

DISTRIBUTION OF *UTRICULARIA* L. IN PENINSULAR INDIA, SOUTH OF THE VINDHYAS

K. SUBRAMANYAM†

Central College, Bangalore

The genus *Utricularia* L. has ca 150 species widely distributed in the world (Heslop-Harrison, 1977). Of these, 30 are reported from the Indian subcontinent. Interestingly in the adjacent continent of Africa, (South of Sahara) and Madagascar too almost a similar number (31) has been recorded (Taylor, 1964). Out of the 30 species in the Indian subcontinent, 23 occur in Peninsular India (73°-87° E and 8°-22° N) south of the Vindhya range. The distribution of the 24 species in Peninsular India is presented here.

Habitat-wise, these species can be broadly classified into epiphytic, terrestrial, aquatic and marshy forms, the last constituting the majority of the taxa occurring in Peninsular India.

The four aquatic species : *Utricularia aurea* Lour., *U. australis* R. Br., *U. exoleta* R. Br., and *U. stellaris* L. f. are all free floating, more or less submerged plants with dichotomously branched capillary leaf segments, peduncles usually or sometimes bearing a whorl of floats (*U. stellaris* and *U. aurea*), seeds tabular, prismatic with slightly winged margins (*U. aurea* and *U. stellaris*) or lenticular with broad dentate corky wings (*U. exoleta*) and pollen 11-28 colporate (except *U. australis* whose pollen was not studied) with elongated ectoapertures (Thanikaimoni, 1966). Corresponding to these special features, they also

show interesting features in their pattern of distribution in Peninsular India. While *U. aurea*, *U. exoleta* and *U. stellaris* have a wide range of distribution in the plains of almost all the states of Peninsular India and the Union territory of Goa, *U. australis* is so far known only from Arkalgud in the Hassan District of Karnataka (Gandhi, 1976). *U. aurea*, *U. exoleta* and *U. stellaris* occur in similar habitats in pools, and ponds and lakes in most of the states of Peninsular India; of these *U. aurea* is extensively distributed in Kerala, *U. exoleta* in Karnataka and Kerala and *U. stellaris* in Karnataka and Maharashtra respectively (Map 1). *Utricularia australis* was first reported for India only from Pipliapala, Indore (Madhya Pradesh) by Saxena (1970). It has been recently reported from the Hassan District of Karnataka (Gandhi *l. c.*). The leaves in these plants are characteristically 2-branched from the base (not with 3 or more primary leaf segments as in *U. aurea*) and have 2 to 3 scales on the scape. Taylor comments thus on this taxon (see Gandhi, p. 563, 1976) : "was confused with *U. aurea* (under the name *U. flexuosa* Vahl) by Bentham in Fl. Austr. and C. B. Clarke in F. B. I. The two species are quite distinct and may have different distributions" It is pertinent to mention here that *U. exoleta* and *U. stellaris* occurring in Peninsular India viz., are also reported from the adjacent continent of Africa (south of Sahara) and Madagascar (Taylor *l. c.*).

U. striatula Sm., is the only epiphyte in the region of Malabar and Deccan (Chatterjee,

† We regret to inform the sad demise of Dr. K. Subramanyam—Editor.

l. c.) and is also reported from tropical South Africa (Taylor *l. c.*). In addition to its peculiar habit, it also shows interesting features like obovate, orbicular to reniform leaves with open dichotomous venation (Subramanyam and Yoganarasimhan, 1978), pollen grains having a maximum thickness of $1.0\ \mu$ which are 3-4 colporate with a short ectoaperture (Thanikaimoni, *l. c.*) and glochidiate seeds. It occurs in all the states, usually preferring altitudes ranging from 850 to 2000 m. A point of interest about the distribution of plants of the species is their more or less continuous occurrence all along, on either side of the Western Ghats from south of Gujarat up to Mundanthorai in the Tirunelveli District of Tamil Nadu (Map 2).

In a limited area of 25 sq. km in Khandala, (Maharashtra) *U. striatula* is reported from as many as 9 nearby localities; (Santapau, 1967). Santapau (*l. c.* p. 220, 221), while studying these populations, observes thus on the colour of flowers, "the more common colour of the flowers is purple with a yellow spot at the base of the lower lip; not seldom the colour is pure white with the yellow spot mentioned; between these two colours, there is a great range of shades; often the outer rim of the lower petal is purple or rosy pink and between this rim and inner yellow spot, there is a ring pure white" Further, according to him plants of *U. striatula* are noticeable because they are the first to come into flower about a week after the first showers of the monsoon. In certain localities in Khandala they grow along with other species of the genus like *U. arcuata*, *U. reticulata*, *U. reticulata* var. *parviflora* and *U. uliginosa* at Behran's plateau and with *U. arcuata* and *U. uliginosa* at Battery Hill Plateau and Reversing station. In the Nilgiri District of Tamil Nadu with an area of about 2543 sq. km 9 species of this genus have been reported (Sharma *et al.*, 1977).

The remaining 18 species are terrestrial,

inhabiting marshy to semi-marshy places, bearing linear or linear-spathulate leaves. They show a varied pattern of distribution; while a few are restricted, others are distributed in one or more states, and still others show a very wide range in their distribution.

U. equiseticaulis Blatt. & McCann and *U. ogmosperma* Blatt. & McCann are known so far only from their type localities. *U. equiseticaulis* grows along with other herbaceous vegetation, forms dense mats in marshy soil, its stolons bear elongate-spathulate, imbricately arranged leaves and these after separating from the stolons, start producing new leaves from the basal end; the scapes resemble the stems of *Equisetum debile* and bear blue to purple flowers; the seeds are subglobose, with longitudinally arranged elongate fusiform areoles.

The plants occur at Panchagani, Dalkeith springs, near Mahabaleshwar in mud at Bilar, 15 km from Panchagani at an altitude 1300 m in the Satara District of Maharashtra (Map 2). Sundararaghavan, *et al.* (1970) who have collected these specimens from the type locality and in other localities in the immediate vicinity of Mahabaleshwar, have treated it as a synonym of *U. graminifolia* and merely its robust form. Our studies indicate that it to be a distinct species.

The other species *U. ogmosperma* commonly called 'Blue Bonnet' is also terrestrial, growing on water-logged soil amidst grass; the leaves are small, oblong-spathulate or linear-spathulate, the blue or purple olive fragrant flowers are borne on erect quadrangular scapes with pedicels sometimes twining; seeds are dark brown, slightly obliquely ellipsoid, blunt at both ends and deeply furrowed longitudinally. Like the previous species, these also occur at Panchagani, in the first table land and plentifully in the second table land, at an altitude of about 1300 m (Map 2). Since both these species are reported only from Pancha-

gani near Mahabaleshwar and closely adjacent localities and not reported elsewhere so far, they can be regarded as endemic species. Mahabale (1936) regards them progressive endemics.

U. albo-caerulea Dalz., are terrestrial plants growing in marshy habitats with linear to linear-spathulate leaves, flowers large, purple-blue with the centre of the plate white and yellow-spotted at the base, seeds obovoid, testa cells elongated and irregular and breviate pollen, 4-5 colporate with elongated ectoaperture (Thanikaimoni, *l. c.*). Their distribution is confined so far only to the south-western regions of Maharashtra State and recorded in such places as Panchagani, Mahabaleshwar, Ratnagiri, Vengurla and Amboli-ghat (Map 1). Cooke (*l. c.*, p. 391) regards it "apparently endemic"

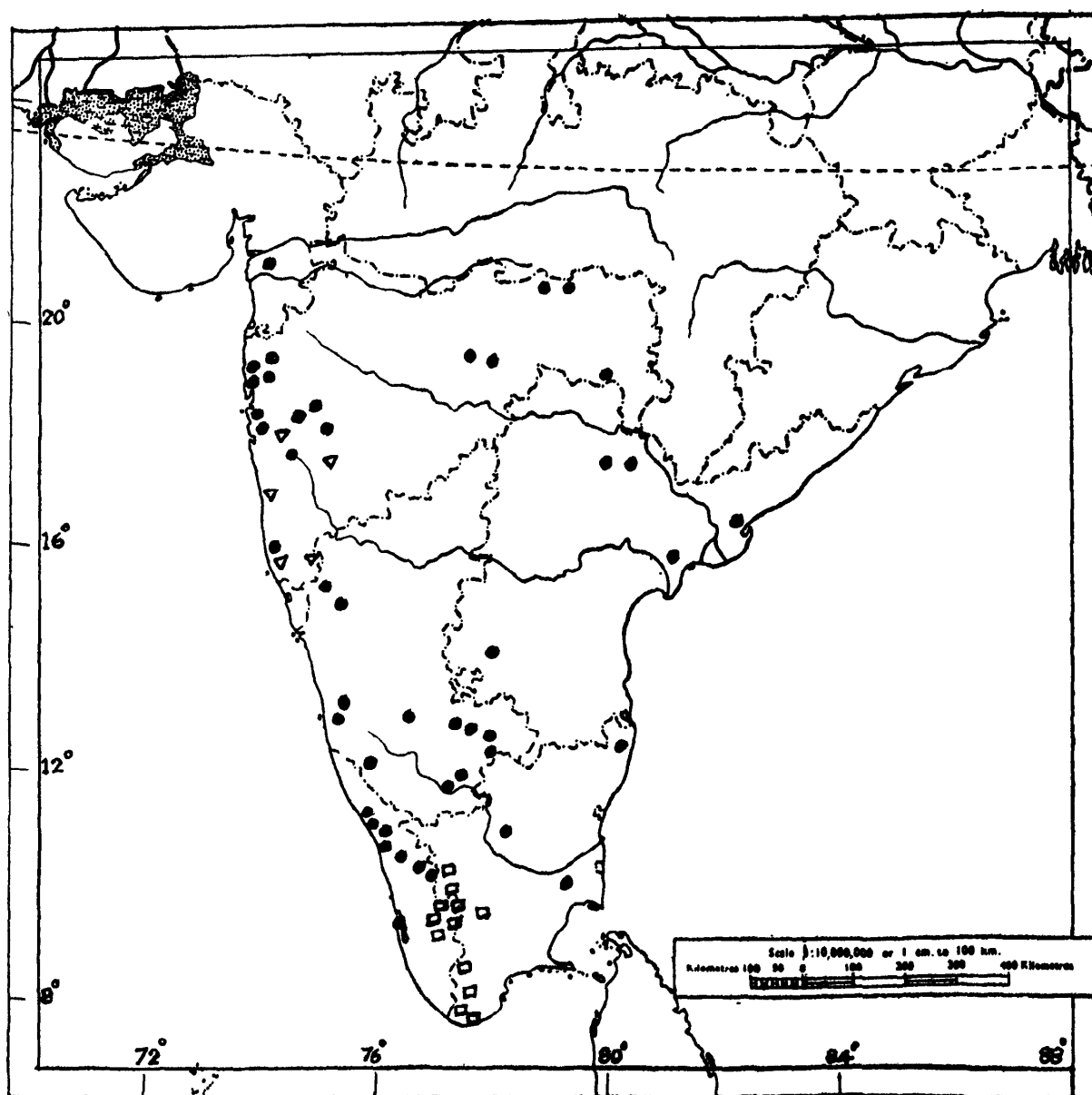
There are a few species occurring in two, three, or more states; they are *U. roseo-purpurea* Stapf ex Gamble, *U. baouleensis* A. Chev., *U. hirta* Klein ex Link, *U. smithiana* Wight, *U. squamosa* Wight, *U. minutissima* and *U. polygaloides* in four states of Peninsular India, though the states in which they have been reported to occur differ in each case.

U. roseo-purpurea is closely allied to *U. caerulea* L. and restricted all along the high altitude ranges of Western Ghats in Kerala and Tamil Nadu (Anamalais and Pulney ranges of hills). A detailed description of this has already been provided by Subramanyam and Banerjee (1968). These slender terrestrial plants occurring in swamps, bear dark purple and apparently pinkish rather large flowers; their stolons are thin bearing short spathulate leaves and traps with terminal mouths arched over by sickle-shaped upper lips; the pollen is 3-colporate (Thanikaimoni, *l. c.*). They occur from 1400 to 2335 m and have been reported so far from only 2 states; Kerala (Munnar, Umaiya Malai Slopes, Devicolam and

Sholiyar submergible area) and Tamil Nadu (Attakatti, Iyerpadi, Parlai in the Anamalais and Kodaikanal, Chitruaravi in Courtallam, Mahendragiri, Tallumukaramparai and Muthukuzhivayal). The greatest concentration is along the Umaiya Malai slopes in the Anaimudi ranges and in the adjoining Anamalai and Pulney ranges (Map 1).

In the case of *U. baouleensis*, the plants are very small, terrestrial, growing in wet places, often with *U. scandens* they bear blue flowers sometimes with twining scapes, with minute reticulate and scrobiculate seeds. They occur in the states of Karnataka, Orissa and Tamil Nadu. The only species in the Indian subcontinent with minutely villous scapes is *U. hirta*. They are terrestrial plants, growing in marshy habitat, with linear to linear-spathulate leaves, with bluish-purple or rarely white flowers and minute brownish, rhomboid, reticulate seeds, and reported from Karnataka, Orissa and Tamil Nadu, with sparse distribution. A detailed description has been provided by Joseph and Ramamurthy (1961) (from Gingee Reserve Forest of Tamil Nadu, c 115 m). In the case of *U. smithiana*, the plants are terrestrial, inhabiting wet regions. The filiform stolons produce linear-spathulate leaves and the erect twining scapes bear large bluish flowers and the seeds and globose and reticulate. It has a restricted distribution and is known so far only from the following three states: viz. Kerala (Trivandrum and Devicolam), Karnataka (Coorg, Agumbe and Thirthahalli) and Tamil Nadu (Kodaikanal slopes, Anamalais, Muthukolam near Siruvani and Pykara near Ootacamund). They usually occur at higher altitudes.

U. squamosa are very slender plants, inhabiting wet places with linear spathulate evanescent leaves and producing crest scapes bearing the flowers and globose reticulate seeds. Like *U. smithiana* they are distributed in the states of Karnataka, Kerala and Tamil



Map 1. Distribution of *Utricularia stellaris* (●), *U. roseo-purpurea* (□) & *U. albo-caerulea* (▲).

Nadu particularly along the eastern and western slopes of Western Ghats.

Clarke (*l. c.*) mentioned *U. minutissima* Vahl among the imperfectly known species. An account of the history and distribution of this in India has been recently published (Subramanyam, 1977). The plants are the minutest species of *Utricularia* in India. The underground stolons which are mycelium-like,

bear small 1-nerved leaves with minute traps on both these vegetative parts : the traps are extraordinary, found hanging on long slender stalks with a latero-terminal narrow mouth flanked on either side by an oblique fan-like wing consisting of paired vesicular cells, each pair with a clavate, gland at the tip ; further, the anterior end of the wall of the trap is extended upward into a flat, acute, slightly bent

plate. This species has been reported so far only from the states of Karnataka, Kerala, Orissa and Tamil Nadu. The main reason for the discontinuity in their distribution between Karnataka, Kerala and Tamil Nadu on one side and the far off north easterly state of Orissa on the other, is their extremely minute size, making it difficult to locate these plants in the field. Though they were reported for the first time in Courtallam in 1960 (named as *U. liliput* Pellegrin; Subramanyam and Balakrishnan, 1960) from collections made during 1957, extension of their distribution up to 1974 in Peninsular India has been the result of further careful collections made in Malam-puzha near Palghat (Nair, 1965), Iringal, Madapally, Badagara (Kerala), Balukhand, Konarak, Puri (Orissa) and Halekote (Karnataka). A further extension of the distribution to other states of India in suitable ecological niches is quite possible through careful future surveys.

The blue flowers and fruits covered by prominent calyces and borne on recurved pedicels on the rather thick scapes are characteristic of *U. polygaloides*; these are terrestrial forms inhabiting wet places and bear narrow linear leaves and very small traps on the stolons; the pollen are 4-5-colporate (Thanikaimoni, l. c.). They are distributed in Andhra Pradesh, Karnataka, Orissa and Tamil Nadu and in as many as 7 and 6 localities respectively in the last two states. In their habitat they show a preference to coastal slacks along Nellore (Andhra Pradesh), Madras (Tamil Nadu) and Gopalpur, Chatrapur, Puri and Konarak (Orissa).

Among the widely distributed species are *U. arcuata* Wight, *U. bifida* L., *U. nivea* Vahl, *U. reticulata* Sm., and *U. uliginosa* Vahl.

U. arcuata is a pretty delicate species; the plants bear small rounded traps and linear-spathulate leaves on the stolons; the bluish-purple flowers are characterised by promi-

nently curved spurs. They are distributed all along the western regions of Peninsular India, in the states of Karnataka, Kerala, Maharashtra and near the east coast in Orissa and in the Union territory of Goa. While in Maharashtra, they have been collected in as many as 12 localities, they are known from 4 in Karnataka, 2 in Kerala and 1 each in Orissa and Goa respectively. At Panhala (Kolhapur District), they occur abundantly at an altitude of about 835 m forming gregarious populations during September.

U. bifida bears yellow flowers on short, rigid, twining scapes. They are small, terrestrial herbs inhabiting wet places with filiform leaves and small 2-horned traps borne on the bases of thread like stolons, and obovoid seeds with prominently striate reticulate testa; the breviate pollen are 3-4 colporate (Thanikaimoni, l. c.). They are distributed in Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh (Bastar Distt.), Orissa and Tamil Nadu.

Another equally interesting species is *U. nivea*. These terrestrial plants inhabiting wet marshy regions bear linear-spathulate leaves and produce seeds whose testa cells have clavate projections (Abraham and Subramanyam, 1965; Abraham, Mitra and Subramanyam, 1974); according to Thanikaimoni (l. c.) the long axis pollens are 3-4 colporate. They are distributed in Andhra Pradesh, Karnataka, Kerala, Maharashtra, Orissa and Tamil Nadu.

U. reticulata Sm., is a striking species bearing large flowers with blue-violet corolla, the palate reticulated with pale blue and white; they are terrestrial, usually found in rice fields, with twining, interlacing scapes on rice plants; the seeds are rhomboid and reticulate and the pollen 4-5 colporate, ectoaperture elongated (Thanikaimoni, l. c.). They are chiefly distributed along the west coast at low elevations in Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, (Bastar District) Maharashtra and the Union territory of Goa and are more

or less confined to these regions. *U. reticulata* Sm. var. *parviflora* Santapau is bright flowered and represents a miniature form of *U. reticulata*. These are reported to occur so far from two localities each in Andhra Pradesh (Balapalla and Srisailam) and Maharashtra (Khandal and Mumbra). Regarding the habitat of this plant at Khandala, Santapau (1950, p. 220) observes thus: "A gregarious plant growing in association with various grasses and other plants (*Linum mysorense*, *Oldenlandia* sp. *Eriocaulon* sp., etc.). This plant has only been observed once in Khandala on 31st Oct., 1944 (Santapau, 5422) on Behran's plateau; it was growing near, but scarcely mixed with, *Utricularia reticulata* Sm.; it can scarcely be said that the small size of the whole plant is due to ecological conditions different from those in which the larger plant grows, for when found the smaller plants were growing on the same sort of soil, and had about the same amount of water as the typical plant; at that particular spot there were two large patches of these two varieties, there being but little intermixing at the point where the two patches met"

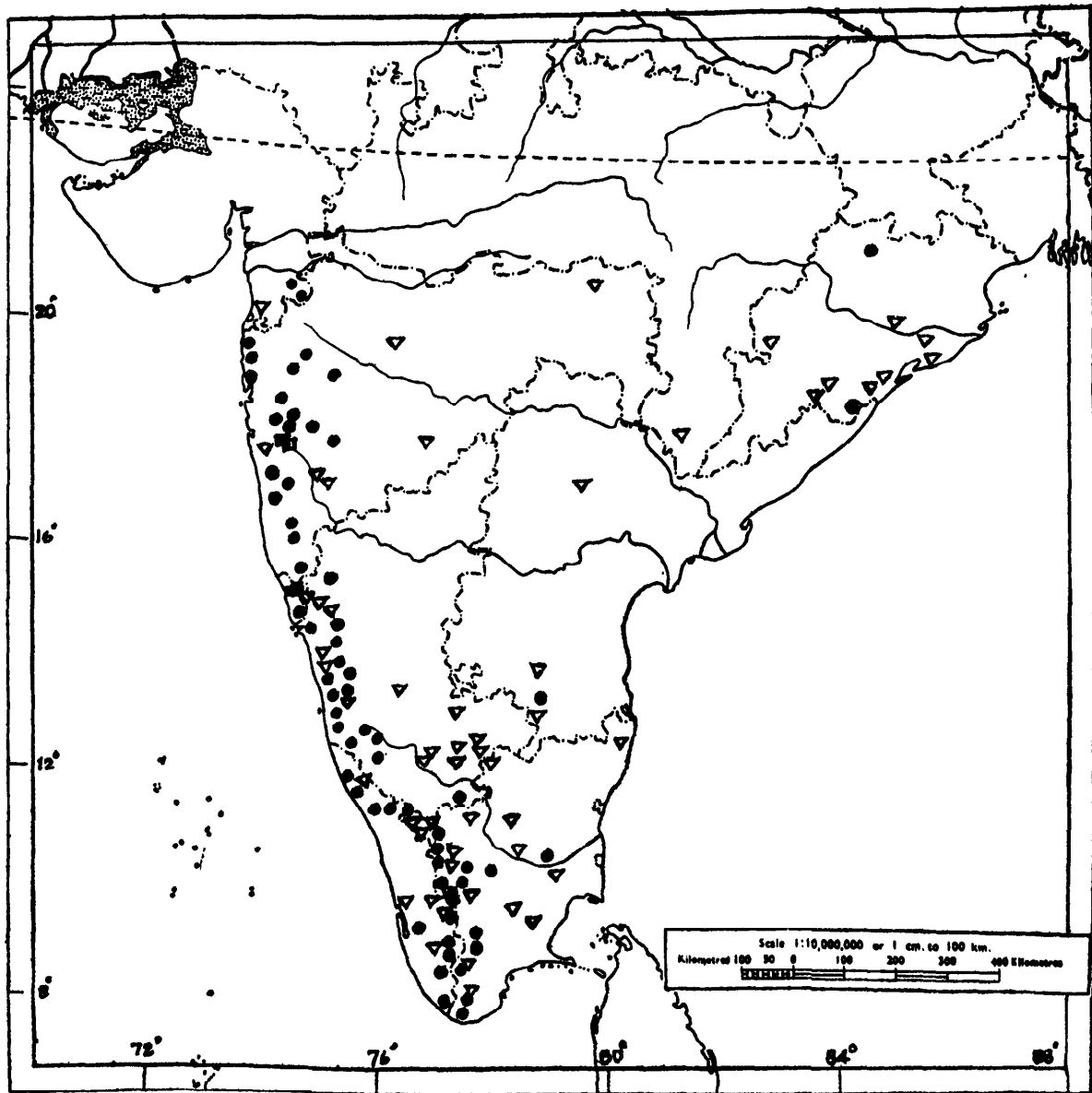
A species closely allied to *U. reticulata* is *U. smithiana* both bearing large blue flowers on twining scapes. But, while *U. reticulata* is widely distributed in many states at lower elevations particularly inhabiting rice fields, *U. smithiana* is restricted in its distribution, usually preferring higher altitudes, particularly in the Western Ghats.

U. uliginosa is a small terrestrial form inhabiting swampy land; this is rather an obscure species with bluish-purple conically spurred flowers; the stolons bear linear-oblong obtuse leaves and the small traps are very evanescent; the subglobose seeds show subhexagonal scrobiculate areoles on the testa; and the breviate pollen are 3-4 colporate (Thanikaimoni, *l. c.*). They occur up to an altitude of 2335 m. They have wide distribu-

tion, all along the Western Ghats and in Karnataka, Kerala, Madhya Pradesh, (Bastar District) Maharashtra, Tamil Nadu and the Union territory of Goa.

U. caerulea L., *U. graminifolia* Vahl, and *U. scandens* Benj. subsp. *scandens* are widely distributed in Peninsular India. *U. caerulea* has slender terrestrial plants inhabiting always swampy places; the leaves are linear spathulate and traps have terminal mouth arched over by sickle-shaped antennae; the scales and bracts on the scape are characteristically medifixed and the flowers are usually purple or rarely white; the seeds are obovoid with prominently reticulate testa with elongated epidermal cells; the pollen are 3-4 colporate, whose ectoapertures are elongated (Thanikaimoni, *l. c.*). According to Taylor (*l. c.*) this is a wide spread and polymorphic Tropical Asian species. Added support to this statement is provided by the distribution of this species in all the states (Map 2) of Peninsular India. It is interesting to point out that they occur all along the coasts of Quilon, Veli near Trivandrum (Kerala) and Konarak (Orissa). At the same time, they prefer swampy habitats in the Western Ghats, Anamalais, Pulneys and the hills of Travancore up to an altitude of about 2335 m; they are found to occur at an altitude of about 835 m in the Deccan and in the Seshachalam Hills of Cuddapah and the Shevaroy Hills of Salem.

Commonly inhabiting bogs and other wet places are the slender terrestrial species of *U. graminifolia*; they bear linear leaves and small traps in filiform stolons which actually grow amidst grass roots; the erect scapes produce bluish-purple flowers; the seeds show reticulate testa with elongated areoles; the pollen are 4-5 colporate (Thanikaimoni, *l. c.*). They are distributed in most of the states like Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu and Goa. They are particularly well distributed along the western and



Map 2. Distribution of *Utricularia striatula* (●), *U. equiseticaulis* (□) *U. ogmosperma* (□), & *U. caerulea* (▲).

eastern slopes of Western Ghats with concentration in the Nilgiri District and surrounding regions (Pulneys). Though they prefer higher altitudes, they are found even near the coast at Konarak in Orissa.

U. scandens is a slender terrestrial plant, usually inhabiting bogs and wet places and is characterised by twining scapes, bearing yel-

low flowers; the leaves are linear, rather evanescent; the seeds are reticulate with elongate areoles; the brevixae pollen are 3-4 colpate (Thanikaimoni, *l. c.*). It is distributed in Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh (Bastar District), Maharashtra, Orissa and Tamil Nadu. There is a concentration of this in the southern states of Peninsular India,

Table : Distribution of the various species of *Utricularia* in Peninsular India

		States/Union territory in Peninsular India								
	Habitat	1	2	3	4	5	6	7	8	9
1. <i>Utricularia aurea</i>	A	+ (5)	—	+ (4)	+ (18)	+ (1)	+ (5)	+ (3)	+ (8)	+ (1)
2. <i>U. australis</i>	A	—	—	+ (1)	—	—	—	—	—	—
3. <i>U. exoleta</i>	A	+ (6)	+ (1)	+ (9)	+ (7)	+ (2)	+ (5)	+ (1)	+ (6)	—
4. <i>U. stellaris</i>	A	+ (5)	+ (1)	+ (12)	+ (8)	—	+ (16)	+ (3)	+ (2)	—
5. <i>U. striatula</i>	E	+ (1)	+ (2)	+ (16)	+ (12)	—	+ (19)	+ (2)	+ (14)	+ (2)
6. <i>U. albo-caerulea</i>	T	—	—	—	—	—	+ (6)	+ —	+ (1)	—
7. <i>U. arcuata</i>	T	—	—	+ (4)	+ (2)	—	+ (12)	+ (1)	—	+ (1)
8. <i>U. baouleensis</i>	T	—	—	+ (2)	—	—	—	+ (1)	+ (5)	—
9. <i>U. bifida</i>	T	+ (2)	—	+ (3)	+ (2)	+ (1)	—	+ (3)	+ (2)	—
10. <i>U. caerulea</i>	T	+ (2)	+ (1)	+ (14)	+ (9)	+ (2)	+ (6)	+ (7)	+ (16)	+ (1)
11. <i>U. equiseticaulis</i>	T	—	—	—	—	—	+ (1)	—	—	—
12. <i>U. graminifolia</i>	T	—	—	+ (12)	+ (3)	+ (1)	+ (7)	+ (1)	+ (19)	+ (1)
13. <i>U. hirta</i>	T	—	—	+ (2)	—	—	—	+ (1)	+ (1)	—
14. <i>U. minutissima</i>	T	—	—	+ (1)	+ (5)	—	—	+ (4)	+ (1)	—
15. <i>U. nivea</i>	T	+ (1)	—	+ (2)	+ (1)	—	+ (1)	+ (2)	+ (1)	—
16. <i>U. ogmosperma</i>	T	—	—	—	—	—	+ (1)	—	—	—
17. <i>U. polygaloides</i>	T	+ (1)	—	+ (2)	—	—	—	+ (7)	+ (6)	—
18. <i>U. reticulata</i>	T	+ (1)	—	+ (14)	+ (15)	+ (1)	+ (12)	—	—	+ (4)
19. <i>U. reticulata</i> var. <i>parviflora</i>	T	+ (2)	—	—	—	—	+ (2)	—	—	—
20. <i>U. roseo-purpurea</i>	T	—	—	—	+ (5)	—	—	—	+ (7)	—
21. <i>U. scandens</i> subsp. <i>scandens</i>	T	+ (4)	—	+ (9)	+ (2)	+ (1)	+ (1)	+ (3)	+ (21)	—
22. <i>U. smithiana</i>	T	—	—	+ (3)	+ (2)	—	—	—	+ (4)	—
23. <i>U. squamosa</i>	T	—	—	+ (2)	+ (3)	—	—	—	+ (3)	—
24. <i>U. uliginosa</i>	T	—	—	+ (16)	+ (6)	+ (2)	+ (11)	—	+ (6)	+ (2)

Notes : 1. Andhra Pradesh; 2. Southern Gujarat; 3. Karnataka; 4. Kerala; 5. Madhya Pradesh (Bastar District); 6. Maharashtra; 7. Orissa; 8. Tamil Nadu; 9. Goa. Habitat : A. Aquatic; E. Epiphytic; T. Terrestrial + present; — not reported so far; () number of localities.

particularly in Karnataka, Kerala and Tamil Nadu. It occurs up to an altitude of about 2335 m in all the districts of Western Ghats and in the hilly regions of Salem and Coimbatore districts up to an altitude of about 335 m.

The distribution of these 24 species of *Utricularia* in Peninsular India is shown in a table and is marked on base maps of India.

It is evident from the table that the species of *Utricularia* showing wide range in their distribution are *U. aurea*, *U. stellaris* (aquatic), *U. striatula* (epiphytic), *U. caerulea*, *U. graminifolia* and *U. scandens* (terrestrial); again here, *U. caerulea* is found in all the states and Union territory of Goa in Peninsular India. At the other extreme is *U. equiseticaulis* and *U. ogmosperma* more or less endemic to Panchagani in Maharashtra; those showing a restricted distribution are *U. albo-caerulea*, almost confined to south-western Maharashtra and *U. roseo-purpurea* occurring in the high altitude slopes along the Umaia Malai, Anaimudi slopes in the Kerala State and the Anaimalai, Pulney ranges and Mahendragiri and surrounding regions in the Tamil Nadu. Of these 24 species, the largest number 19 occur in Karnataka with the next large number 18 in Tamil Nadu.

Out of these 24 species, the following 9 species are found both in Peninsular India and Sri Lanka (Trimen, 1895): *U. bifida*, *U. caerulea*, *U. exoleta*, *U. flexuosa*, *U. nivea*, *U. reticulata*, *U. stellaris*, *U. striatula* (syn. *U. orbiculata* Wall. in Trimen l. c.). Hence, nearly 39 per cent of these species are common to Peninsular India and Sri Lanka. Again comparing on the same lines with Africa (south of Sahara) and Madagascar where 31 species are reported (Taylor, l. c.), with Peninsular India, the following species are common to both these large land masses: *U. exoleta*, *U. stellaris* (aquatic), *U. striatula* (epiphytic), *U. baouleensis* and *U. scandens* (terrestrial). Hence the number of species common is only

5 and amounts to 16 per cent. Perhaps the close proximity of Sri Lanka with the extreme tip of Peninsular India accounts for a larger number of species common to both.

Finally, it must be pointed out that the distribution of the 24 taxa in Peninsular India should not be construed as complete and final at this stage, for there is every likelihood of an extension of their distribution in or to other states/union territory of India by future floristic studies and explorations. However, every effort has been made to compile this information as up-to-date as possible, from studies on the data available in the various herbaria, institutions and field collections by the author in India and from relevant published literature so far on the taxonomy and floristic studies of this genus.

ACKNOWLEDGEMENTS

I wish to thank Professor M. Nagaraj for facilities, Dr. S. N. Yoganarasimhan for his valuable suggestions and help in the preparation of this paper and the University Grants Commission for financial assistance.

REFERENCES

- ABRAHAM, V., R. L. MITRA AND K. SUBRAMANYAM. Identity and nomenclature of *Utricularia nivea* Vahl. *Curr. Sci.* 43 : 571-572, 1974.
- AND K. SUBRAMANYAM. Studies on seeds of various taxa of *Utricularia* occurring in West Bengal. *Proc. Indian Acad. Sci.* 62 B : 97-102. 1965.
- BLASCO, F. Montagnes des sud L' Inde, Forets, Savanes, Ecologie. *Inst. Fr. Pondicherry Tray. Sec. Sci. Tech.* 10(1) : 1-436. 1971.
- BLATTER, E. AND C. McCANN. Two new *Utricularias* from the Western Ghats. *Journ. Indian bot. Soc.* 10 : 122-125. 1931.
- CHATTERJEE, D. Floristic patterns of Indian vegetation. In *Proc. Summer School Botany, Darjeeling*, edited by P. Maheshwari, B. M. Johri and I. K. Vasil. 32-42. 1962.

- CLARKE, C. B. Lentibulariaceae in Hook. f. et al., Flora of British India 4 : 328-336. 1884.
- COOKE, T. The Flora of the Presidency of Bombay. Lentibulariaceae. 389-394. repr. ed. Calcutta. 1958.
- FYSON, P. F. The Flora of the Nilgiri and Pulney Hill Tops. Lentibulariaceae. 1 : 306-308. 1915.
- GAMBLE, J. S. Flora of the Presidency of Madras. Lentibulariaceae. 687-691. repr. ed. Calcutta. 1957.
- GANDHI, K. N. Lentibulariaceae in Flora of Hassan. Edited by C. J. Saldanha & D. H. Nicolson. 563. 1976.
- HESLOP-HARRISON, YOLANDE. Carnivorous plants a century after Darwin. *Endeavour* 126 : 114-122. 1977.
- JOSEPH, J. AND K. RAMAMURTHY. Occurrence of *Utricularia hirta* Klein in South India. *Journ. Bombay nat. Hist. Soc.* 58 : 701-703. 1961.
- MAHABALE, T. S. Flora of the Deccan : Past and Present. Presidential address. *Proc. Indian Sci. Cong. Assoc.* 53rd session, 1-30. 1966.
- SANTAPAU, H. Notes on the Lentibulariaceae of Bombay. *Journ. Bombay nat. Hist. Soc.* 49 : 217-221. 1950.
- The Flora of Khandala, Lentibulariaceae, 188-190. 3rd ed. *Rec. bot. Surv. India* 16(1) : 188-190. 1967.
- SAXENA, H. O. *Utricularia australis* R. Br.—A new record for India from Indore. (Madhya Pradesh). *Indian Forester* 96 : 249-250. 1970.
- SHARMA, B. D. ET AL. Studies on the flora of Nilgiris, Tamil Nadu. *Biol. Mem. Angiosperm Taxonomy Series I*, 2 : 102-103. 1977.
- SUBRAMANYAM, K. Studies on the Indian *Utricularia* L. : 1. *Utricularia minutissima* Vahl—History and distribution in India. *Vignana Bharathi* 3 : 76-81. 1977.
- AND N. P. BALAKRISHNAN. *Utricularia liliput* Pellegrin—A new record for India. *Bull. bot. Surv. India* 2 : 347-348. 1960.
- AND L. K. BANERJEE. *Utricularia roseo-purpurea* Stapf ex Gamble (Lentibulariaceae) A little known species. *Ibid.* 10 : 103-106. 1968.
- AND S. N. YOGANARASIMHAN. Studies on Indian *Utricularia* L.-3 : Open dichotomous pattern of venation in the leaves of *Utricularia striatula* Sm. *Plant Syst. Evol.* 129 : 1978.
- SUNDARARAGHAVAN, R., B. M. WADHWA AND M. Y. ANSARI. On the identity of *Utricularia equiseticaulis* Blatt. et McCann. *Indian Forester* 96 : 503-505. 1970.
- THANIKAIMONI, G. Pollen morphology of the genus *Utricularia*. *Pollen et Spores* 8 : 265-284. 1966.
- TAYLOR, P. The genus *Utricularia* L., (Lentibulariaceae) in Africa (south of Sahara) and Madagascar. *Kew Bull.* 18 : 1-245. 1964.
- TRIMEN, H. A Hand-book of the Flora of Ceylon III. Repr. Lentibulariaceae, 267. 1895.