Peter Taylor

### Introduction

The genus *Genlisea* currently comprises 19 species, 8 of which occur in tropical and South Africa (one of these occurring also in Madagascar), the remaining 11 being found in Central and South America. None of the species occurs in both continents. It differs from *Utricularia* in having a 5- (not 2-) lobed calyx and in its traps, which are very different. Unlike *Utricularia*, the trapping mechanism is passive, and works on the principle of a lobster-pot; that is, the prey can enter the trap but is prevented from leaving by inward-pointing bristles, and once inside can move only towards the

"digestion-chamber". A lobster-pot, of course, contains some bait, but what causes the prey to approach and enter the *Genlisea* trap does not seem to have been established. In *Utricularia* the traps are very diverse in their morphology, but in *Genlisea* they appear to be rather uniform in shape, and although they vary considerably in size both between and within the species (or even sometimes the individual), they do not, at present, appear to provide useful characters for identification, although an examination of more complete material of all the species may yet reveal constant specific differences. The genus has been divided, by Elza Fromm-Trinta, into two sections, based chiefly on the manner in which the capsule splits to shed its seeds. In section **Genlisea**, which occurs in both Africa and America, the fruit is unique among the flowering plants in that it is circumscissile, but splits (comparing the capsule to the globe) not only at the equator, but also at two further latitudes between the equator and the north pole. Stopp (1958) figures this, and also a capsule which is splitting in a spiral manner, but I have not personally observed this. In section **Tayloria**, which occurs only in Brazil, the capsule splits into longitudinal valves. The three species which comprise this section (*G. violacea*, *G. uncinata* and *G. lobata*) differ from the American species in section **Genlisea** in having the fruiting pedicels reflexed or recurved, but in Africa three species in the latter section (*G. margaretae*, *G. glandulosissima* and *G. pallida*) also have recurved fruiting pedicels.

I have personally observed only two species in the field (in Africa), *G. subglabra* which grew in permanently wet bogs with a peaty substrate, and flowered just before and during the early part of the wet season, and *G. margaretae*, which grew in a woodland clearing in a wet valley bottom on pure sand. It vegetated all through the wet season and came into flower in the early part of the dry season. In the latter species some of the traps descended to a depth of about 20 cm below the surface, and were very difficult to collect intact.

The genus is a very natural group; that is, the species are all very similar to each other, and the range of taxonomic characters available for distinguishing them is small. The traps have already been dismissed as being of little use, and the only other vegetative characters available are habit and leaf shape. In habit they are, in general, not at all diverse, most having a very short vertical stem which springs a more or less dense rosette of leaves. Only one species differs in having a more or less elongated, horizontal stem. As to the leaves, they are mostly spatulate, but a few are strap-shaped, although in one species both types have been observed. They vary somewhat in size, and in some species appear to be invariably small, or large, while in others there seems to be a wide range within the species. There is also variation between species in the number of leaves per rosette, although, again, this appears to vary considerably within a single species or even population. We are thus left with characters derived from the inflorescence. Corolla color is mostly either yellow or some shade of violet or mauve, a few are white or cream. Within most species the color appears to be constant, but one, normally violet-flowered African species, has a bright and a greenish yellow flowered form (there are no normally yellow-flowered species in Africa), and also an albino, white-flowered form. It is, of course, possible that albino forms of other violet-flowered species may occur, as they are known to do in several violet or pink flowered *Utricularia* species. There is considerable diversity in the size and shape of the corolla and its various parts; the spur may be longer or shorter than the lower lip, and its apex obtuse or acute, and the shape and relative proportions of the two lips varies considerably between different species. Perhaps the most important character, of which much use is made in the key, is the indumentum, that is the hairs and glands which occur on most of the various parts of the inflorescence. A few are glabrous or almost so, while others bear either simple hairs or gland-tipped hairs (sometimes termed stipitate glands), or a mixture of both, and close attention to the distribution

and nature of the indumentum is essential for the determination of most species, and in most cases can be observed with a hand lens. As in *Utricularia*, there appear to be differences in the seeds and pollen which could be of use in distinguishing species, but as a microscope is necessary, and not all species have been studied, such characters have not been used in what is intended to be a practical key.

The habitats in which *Genlisea* species are found are similar to those where terrestrial *Utricularia* species grow, and the two genera are often found together. As with the latter genus, some appear to prefer wetter habitats than others, but water is probably essential underground around the traps for them to function. All of the species, except perhaps for *G. repens*, which may spread, short range by its creeping stem, appear to be propagated and dispersed only by seed, although it may be possible to propagate by leaf-cuttings in cultivation, as with some *Utricularia* species. The flowers appear to be adapted to insect pollination, but it is likely that they may be autogamous (self pollinating) as in *Utricularia*.

The function of the traps has been studied, but rather less than most other carnivorous plants, possibly because of the lack of suitable material.

No key to the whole genus has been published hitherto, and I hope that the one that follows will serve until Elza Fromm-Trinta completes the monograph of the genus on which she has been working for some years.

### Key to Species of *Genlisea*

1. Corolla bright or greenish yellow.
  2. Spur of corolla shorter than the lower lip (Am) 14. *roraimensis*
  2. Spur of corolla longer than, or at least as long as, the lower lip.
    3. Corolla 15-20 mm long; raceme axis short, the flowers more or less congested; robust plant, up to 40 cm tall; upper part of inflorescence, including flowers, densely covered with gland-tipped hairs (Am) 3. *aurea*
    3. Corolla less than 12 mm long; raceme axis elongate, the flowers more or less widely spaced; small plant, usually less than 25 cm tall; upper part of inflorescence glabrous or almost so, or with simple hairs, or gland-tipped hairs, or a mixture of both.
      4. Upper part of inflorescence sparsely to quite densely covered with gland-tipped hairs only; spur not narrowly conical.
        5. Corolla 6-8 mm long, with spur inflated, cylindrical, with apex obtuse; gland-tipped hairs few; corolla, including spur, longer than wide (Am) 4. *filiformis*
        5. Corolla 10-12 mm long, with spur broad in the proximal half, tapering to a narrowly cylindrical or obtusely conical distal half; gland-tipped hairs usually numerous; corolla, including spur, about as long as wide (Afr) 1. *africana*
      4. Upper part of inflorescence with a few simple hairs, or with a mixture of short simple hairs and longer gland-tipped hairs; spur narrowly conical.

6. Upper part of inflorescence covered with a mixture of simple hairs and longer, gland-tipped hairs; stem very short, erect (Am). 12. *pygmaea*
6. Upper part of inflorescence with a few simple hairs only; stem elongated, prostrate. 13. *repens*
1. Corolla mauve, violet, cream or (abnormally) white.
7. Pedicels reflexing or recurving after flowering.
8. Upper lip of corolla with apex distinctly 2-lobed.
9. Lobes of lower lip of corolla with apex rounded or truncate; corolla violet (Am). 19. *violacea*
9. Lobes of lower lip of corolla with apex emarginate; corolla white, with a violet spur (Am). 9. *lobata*
8. Upper lip of corolla with apex rounded, not lobed.
10. Spur of corolla hooked, with the distal half curving forwards and upwards (Am). 18. *uncinata*
10. Spur of corolla not hooked, more or less straight.
11. Corolla cream; raceme with flowers fewer than 6, not congested; peduncle with few, inconspicuous scales (Afr). 11. *pallida*
11. Corolla violet or mauve; raceme with more than 10 flowers, congested; peduncle with numerous, conspicuous scales.
12. Inflorescence 6-14 cm tall, densely covered throughout with gland-tipped hairs (Afr). 6. *glandulosissima*
12. Inflorescence 20-60 cm tall, the upper part densely covered with gland-tipped hairs, the lower part glabrous or only sparsely glandular (Afr). 10. *margaretae*
7. Pedicels not reflexing or recurving after flowering.
13. Inflorescence completely glabrous (Am). 5. *glabra*
13. Inflorescence, or at least the ovary and capsule, with at least some simple or gland-tipped hairs, or both.
14. Leaves strap-shaped up to 12 cm long and 1 cm wide.
15. Inflorescence, excluding ovary and capsule, glabrous or with a few scattered simple hairs.
16. Ovary and capsule with short gland-tipped hairs (Afr). 2. *angolensis*

16. Ovary and capsule with simple hairs (Am). 7. *guianensis*
15. Inflorescence, at least the upper part, densely covered with a mixture of simple and gland-tipped hairs (Am). 15. *sanariapoana*
14. Leaves obovate-spathulate, not more than 5 cm long.
17. Inflorescence, including ovary and fruit, with simple hairs only.
18. Distal half of ovary and capsule densely hispid. 8. *hispidula*
18. Distal half of ovary with a few hairs only. 17. *subglabra*
17. Inflorescence with gland-tipped hairs, sometimes mixed with simple hairs.
19. Spur of corolla about twice as long as the lower lip, and the corolla, including spur, about three times as long as wide (Am). 15. *sanariapoana*
19. Spur of corolla less than one and half times as long as the lower lip, and the corolla, including spur, scarcely longer than wide.
20. Upper part of inflorescence more or less densely covered with a mixture of gland-tipped hairs and shorter, simple hairs. 1. *stapfii*
20. Upper part of inflorescence sparsely to more or less densely covered with gland-tipped hairs only; corolla violet or rarely white. 16. *africana*

### Notes on Distribution of *Genlisea*

#### 1. *G. africana* Oliver

C & S tropical Africa (SE Zaïre, Angola, Zimbabwe & Zambia). A medium sized to large species with relatively large flowers. The corolla is usually deep violet, with a rare bright or greenish yellow form which may grow with typical plants and intermediate forms, or sometimes as pure populations. An albino form with a white corolla is also recorded. Very similar to the largely W. African *G. stapfii*, which tends to be smaller and differs in its indumentum.

#### 2. *G. angolensis* Good

C & S tropical Africa (Angola and SE Zaïre). A rare, relatively large species, apparently of wet habitats, which differs from all other African ones in its relatively long, strap-shaped leaves (for differences from American species with similar leaves see key).

#### 3. *G. aurea* St. Hil.

Tropical America (Brazil, from Goiás to Sta. Catarina). The largest and most showy of the yellow-flowered species, not excusably confused with any other. The corolla can be up to 2 cm long, but is often somewhat smaller.

4. *G. filiformis* St. Hil.

Tropical America (Belize, Cuba, Colombia, Venezuela, Guyana and Brazil (from Amazonas to São Paulo)). The only species with small yellow flowers that has an obtuse, rather than an acute, spur-apex, and usually rather sparse, long gland-tipped hairs, without any admixture of simple hairs.

5. *G. glabra* P. Taylor

Venezuela only, where it is known from Apàcara-tepui, Aprada-tepui and Toronotepui. The only species with the combination of small violet flowers and a completely glabrous inflorescence.

6. *G. glandulosissima* R. E. Fries

S. tropical Africa (Zambia only). A small species with mauve or violet flowers. It is similar to *G. margaretae*, with which it is known to hybridize, but has a shorter inflorescence which is densely glandular throughout. The pedicels of both species are strongly recurved in fruit.

7. *G. guianensis* N. E. Brown

Tropical America (Guyana, Venezuela (Bolívar) and Brazil (Bahia, Mato Grosso, Goiás)). A large, violet-flowered species of wet habitats. It is distinguished from the African *G. angolensis*, which has similar strap-shaped leaves, by the absence of gland-tipped hairs on its ovary and capsule. It is also somewhat similar to *G. sanariapoana*, which may also have strap-shaped leaves, but has a densely glandular, rather than the very sparsely glandular or hairy or almost glabrous inflorescence of *G. guianensis*.

8. *G. hispidula* Stapf

Tropical Africa (Nigeria, Cameroun, Central African Republic, Kenya, Tanzania, Zambia, Zimbabwe, Malawi and Mozambique) and S. Africa. A medium sized eglandular species with mauve or pink flowers. It is very similar to *G. subglabra*, but is much more widespread. It differs only in having more numerous hairs on the ovary and capsule.

9. *G. lobata* Fromm-Trinta

At present known from a single collection (which I have not seen) from Brazil (Minas Gerais). A small, delicate species in section *Tayloria*, which differs from *G. violacea* in having the lobes of both upper and lower lips of the corolla distinctly emarginate. The corolla also differs in being white with a violet spur. The pedicels are sharply reflexed in fruit.

10. *G. margaretae* Hutchinson

Tropical Africa (Tanzania and Zambia) and Madagascar. An uncommon, relatively tall, slender species with violet or mauve flowers and recurved fruiting pedicels.

11. *G. pallida* Fromm-Trinta and P. Taylor

Tropical Africa (Angola and Zambia). The only African species in which the corolla is not normally violet or mauve but is apparently always cream, and the fruiting pedicels are recurved.

12. *G. pygmaea* St. Hil.

Tropical America (Colombia, Trinidad, Venezuela, Guyana and Brazil). A small yellow-flowered species with an acute spur and densely glandular inflorescence.

13. *G. repens* Benj.

Tropical America (Venezuela, Guyana, Brazil and Paraguay). A small, yellow-flowered almost glabrous species distinguished by its relatively long subterranean stem, which bears leaves throughout its length. All of the species with similar flowers have a very short, erect stem which bears a more or less dense rosette of leaves.

14. *G. roraimensis* N. E. Brown

Tropical America (Venezuela and Guyana, where it is confined to relatively high altitudes on the "tepui"). Differs from the other small, yellow-flowered species in having the spur shorter than the lower lip of the corolla.

15. *G. sanariapoana* Steyermark

Venezuela only, where it is known from a number of localities in Edo Bolivar and Terr. Fed. Amazonas. Very like *G. guianensis* and appears to sometimes have similar strap-shaped leaves, at least when growing in wetter habitats, plants from drier habitats having spatulate leaves. A fairly large, robust, densely glandular species with violet flowers.

16. *G. stapfii* A. Chev.

Tropical Africa, from Guinea-Bissau to Cameroun, Central African Republic, Gabon and, Zaïre and Angola. A medium sized violet-flowered species, very similar to *G. africana* and replacing it in western Africa. It differs mainly in indumentum.

17. *G. subglabra* Stapf

Tropical Africa, Zaïre, Rwanda-Burundi, Tanzania, Malawi and Zambia. A medium sized species with pink or mauve flowers, very similar to *G. hispidula* but with a more restricted distribution and differing from it in indumentum.

18. *G. uncinata* P. Taylor and Fromm-Trinta

Known only from Brazil (Bahia). A very distinct large, violet-flowered species in section *Tayloria*, differing from the other two species in the section in being much larger and more robust, in its hooked spur-apex and its papillose seeds. The fruiting pedicels are recurved rather than reflexed.

19. *G. violacea* St. Hil.

Known only from Brazil (Minas Gerais, Espirito Santo and São Paulo). A small, violet-flowered species in section *Tayloria*. The lower lip of the corolla is deeply 3-lobed, the lobes being cuneate in shape (wedge-shaped, narrowed to the base) and the spur is scarcely half as long and either narrowly cylindrical or sometimes club-shaped, that is, slightly swollen at the apex.