

DISTRIBUTION OF CARNIVOROUS PLANTS IN WEST BENGAL

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ABSTRACT

The distribution of 18 species of carnivorous plants in the different districts of West Bengal is recorded with annotations. Some of these are new records for the state of West Bengal.

INTRODUCTION

The carnivorous or insectivorous plants that capture and digest insects and other tiny animalcules have been objects of scientific curiosity for quite a long time. The conspicuous trapping mechanism which is a leaf modification, draws special attention to this interesting group of plants (Lloyd, 1942; Shetler and Montgomery, 1965). During the course of studies on the floristics of the Birbhum district in West Bengal since 1966, 10 species of carnivorous plants were collected from the forest areas in the western sector of the district (Basak, unpub.). The study of those material has led to the writing of this note on the carnivorous plants of West Bengal. A reference to the previous literature (Basak, 1976) indicates that some of the taxa cited in the present study were not reported earlier as occurring in the state of West Bengal pro-

per and thus form new records.

On the basis of their form, structure and trapping adaptations, carnivorous plants of West Bengal belong to the following three groups. A. Bladderworts: *Utricularia* L. (Lentibulariaceae), B. Sundews: *Drosera* L. (Droseraceae) C. Flytraps: *Aldrovanda* L. (Droseraceae). Representatives of these groups, reported so far from West Bengal and/or deposited in the Calcutta Herbarium (CAL) are enumerated below with annotations. These can be identified with the help of key, supplemented by some additional features stated under various species. As I have not examined the type specimens of all these taxa dealt herein, the lists of synonyms are cited on the authority of Taylor (1964) and various recent publications (Santapau, 1950; Backer & Bakht, 1965; Hara, 1966 and others).

Key to the genera of Carnivorous plants

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| 1. Leaves with minute bladders and without any glandular hair on the upper surface ; calyx deeply 2-lobed, corolla 2-lipped and spurred | ... | 1. <i>Utricularia</i> |
| 1. Leaves without any bladder but with glandular hairs on the upper surface ; calyx and corolla 5-merous, without any spur | | |
| 2. Leaves vesicular, lamina bi-lobed, covered with minute glands and hairs ; rootless floating herbs | ... | 2. <i>Aldrovanda</i> |
| 2. Leaves not vesicular, lamina not bi-lobed, covered with long sticky glandular hairs ; terrestrial herbs rooted on moist areas | ... | 3. <i>Drosera</i> |

LENTIBULARIACEAE

A. BLADDERWORTS: *Utricularia* L.

Out of the 275 species of *Utricularia* represented mainly in the tropical regions of

both the hemispheres (Shetler and Montgomery 1965), only about 29 species are found in India and perhaps 15 species occur in West Bengal. Abraham and Subramanyam (1965) attributed to the occurrence

of 10 species of *Utricularia* in West Bengal. They dealt with the external morphology of mature seeds of those taxa and presented a key for their identification. They, however, did not refer to or annotate any voucher specimen studied by them in the herbarium CAL. The chromosome numbers from meiotic studies of 7 Indian species of *Utricularia*, which also occur in West Bengal, were reported by Subramanyam and Kamble (1968). On the basis of their habitats, seeds and diversified pollen characters, Thanikaimoni (1965) divided 22 Indian species of *Utricularia* into three groups. He studied polliniferous materials of 4 species of *Utricularia* collected from West Bengal. Huynh (1968) recognised five groups of pollen forms after a detailed pollen morphological study

on about 143 species of *Utricularia*. Representatives of Indian species of *Utricularia* of terrestrial and epiphytic habits and usually with 3-4 (rarely more) colporate pollens belong to the group I of his classification and their aquatic forms belong to the group V and are distinguished by the presence of aperturation in the apocolpium region and 12-28 colporate pollen grains (Huynh, l.c.). The traps were described and different views on the mechanism of bladders in various species of *Utricularia* were reviewed by Kamiński (1895). Lloyd (1942), Subramanyam (1962), Shetler and Montgomery (1965) and Shetler (1968). An account of the traps of some Indian species of *Utricularia* was presented by Subramanyam and Abraham (1967).

Key to the species of *Utricularia*

1. Plants aquatic or semi-aquatic
 2. Stems aquatic with numerous persistent multifid leaves interspersed with bladders; peduncles long and stout and without scales, pedicels recurved in fruits; wings of seeds narrow, 1-4 layer thick, not corky
 3. Peduncles bearing whorl of oblong vesicles about the middle; wings of seeds 1-2 layer thick
 4. Flowers white with prominent violet stripes, calyx lobes erect concealing the capsules, float leaves narrow, cylindrical to fusiform 2-5 cm long ... 1. *U. inflexa*
 4. Flowers yellow, calyx lobes reflexed exposing the capsules, float leaves ellipsoid or ovoid, 1-2 cm long ... 2. *U. stellaris*
 3. Peduncles without any whorl of vesicles (rarely branches inflated at the base of peduncle), wings of seeds 3-4 layer thick ... 3. *U. aurea*
 2. Stems often semi-aquatic with sparse filiform leaves and minute bladder bearing branches, peduncles slender with minute scales, pedicels erect in fruits, wings of seeds broad, crenulate and corky, 12-20 layers thick ... 4. *U. gibba* subsp. *exoleata*
1. Plants terrestrial or epiphytic
 5. Leaves at the base of the scape linear or spatulate, usually disappearing before flowering, stems rooted on moist soil, seeds not glochidiate
 6. Scapes with bracts attached by the middle
 7. Flowers pale blue or purple violet, numerous and crowded towards the apex, seeds without clavate projections ... 5. *U. caerulea*
 7. Flowers white (rarely purple), sparse and not crowded towards the apex, 2-4 flowered, seeds with minute clavate projections ... 6. *U. nivea*
 6. Scapes with bracts attached by the base
 8. Flowers subsessile; capsule globose
 9. Scapes hairy; calyx lobes orbicular ... 7. *U. hirta*
 9. Scapes glabrous; calyx lobes subobtusate ... 8. *U. minutissima*
 8. Flowers pedicelled, capsule ovoid
 10. Flowers blue or purple violet
 11. Scapes stout and erect, flowers about 12 mm long, calyx lobes decurrent acute, pedicels recurved in fruits ... 9. *U. polygaloides*
 11. Scapes slender and twining; flowers minute about 4 mm long; calyx lobes obtuse and pedicels reflexed in fruits ... 10. *U. baouleiensis*
 10. Flowers yellow

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|---|-----|--------------------------|
| 12. Scapes filiform and twining, calyx lobes acute, pedicels in fruits suberect | ... | 11. <i>U. scandens</i> |
| 12. Scapes slender but erect, calyx lobes obtuse, pedicels in fruit recurved | ... | 12. <i>U. bifida</i> |
| 5. Leaves at the base of scapes orbicular or reniform, persistent; stems often epiphytic; seeds glochidiate | | |
| 13. Lower lip of corolla 4-lobed, lobes deeply cut; flowers not yellow spotted | ... | 13. <i>U. furcellato</i> |
| 13. Lower lip of corolla 5-lobed, lobes shallow, flowers yellow spotted | | |
| 14. Leaves reniform, flowers white, faintly yellow spotted | ... | 14. <i>U. brachiata</i> |
| 14. Leaves orbicular; flowers almost white to pink with prevailing yellow spots | ... | 15. <i>U. striatula</i> |

1. ***Utricularia inflexa* var. *inflexa*** Forsk. Fl. Aegypt.-Arab. Descr. Pl. 9. 1775; P. Taylor in Mitt. Bot. Staatss. München 4: 95. 1961 & in Kew Bull. 18: 186. 1964. *U. stellaris* L. f. var. *inflexa* (Forsk.) Clarke in Hook. f. Fl. Brit. Ind. 4: 329. 1884; Prain, Beng. Pl. 2: 581. 1903 (repr.) & in Rec. bot. Surv. Ind. 3: 254. 1905; Haines, Bot. Bih. & Or. 2: 675. 1922 (repr.); Culshaw in Journ. Bomb. nat. Hist. Soc. 49: 195. 1950.

Clarke (1884) observed that these are by no means rare in Bengal. Prain (1903 & 1905) reported them from Central Bengal and from the area of 'Hughly, Howrah and 24 Pergunnahs'. Later, Haines (1922) and Culshaw (1950) reported them from Bihar and from the adjoining areas of Bankura and Midnapur districts respectively. But I have seen no specimen in the herbarium CAL from any part of India nor seen the specimens of the world to confirm its occurrence in West Bengal and in the adjacent regions.

Distribution: Tropical north and central Africa and India (?).

2. ***Utricularia stellaris*** L. f. Suppl. 86. 1781; Roxb. Fl. Ind. 1: 143. 1820 & 1: 143. 1832; Clarke in Hook. f. Fl. Brit. Ind. 4: 328. 1884, *partim*, excl. var. *inflexa* (Forsk.) Clarke; Prain, Beng. Pl. 2: 581. 1903 (repr.) & in Rec. bot. Surv. Ind. 2: 326. 1903 & in Rec. bot. Surv. Ind. 3: 254. 1905; P. Taylor in Bull. Jard. Bot. Nat. Belg. Bull. Nat. Plantentuin Belg. 41: 271. 1971. *U. inflexa* var. *stellaris* (L. f.) P. Taylor in Mitt. Bot. Staatss. München 4: 96. 1961 & in Kew Bull. 18: 189. 1964; Abraham & Subra-

manyam in Proc. Ind. Acad. Sci. 62 B: 98. 1965.

These have so far been collected from the Lower Ganga Plain and the Ganga Delta area of West Bengal. It is quite likely to locate them in other parts of West Bengal as well.

Distribution: Widespread species, found all over tropical Africa, India and in tropical Asia to north Australia.

Specimens examined: MURSHIDABAD DISTRICT: Motijhil, 23 Dec. 1966, Guha Bakshi 752. HOWRAH DISTRICT: Botanic Garden, without date, Wallich 6400D; Mourigram, 18 Nov. 1963, Bennet 434. DISTRICT 24 PARGANAS: Basirhat, 21 Nov. 1962, Ghosh 830; Sonarpur, 7 Sept. 1963, Shetty 73; Sagar Islands, 7 Aug. 1968, Mukherjee 7067; Lower Bengal, without locality and date, Kurz s. n.; Sundarbans, Dec. 1893, Heinig s. n. BENGAL: Without locality, 15 Oct. 1859. T. Thomson s. n.

3. ***Utricularia aurea*** Lour. Fl. Cochinch. 1: 26, 1790; Backer & Bakh. f. Fl. Java 2: 517. 1965; Abraham and Subramanyam in Proc. Ind. Acad. Sci. 62 B: 98. 1965; Hara, Fl. East. Himal. 299. 1966. *U. flexuosa* Vahl, Enum. 1: 198. 1804; Clarke in Hook. f. Fl. Brit. Ind. 4: 329. 1884; Prain, Beng. Pl. 2: 582. 1903 (repr.) & in Rec. bot. Surv. Ind. 2: 326. 1903 & in Rec. bot. Surv. Ind. 3: 254. 1905. *U. fasciculata* Roxb., Fl. Ind. 1: 143, 1820 & 1: 143. 1832.

Floating herbs with numerous bladders, stout peduncles, rather long recurved pedicels and yellow (3-8) flowers; calyx lobes in fruits patent, hardly so long as the capsule.

These are very similar to *U. stellaris* L. f. but are more common and abundant.

Usually no float leaves are developed on the scapes. However, in specimens of *Basak* 1127 from Birbhum district, the scape arises from a whorl of 4 hollow tapering cylindrical float leaves (2.5-3.5 cm long) just at the base (see also Clarke, *l.c.*; Taylor in Kew Bull. 18: 197. 1964 Backer & Bakh. f. Fl. Java 2: 517. 1965). Of all the aquatic species of *Utricularia* found in West Bengal, these are most widespread and occur in plenty all over West Bengal, from the base of the Himalaya down to the Sundarban area in the lower Bengal.

Distribution: Throughout India, south-east Asia, Java, Malaya eastwards to China, Japan and north Australia.

Specimens examined: DARJEELING DISTRICT: Siliguri, Nov. 1879, *Gamble* 7408; Siliguri, Aug. 1874, without collector's name and number; Tista plains, Terai, 22 Feb. 1910, *Ribu & Rhomoo* D3673 & D3694. JALPAIGURI DISTRICT: Jalpaiguri, Aug. 1879, *Gamble* 7031. NORTH BENGAL: Jitalaya, without date, *Kurz s.n.* MURSHIDABAD DISTRICT: Bhabta, 14 Nov. 1972, *Guha Bakshi* 1361. BIRBHUM DISTRICT: Bhabanandapur, Nalhati, 26 Mar. 1966, *Basak* 150; Margram, Rampurhat, 20 Apr. 1966, *Basak* 189; Nimdaspur, Charicha, 3 Sept. 1969, *Basak* 1127. PURULIA DISTRICT: Sahebbundh, Purulia, 10 Mar. 1964, *Biswas* 5. BANKURA DISTRICT: Koch Birai river, Bishnupur, 3 Oct. 1964, *Sanyal* 299. HOOGHLY DISTRICT: Goghat, 11 Mar. 1902, *Naskar* 27; Kamarkundu, 4 Aug. 1963, *Shetty* 63; Polba, Bandel, 15 Nov. 1963, *Ghosh* 822; Bandel, 19 Dec. 1964, *Ghosh* 2646; Mavadur, 19 Dec. 1964, *Ghosh* 2672. HOWRAH DISTRICT: Rajgaunj, Sibpur, 10 Aug. 1914, *Ramaswamy* 212; Makardah, 25 Nov. 1961, *Bannerjee* 57. DISTRICT 24 PARAGANAS: Doadhnoi, Canning, 14 Sept. 1962, *Ghosh* 958; Budge Budge, 26 Oct. 1962, *Ghosh* 996; East Barisha, 25 Jan. 1963, *Ghosh* 859; Falta Fort, 17 Dec. 1964, *Ghosh*

2644; Calcutta, 10 Nov. 1855, *T Thomson s.n.*; Calcutta, Feb. 1907, without collector's name, no. 671; Sundarbans, Dec. 1893, *Heinig s.n.*

4. *Utricularia gibba* L. subsp. *exo'eata* (R. Br.) P. Taylor in Bot. Staatss. München 4: 101. 1961 & in Kew Bull. 18: 204. 1964; Abraham and Subramanyam in Proc. Ind. Acad. Sci. 62 B: 98. 1965; Hara, Fl. East. Himal. 300. 1966. *U. exoleata* R. Br. Prodr. 430. 1810; Clarke in Hook. f. Fl. Brit. Ind. 4: 329. 1884; Prain, Beng. Pl. 2: 582. 1903 (repr.) & in Rec. bot. Surv. Ind. 3: 254. 1905; Haines, Bot. Bih. & Or. 2: 676. 1922 (repr.). *U. diflora* Roxb. Hort. Beng. 4. 1814, *nom. nud.* *U. biflora* Roxb., Fl. Ind. 1: 144. 1820 & 1: 144. 1832. *U. pterosperma* Edgeworth in Proc. Linn. Soc. 1: 352. 1847.

Aquatic to semi-aquatic herbs, often stranded and rooted on mud; flowers few (1-3), small, yellow having straight spurs; corolla 5-8 mm long, upper lip of corolla 3-5 mm wide.

These have been reported to occur in West Bengal by Roxburgh (1814, 1820 & 1832), Edgeworth (1847) and Prain (1903 & 1905) mainly from the West Bengal Plain Division. Later, Haines (1922) reported their occurrence in the Jalpaiguri district. These may also be found in other districts of the Himalayan Division of West Bengal.

Distribution: Pantropical species found throughout India, Malaysia, tropical south Asia to Japan, north Australia, Portugal and tropical Africa.

Specimens examined: MALDA DISTRICT: Ma'da, without date, *Vicary s.n.* BIRBHUM DISTRICT: Chatra, stranded and rooted on mud, 18 Feb. 1970, *Basak* 1409. BANKURA DISTRICT: Koch Birai, Bishnupur, 25 Feb. 1963, *Sanyal* 520. HOOGHLY DISTRICT: Jahanabad canal, 10 Mar. 1902, *Naskar* 3.

HOWRAH DISTRICT: Sibpore, Feb. 1867, Kurz *s.n.*

5. *Utricularia caerulea* L. Sp. Pl. 18. 1753 (non Oliver, 1859 & non Clarke, 1884); Smith, Exot. Bot. 2: 119-120. 1805; Wight Ic. 4: t. 1583. 1850; Barnhat in Mem. New York Bot. Gard. 6: 50-52. 1915 (1916); Haines, Bot. Bih. & Or. 2: 676. 1922 (repr.); Santapau in Journ. Bomb. nat. Hist. Soc. 49: 219. 1950; Abraham and Subramanyam in Proc. Ind. Acad. Sci. 62 B: 98. 1965. *U. racemosa* Wall. ex A. DC., Prodr. 8: 21. 1844; Clarke in Hook. f. Fl. Brit. Ind. 4: 333. 1884; Prain, Beng. Pl. 2: 582. 1903 (repr.) & in Rec. bot. Surv. Ind. 3: 254. 1905; Culshaw in Journ. Bomb. nat. Hist. Soc. 49: 194. 1950.

Flowers mostly pale blue to purple violet (rarely white, Basak 1233 in CAL), seeds obovoid more than 0.5 mm in diam., reticulate with epidermal cells not striated. Smith (*l.c.*), Barnhat (*l.c.*) and Haines (*l.c.*) cleared up the confusion about the correct name of this taxon.

Prain (1903) reported them from Chota Nagpur and north Bengal area only. Later, he attributed to their occurrence in Serampore (as recorded by Voigt, 1845) and also in the Lower Bengal (Prain, 1905). Culshaw (*l.c.*) reported them from the adjoining areas of Bankura and Midnapur districts. Although reported from different districts of West Bengal, few representative specimens are deposited in the herbarium CAL from West Bengal proper.

Distribution: Tropical Asia, throughout India, Sri Lanka, Burma, Cambodia to China.

Specimens examined: BENGAL: Without date, Griffith *s.n.* DARJEELING DISTRICT: Siliguri, without date, Kurz *s.n.* DINAJPUR DISTRICT: Dinajpur (adjacent to West Bengal), Vicary *s.n.* BIRBHUM DISTRICT: Amar-kutir, near Santiniketan, Oct. 1964, Guha

s.n.; Deer Park, Santiniketan, 16 Oct. 1968, Basak 974; Nimdaspur, Charicha, 3 Sept. 1969, Basak 1131; Charicha, white flowers, 5 Nov. 1969, Basak 1233; Baidayanathpur, 24 Oct. 1970, Basak 1534; Charicha, 24 Oct. 1970, Basak 1544. PURULIA DISTRICT: Manbhum, 1886, Campbell *s.n.*

6. *Utricularia nivea* Vahl, Enum. 1: 203. 1804; Wallich in Roxb., Fl. Ind. 1: 144. 1820; Wight Ic. t. 1582. 1850; Kurz in Journ. Bot. 12 (n.s. 3): 53. 1874; Merrill in Philipp. Journ. Sci. 7: 247. 1912; Abraham and Subramanyam in Proc. Ind. Acad. Sci. 62 B: 98. 1965; Abraham, Mitra and Subramanyam in Curr. Sci. 43: 571. 1974. *U. filicaulis* Wall. ex A. DC., Prodr. 8: 21. 1844. *U. racemosa* Wall. ex A. DC. var. *filicaulis* (Wall. ex A. DC.) Clarke in Hook. f. Fl. Brit. Ind. 4: 333. 1884; Culshaw in Journ. Bomb. nat. Hist. Soc. 49: 194. 1950. *U. racemosa* Wall. ex A. DC., Prain in Rec. bot. Surv. Ind. 3: 254. 1905, *p.p.* *U. caerulea* L. var. *filicaulis* Haines, Bot. Bih. & Or. 2: 676. 1922 (repr.).

Small herbs with filiform scapes, upper lip of corolla minutely 2-lobed, seeds ovoid. These grow on sandy soil amidst low pasture grass and members of Cyperaceae.

The characteristic features distinguishing them from *U. caerulea* L. (syn. *U. racemosa* Wall. ex A. DC.) and their distribution in North Bengal were discussed earlier in detail by Kurz (1874) and later by Abraham, Mitra and Subramanyam (1974). Prain (1905) noted their occurrence in Serampore (also see Wallich, 1820 & Voigt, 1845) and in other parts of West Bengal. Culshaw (*l.c.*) reported them from the areas of Bankura and Midnapur districts. Although the occurrence of this taxon has been reported from different parts of West Bengal, these are particularly abundant in the areas adjacent to the Chota Nagpur Plateau (Haines, 1922).

U. rosea Edgeworth (Proc. Linn. Soc. 1: 352. 1847) which is known solely from the description, differs from *U. nivea* Vahl in having purple rose flowers, reddish scapes and calyx lobes, and capsules equal to calyx lobes (Edgeworth, l.c.). All these are, however, variable characters and are also met with in *U. nivea*. As Prain collected specimens (CAL) similar to *U. nivea* from Daumda area of Chota Nagpur Division with rosy purple flowers and as some specimens of *Utricularia* in no way differ from *U. nivea* (Sagar, annotated, Vicary s.n., Acc. no. 330277 in CAL) except the colour which is purplish, it is likely that *U. rosea* as described by Edgeworth from Burdwan, West Bengal, is only a variant form of *U. nivea* (see also Merrill, l.c. and Abraham, Mitra and Subramanyam, l.c.).

Distribution: All over India, Sri Lanka, southeast Asia, Java, Malaya to Borneo.

Specimens examined: DARJEELING DISTRICT: Siliguri, Nov. 1878, King s.n.; Siliguri, Nov. 1878, without collector's name and number. NORTH BENGAL: Between Goliabaree and Jitalaya, Sept. 1868, Kurz s.n. BIRBHUM DISTRICT: Deer Park, Santiniketan, 16 Oct. 1968, Basak 976; Nimdasapur, Charicha, 3 Sept. 1969, Basak 1128. PURULIA DISTRICT: Manbhum, year 1886, Campbell s.n. CHOTA NAGPUR DIVISION: Daumda, annotated, Nov. 1885, Prain s.n.

7. *Utricularia hirta* Klein ex Link, Jahrb. 1: 55. 1820; Clarke in Hook. f. Fl. Brit. Ind. 4: 332. 1884; Prain, Bengal Pl. 2: 582. 1903 (repr.); Haines, Bot. Bih. & Or. 2: 676, 1922 (repr.); Joseph and Ramamurthy in Journ. Bomb. nat. Hist. Soc. 58: 832. 1961; Abraham and Subramanyam in Proc. Ind. Acad. Sci. 62 B: 98. 1965.

Flowers few (3-4), blue or purple violet; seeds ovate having slightly wavy outline and without any clavate projections. These were growing amidst grass on open wet sandy

laterite soil near the edges of receding water.

Prain (l.c.) recorded their distribution in Chota Nagpur only. Haines (l.c.) cited Campbell's collections from Manbhum (Purulia district). The collections of Ball from Manbhum (CAL) show almost glabrous scapes. The gathering of the hirsute forms from Birbhum district is noteworthy and shows north-eastwards extension of the species from south India. These have been collected again from West Bengal after about 100 years.

Distribution: Deccan Peninsula, Chota Nagpur and Meghalaya.

Specimens examined: PURULIA DISTRICT: Manbhum, Jan. 1868, Ball s.n. BIRBHUM DISTRICT: Amar Kutir, near Santiniketan, Oct. 1964, Guha s.n.; Deer Park, Santiniketan, 16 Oct. 1968, Basak 973.

8. *Utricularia minutissima* Vahl, Enum. 1: 204. 1804; Clarke in Hook. f. Fl. Brit. Ind. 4: 334. 1884; Nair in Journ. Bomb. nat. Hist. Soc. 62: 180. 1955; Abraham in Journ. Bomb. nat. Hist. Soc. 63: 459. 1967. *U. lilliput* Pell. in Bull. Mus. Hist. nat. Paris 26: 181. 1920; Subramanyam and Balakrishnan in Bull. bot. Surv. Ind. 2: 347. 1960.

Minute herbs with 3-6 cm long filiform scapes, bluish violet minute (2-5) flowers, spurs much longer than lower lips of corolla and seeds globose with distinct reticulate testa. These are rare but locally abundant and are found on open moist sandy soil along with grass.

Prain (1903) did not report them from West Bengal. These are reported for the first time from West Bengal. Recently Nair (l.c.) and Abraham (l.c.) collected representatives of this taxon from the state of Kerala and Orissa respectively. There is no record of previous collection from India in the Calcutta herbarium. The present collection from Birbhum district West Bengal

shows north-eastwards extension of the taxon from the south India.

Distribution: South India, Kerala, Orissa, Bengal, Perak, Pahang and Malacca.

Specimens examined: BIRBHUM DISTRICT: Deer Park, Santiniketan, 14 Oct. 1968, *Basak* 937; Nimdaspur, Charicha, 3 Sept. 1969, *Basak* 1130.

9. ***Utricularia polygaloides*** Edgeworth in Proc. Linn. Soc. 1: 351. 1847; *Basak* in Taxon 25: 189. 1976. *U. reticulata* Smith var. *stricticaulis* Koenig ex Oliver in Journ. Linn. Soc. 3: 180. 1859. *U. reticulata* Smith var. *uliginosa* Clarke in Hook. f. Fl. Brit. Ind. 4: 331. 1884, p.p. (excluding syn. *U. uliginosa* Vahl, 1804); Prain, Beng. Pl. 2: 582. 1903 (repr.) & in Rec. bot. Surv. Ind. 3: 254; 1905. *U. stricticaulis* (Koenig ex Oliver) Stapf ex Gamble in Fl. Madras 981. 1924 & in Fl. Madras 2: 689. 1924 (repr.). Abraham and Subramanyam in Proc. Ind. Acad. Sci. 62 B: 98. 1965; Subramanyam and Kamble in Proc. Ind. Acad. Sci. 68 B: 222. 1968. *U. humilis* Heyne ex Wall. list 1495. 1828, nom. nud. *U. humilis* Wight Ic. 4: t. 1572. 1850 (non Vahl, 1804). *U. stricticaulis* (Koenig ex Oliver) Stapf in Herb. Kew nom. nud. *U. caerulea* var. *stricticaulis* Koenig in Herb. Brit. Mus. nom. nud.

Scapes sometimes bifid, flowers 3-10, deep blue, pedicels of variable lengths, seeds finely striated and obovoid.

Skepwith collected representatives of the taxon from Burdwan in 1837 (in CAL) and Edgeworth described them from the same locality in 1847. Prain (1903), however, noted their occurrence in Bihar and Orissa only. Later he reported them from Serampore and Burdwan (Prain, 1905). These are found abundantly in Birbhum district.

The specimens of *U. polygaloides* have often been considered by many (*l.c.*) as varieties of *U. reticulata* Smith (Exot. Bot. 2:

t. 119. 1805). But these are quite distinct in habit and exomorphic characters, particularly in those of fruits and I consider the taxon as distinct from *U. reticulata*. It is also evident from their descriptions that *U. polygaloides* and the plants usually known as *U. stricticaulis* are conspecific. As such, the earliest available specific epithet *U. polygaloides* Edgew. becomes the correct name for the taxon (*Basak, l.c.*). Mr. P. Taylor of the Kew Herbarium considers that a specimen in the Willdenow herbarium at Berlin (described as *U. capillacea* Willd., Sp. Pl. ed. 4, 1: 113. 1797) could possibly be *U. polygaloides*. As the specimen of Willdenow is small and incomplete, Mr. Taylor however, doubts if it will ever be possible to prove that both are conspecific.

Distribution: Deccan Peninsula, Bihar, Orissa, West Bengal and Sri Lanka.

Specimens examined: BURDWAN DISTRICT: Burdwan, Jan. 1837, *Skepwith s.n.* (Acc. no. 330152 in CAL)—Neotype. BIRBHUM DISTRICT: Charicha, 5 Nov. 1969, *Basak* 1232; Mosmara, Kchujore, 18 Dec. 1969, *Basak* 1260; Nimdaspur, Charicha, 23 Dec. 1969, *Basak* 1323; Baidayanathpur, 24 Oct. 1970, *Basak* 1532. HOOGHLY DISTRICT: Goghat, 23 Nov. 1961, *Hazra* 139.

10. ***Utricularia baouleënsis*** A. Chev. in Bull. Soc. Fr. Mém. 8: 136. 1912; P. Taylor in Kew Bull. 18: 69. 1964; Abraham and Subramanyam in Proc. Ind. Acad. Sci. 62 B: 98. 1965. *U. scandens* Oliver in Journ. Linn. Soc. 3: 181. 1859 (non Benj. 1847); Clarke in Hook. f. Fl. Brit. Ind. 4: 332. 1884; Prain, Beng. Pl. 2: 582. 1903 (repr.); Haines, Bot. Bih. & Or. 2: 677. 1922 (repr.).

Prain (*l.c.*) reported them as very rare and these were collected previously only once from North Bengal by Kurz. Haines (*l.c.*) also cited the same collection by Kurz. No other information is available on the occur-

rence of this taxon in West Bengal. However, Vicary and Haines collected them from Dinajpore and Singhbhum districts respectively, both the areas being adjacent to West Bengal. These are probably overlooked owing to their small size and inconspicuous flowers.

Distribution: Widespread in tropical Africa, Tamil Nadu, Bihar and north Bengal in India and Philippines.

Specimens examined: NORTH BENGAL: Jitalaya, without date, *Kurz s. n.* DINAJPORE DISTRICT (Adjacent to West Dinajpore): Dinajpore, without date, *Vicary s. n.* SINGHBHUM DISTRICT: Singhbhum, Sept. 1899, *Haines* 207.

11. ***Utricularia scandens*** subsp. ***scandens*** Benj. in *Linnaea* 20: 309. 1847 (non Oliver, 1859); P. Taylor in *Hutch. & Dalz., Fl. W. Trop. Afr.* ed. 2, 2: 378. 1963 & in *Kew Bull.* 18: 46. 1964; Abraham and Subramanyam in *Proc. Ind. Acad. Sci.* 62 B: 98. 1965; Hara, *Fl. East. Himal.* 300. 1966. *U. wallichiana* Wight *l.c.* 4: t. 1572. f. 1. 1850; Clarke in *Hook. f. Fl. Brit. Ind.* 4: 332. 1884; Prain, *Beng. Pl.* 2: 582. 1903 (repr.); Haines, *Bot. Bih. & Or.* 2: 677. 1922 (repr.).

Prain (*l.c.*) reported them only from Bihar and Chota Nagpur. Haines (*l.c.*) cited a collection of Campbell from Manbhum area, presently in the Purulia district of West Bengal. It is however, quite possible to locate this widespread species within the areas of West Bengal. These are also often overlooked because of their small size.

Distribution: Widespread in tropical Africa, eastwards to Java and New Guinea. In India from the Himalaya to the hills of Deccan Peninsula and Sri Lanka.

Specimens examined: BENGAL: Without locality and date, *Vicary s. n.*

DINAJPORE DISTRICT: Dinajpore, adjacent to West Dinajpore, single twining specimen

on *U. caerulea* L., without date, *Vicary s. n.* CHOTANAGPUR DIVISION: Daumda, Nov. 1885, *Prain s. n.*

12. ***Utricularia bifida*** L. *Sp. Pl.* 18. 1753; Clarke in *Hook. f. Fl. Brit. Ind.* 4: 332. 1884; Prain, *Beng. Pl.* 2: 582. 1903 (repr.) & in *Rec. bot. Surv. Ind.* 3: 255. 1905; Abraham and Subramanyam in *Proc. Ind. Acad. Sci.* 62 B: 98. 1965.

Although the taxon is a common and abundant species in West Bengal, it is, however, not well represented in the Calcutta herbarium from all the districts of West Bengal.

Distribution: Throughout eastern Asia, from Japan to Java, Borneo, Philippines and Malacca; throughout India and Sri Lanka.

Specimens examined: NORTH BENGAL: Between Siliguri and Jitalaya, 27 Oct. 1868, *Kurz s. n.* BIRBHUM DISTRICT: Santiniketan, 7 Sept. 1949, *Biswas* 4279; Dzer Park, Santiniketan, 13 Oct. 1968, *Basak* 930; Charicha, 23 July 1969, *Basak* 1005; Nimdaspur, Charicha, 3 Sept. 1969, *Basak* 1129; Sarmara, Kachujore, 22 Oct. 1970, *Basak* 1527; Baidayanathpur, 24 Oct. 1970, *Basak* 1533; Charicha, 24 Oct. 1970, *Basak* 1543. PURULIA DISTRICT: Manbhum, without date, *Campbell s. n.* BURDWAN DISTRICT: Burdwan, Jan. 1837, *Skeppwith s. n.*

13. ***Utricularia furcellata*** Oliver in *Journ. Linn. Soc.* 3: 189. 1859; Clarke in *Hook. f. Fl. Brit. Ind.* 4: 334. 1884.

Minute herbs with spatulate orbicular leaves and 2-6 flowered scapes. In dried vegetative state, they have few large almost erect and light green leaves.

It prefers higher elevation and is usually found above 2000 metres between Ghoom and Tongloo.

Distribution: Sikkim Himalaya, at Darjeeling 2150-2750 m, Meghalaya and Indo-China.

Specimens examined: DARJEELING DISTRICT: Darjeeling, 27 Aug. 1862, *Anderson* 833; Tongloo, 3 Aug. 1862, *Anderson s. n.*; Senchal, July 1874, without collector's name, 3200 A; Tongloo, 1877, *King s. n.*; Darjeeling, 9 Sept. 1903, *Cave s. n.*

14. ***Utricularia brachiata*** Oliver in Journ. Linn. Soc. 3: 187. 1859; Clarke in Hook. f. Fl. Brit. Ind. 4: 333, 1884.

Small herbs with 1-2 flowered linear scapes. These have so far been collected from Phalout area of Darjeeling district. These also prefer higher elevation.

Distribution: Alpine Sikkim, 2450-3350 m.

Specimens examined: DARJEELING DISTRICT: Phalout, 1 Oct. 1857, *T. Thomson s. n.*

15. ***Utricularia striatula*** Smith in Rees, Cyclop. 37: no. 17. 1819; P. Taylor in Kew Bull. 18: 91. 1964; Hara, Fl. East. Himal. 300. 1966. *U. orbiculata* Wall. ex A. DC. Prodr. 8: 18. 1844; Oliver in Journ. Linn. Soc. 3: 187. 1859; Clarke in Hook. f. Fl. Brit. Ind. 4: 334. 1884. *U. glochidiata* Wight in Hook., Kew Journ. Bot. 1: 373. 1849 & in Wt. Ic. t. 1581. 1850.

Small herbs with rosette of petiolate leaves at the base of the erect slender 1-5 flowered scapes, orbicular upper calyx lobes having emarginate apex. In dried vegetative state, they have radiating strings of tiny almost black leaves which lie flat on the rocks all around them.

These are extremely variable in stature and in the size, shape and number of its flowers (see also *Taylor, l.c.*). *Hara (l.c.)* is of the opinion that three other species, *U. brachiata*, *U. furcellata* and *U. multicaulis* described earlier by Oliver (1859) from the Himalayan region may also fall within variations of *U. striatula*. It is rather difficult to distinguish all these taxa in dried forms. However, further study of fresh material of all these taxa is required to determine their

specific delimitations. These occur in the Darjeeling district of West Bengal at higher elevations.

Distribution: Tropical Africa, tropical Asia, India, Nepal, Bhutan, Sri Lanka, Malaysia to New Guinea, south China and Formosa. In India, it is common in the hills of Himalaya, 900-2450 m, Meghalaya and western part of Deccan Peninsula.

Specimens examined: DARJEELING DISTRICT: Birch hill, 7 Aug. 1857, *T. Thomson s. n.*; Between Sandah and Kurseong, without date, *Kurz s. n.*; Birch hill, without date, *Kurz s. n.*; Punkabari, without date, *Kurz s. n.*; Jalapahar, 7 Oct. 1874, *King s. n.*; Kurseong, 1370 m, Aug. 1874, *Gamble* 3291A; Darjeeling, 2300 m, 17 Aug. 1875, *Clarke* 27036; Darjeeling, 23 Aug. 1875, *Clarke* 27107B; Punkabari, 30 Aug. 1877, *King s. n.*; Darjeeling, Sept. 1903, *Cave s. n.*

DROSERACEAE

B. SUNDEWS: *Drosera* L.

Out of about 90 species of *Drosera* in the world (Shetler and Montgomery, 1965), only 3 species occur in India and 2 species are found in West Bengal. Lloyd (1942) and Shetler and Montgomery (*l.c.*) discussed in details the mechanism of traps in *Drosera*. The pollen morphology of the family Droseraceae with special reference to taxonomy was studied by Chanda (1965) and Raj (1965).

Key to the species of *Drosera*

Stem short, leafless, leaves all radical, forming basal rosette	...	<i>D. burmanni</i>
Stem elongate, leafy, leaves cauline, alternate, long linear	...	<i>D. indica</i>

16. ***Drosera burmanni*** Vahl, Symb. 3: 50. 1794; Clarke in Hook. f. Fl. Brit. Ind. 2: 424. 1878; Prain, Beng. Pl. 1: 341. 1903 (repr.) & in Rec. bot. Surv. Ind. 3: 210. 1905; van Steenis in Fl. Males. Ser. I. 4(4): 378. 1953.

Small herbs having reddish leaves covered with long glistening glandular hairs and

producing central flowering stalks. They grow abundantly in rice fields and open waste land, especially along the western sector of West Bengal.

These are yet to be located in the botanical area of Central Bengal as stated earlier by Prain (1903).

Distribution: West Africa, throughout India, Burma, China, Japan, Malaya and Australia.

Specimens examined: JALPAIGURI DISTRICT: Jalpaiguri, 24 Jan. 1879, Gamble 6535B; Jalpaiguri, Jan. 1880, Gamble 7726. BIRBHUM DISTRICT: Santiniketan, Sept./Oct. 1964, Guha s. n.; Baidyanathpur, 22 Mar. 1966, Basak 31; Charicha, 23 Dec. 1969, Basak 1320. PURULIA DISTRICT: Manbhum, without date, Campbell s. n.; Manbhum, without date, Ball s. n. MIDNAPUR DISTRICT: Hijli, 20 Jan. 1957, Mukherjee s. n. BURDWAN DISTRICT: Burdwan, Jan. 1837, Skepwith s. n. HOOGHLY DISTRICT: Hooghly, 30 Dec. 1899, Prain's collector s. n.; Hooghly, 27 Jan. 1963, Mallick & Hazra 290; Tarakeswar, 25 Jan. 1900, Chatterjee s. n.

17. *Drosera indica* L. Sp. Pl. 282. 1753; Clarke in Hook. f. Fl. Brit. Ind. 2: 424. 1878; Prain, Beng. Pl. 1: 341. 1903 (repr.); van Steenis in Fl. Males. Ser. I. 4 (4): 379. 1953; Backer and Bakh. f., Fl. Java 1: 203. 1963.

Slender herbs with elongate stems and leaves covered with long glandular hairs. They grow on marshy land and wet meadows in the forest belts of Birbhum district amidst grass and *Utricularia*.

Clarke (l.c.) mentioned their distribution in India from the Deccan Peninsula to as far north as Chota Nagpur. He further remarked that these are not known in the Upper Ganga Plain. Prain (1903) also reported them from Chota Nagpur only. The collection from Birbhum district is the first record from West Bengal and shows the ex-

tension of distribution towards the north east.

Distribution: Tropical Africa, India, Sri Lanka, China, Japan, Malaya and Australia.

Specimens examined: BIRBHUM DISTRICT: Nimdaspur, Charicha, 3 Sept. 1969, Basak 1126; Sarmara, Kachujore, 22 Oct. 1970, Basak 1525.

C. FLYTRAPS: *Aldrovanda* L.

The genus *Aldrovanda* includes single species *A. vesiculosa* L. These are free floating freshwater herbs with small leaves attached to 6-10 cm long stems in whorls of eight. The mechanism of the traps in *Aldrovanda* was described by Lloyd (1942) and Shetler (1968).

18. *Aldrovanda vesiculosa* L. Sp. Pl. 281. 1753; Clarke in Hook. f. Fl. Brit. Ind. 2: 424. 1878; Prain, Beng. Pl. 1: 342. 1903a (repr.), in Rec. bot. Surv. Ind. 2: 305. 1903b & in Rec. bot. Surv. Ind. 3: 210. 1905; Sen Gupta in Sci. & Cult. 3: 97. 1937; van Steenis in Fl. Males. Ser. I. 4(4): 381. 1953; Deb in Curr. Sci. 26: 229. 1957 & in Bull. bot. Surv. Ind. 3: 327. 1961.

Free floating submerged rootless herbs with articulated stems, leaves spatulate-orbicular, the blades contorted; flowers solitary.

Clarke (l.c.) cited the collections of Roxburgh, Thomson and Kurz from salt pans, south of Calcutta. Based on the same collections, Prain (1903 a & b) reported them from the salt lakes of central Bengal, just to the north of Sundarbans. Possibly these are the only specimens collected so far from West Bengal. The distribution pattern of the taxon in India was noted by Prain (1903b). The two other collections from eastern part of the Indian subcontinent are by Sen Gupta (l.c.) from Dacca district in Bangladesh and by Deb (l.c.) from Imphal,

Manipur state in India. According to Deb (1961), the rarity of the species is either due to the prolonged dormancy of the seeds or due to the germination of the seeds only under a small range of favourable microclimate.

Distribution: Widely distributed species, from Spain to Japan and Australia, southwards to Mozambique, east Africa; Lower Bengal and Manipur in India and Dacca in Bangladesh.

Specimens examined: CALCUTTA: Jhills, south of Calcutta, 10 Nov. 1855, *T. Thomson* (?), DISTRICT: 24 PARGANAS: Salt pan near Mutlah, Nov. 1869, *Kurz s. n.* Lower Bengal, without date, *Kurz s. n.*

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