

Some epiphytic mosses of Mumbai

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Abstract

Mosses of Mumbai area were explored with special emphasis on epiphytic ones. The epiphytes are also known as "Space parasites", as they do not depend on the host plant for their nutrition because by virtue of the presence of chlorophyll they are autotrophic and carry out the function of photosynthesis. In the present paper five different species of epiphytic mosses have so far been encountered growing on various arboreal species in Mumbai area. These are *Macromitrium sulcatum* (Hook.) Brid., *Octoblepharum albidum* Hedw., *Calymperes thwaitessii* (Beisch.) Fleisch., *Erpodium magnifera* C. Muell. and *Stereohyllum tavoyense* (Hook.) Jaeg.

Mosses are a highly developed group of Bryophytes, occupying unique position between lower cryptogams and vascular cryptogams. They, like lower cryptogams, have filamentous protonema looking like some green filamentous algae and like high cryptogams they have a conducting strands. Systematic studies on some members of this group are available in the form of moss floras of Eastern India (monographic work of Gangulee 1969, 71, 74) North West Himalayas³ and Nilgiris (Foreau, 1917) and by different workers, but those in Western India remained mostly unworked or unexplored with some exceptions.

Mosses are highly sensitive to atmospheric pollution. They can absorb heavy metals from the atmosphere. They show several injury symptoms on exposure to metal pollutants. Thus they serve as very good bio-

indicators to pollution. This aspect is of very much importance to environmentalists and of great relevance in redeveloping and framing the urbanization aspects of commercial capital of India – Mumbai. Work of a number of workers has been consulted for the preparation of this manuscript¹⁻¹⁴.

Indian mosses have attracted the attention of many bryologist like Hamilton (1802-1803) who explored the moss flora of Nepal, Burma and Assam. Further detailed studies as the flora of mosses in India were conducted by Bridel (1818), Wallich (1828), Mueller (1853), Mitten (1859), Gollan (1896), Gammie (1896), Kirtikar (1897), Brotherus (1898), Blatter (1905), Sedgwick¹¹, Bruhl², Pottier de la Varde (1931), Chopra³, Dixon (1937), G.P. Foreau (1961), Norkett (1961), Gangulee (1963), Dabhade (1975) and others.

In the last decade of the 19th Century, mosses of Western Ghats were collected from diverse localities by enthusiastic botanists like Woodrow (1895), Surgeon-general Kirtikar (1897), Sedgwick (1908), Rev. Father Blatter (1905) and a few others. Dr. Kirtikar (1897), had collected the mosses of Mahabaleshwar, Matheran and they were published in Birdwoods "**Catalogue of the Flora of Matheran and Mahabaleshwar**" in 1897. In 1908, Maxwell and Dixon (1921) made a collection from forest of Kanara District and Sedgwick¹¹ from different localities in Western Ghats such as Purandar, Poona, Mahabaleshwar, Lonavala, Khandala, Trimbakeshwar, etc. They were published in three different papers on the "**Mosses of Western Ghats**". Gammie (1905-1910) and Burns (1910) collected mosses from Sakar Pather of Lonavala and adjacent area. Dixon^{5,6} who had special interest in the mosses of Sahyadris of Western Ghats discovered several new genera and species like *Marceyopsis* sp.⁵, *Hyophilopsis* Sp.⁵ *Bryosedwickis Kirtikari carde. et Dix.* (1912), etc. After Dixon, there has been a big gap in studies on moss flora of Western Ghats. Norkett and Dabhade (1966, 1970), have been collecting them at Mahabaleshwar, Khandala, Purandar Fort, Kandwshwar, Kasara (Thal Ghat), Amba Ghat, etc. in Western Ghats. Dabhade (1974) has thoroughly worked out the monographic work on "The mosses of Mahabaleshwar and Khandala" with a note on the Genus *Riccia* (Mich.) L. from Maharashtra.

Area under study and significance of study:

Mumbai, the capital city of Maharashtra and commercial capital of India is the principal

seaport of Western India. It lies on 18°55' N and 72°54' E. The climate of this city is warm and humid. It is placed on the North West coastal side of Western Ghats. Soil cover in the city region is sandy, whereas, in the suburbs soil cover is largely alluvial and loamy. The underlying rocky region is composed of dark black basalt to red lateritic soil. Muddy or marshy areas are found near the coast belt.

The vegetation of this coastal areas is mainly mangroves. However few species of mosses are also observed near marshy places.

The review of previous work indicates that the bryological diversity of this region is not much studied which can be of great help to ecologists.

The mosses were collected by frequent visits to different localities in and around Mumbai. The mosses collected were dried and stored in herbarium packets. They were identified and preserved in Bryophyte Herbaria.

The present paper highlights some epiphytic mosses of Mumbai.

Localities of collection :

Mosses of Mumbai were collected from different places and localities described below :

1. Sanjay Gandhi National ParK, Borivali.
2. Malabar Hill.
3. Mumbra
4. Powai and Vihar Lake Area
5. Elephanta island
6. Jogeshwari
7. Jijamata Garden Wall, Byculla,
8. Yehur hills and
- 9 Kanheri Caves.

However, epiphytic mosses were

observed growing in Sanjay Gandhi National Park, Borivli and near Gorai beach, Mumbai.

Preservation of material – dry & wet :

Mosses being more acidic in nature, are easily preserved free from infection by fungi and insects by themselves. Material collected in the field was exposed to dry in open shade. After drying it was kept in packets (13.5 x 15.5 cm) in size. Date of collection, locality from where it is was collected, latitude, habitat, etc. were noted in field note book and also on the packets containing the material. Some of the material which was very minute or less in quantity was preserved by preparing slides. Media used for preparing slides was Gum-Chloral.

A total no of five epiphytic mosses were observed which are described below-

1. *Macromitrium sulcatum* (Hook) Brid.:

Plants robust, glossy, red brown, with yellow tips, densely tufted, Branches upto 5 cm long. Leaves all alike, crowded, erect, long, lanceolate, leaf base cells.

Narrow rectangular seta erect, soon becoming lateral, red, capsule exerted, ovoid. Spores light to dark brown

Distribution :

This epiphytic moss was growing on the branches of trees at Sanjay Gandhi National park. It grows luxuriently at Khandala, Matheran, Thailand, Srilanka and other South Asian countries.

2. *Octoblepharum albidum* Hedw. Sp. Musc. 50, 1801, Musc. Frond, iii, 15 C.M. Syn. Musc., I, 80 Broth. Pfl X 226 :

Plants dense whitish green or brownish, epiphytic, upto 1.2 to 2 cm. high, forming tufts on tree trunks. Leaves crowded, erect, spreading apex pointed, changes when dry. 5.5. mm long. Ligulate, base concave, wide, hyaline and apiculate, margin entire or slightly undulate; nerve broad and thick, multi layered with a median row of triangular chlorocysts with 3-4 layers of leucocysts on both the dorsal and ventral sides. Leaf base flanked by 5-6 rows hyaline, rectangular, elongated. Seta erect 6.5 mm long. Capsule erect, oblong ovoid, greenish-brown. Peristome teeth 8, yellowish, well spaced with a longitudinal fissure. Light brown spores are papillose, globose.

Distribution :

This epiphytic species is very common on the burnt area of hollow cavities of tree trunks or decayed wood at Sanjay Gandhi National Park, Borivali Mumbai. At Khandala⁴ Mahabaleshwar (Dabhade 1967). It is cosmopolitan and widely distributed in tropical and subtropical countries. It is very common in East Nepal, Sikkim, Darjeeling, Orissa, Arunachal Pradesh (NEFA), Assam, Western Ghats, Outside India, it is also found in Ceylon, Burma, Thailand, Vietnam, Java, New Guinea, Africa Cape, W. (Knysna ex – Rehm) Natal Great Noodsberge (J. Wood), Transvaal, Macmae (MacLea, Rehm), Portuguese E. Africa, Mazakwen Forest, Lourenzo Marques, Junod and America (Hawai), Zimbabwe (Sim), Makani Forest as Rhodasia (Eyles), Phillipines, China, it can be easily recognized by the light green colour of ligulate tufts of leaves and

oblong ovoid brown, erect capsule when dry. India.

3. *Calymperes thwaitesii* (Besch.) Fleisch:

Plants were small forming short bluish or yellowish green tuft with a felt of rhizoids in their lower part. Stem 1 to 1.5 cm, high enclosed by leaves and fine smooth axillary rhizoids. Leaves when dry nearly erect, slightly contorted and incurved. On keeping them in moist condition, they become erectopatient, lanceolate, concave with wavy margin and round apex. Margin of the leaf apex is denticulate. Terminal leaves are acuminate, ligulate and with an excurrent nerve. Transversely septated, clavate gemmae present only at the tips of terminal leaves. The hyaline basal part of the leaf narrow, oval with loosely arranged rectangular to polygonal cells. The top cells of the hyaline basal region of leaf are rhomboidal. Teniolae, (intralaminar cells) rectangular, elongated in 3-5 series; persistent from the basal hyaline region to the middle part of leaf. Hyaline marginal cells at the leaf base in 1-2 series. The chlorophyllose laminar cells are prosenchymatous, thin-walled, quadrate, to hexagonal, prominent, percurrent in normal leaves, but excurrent in gemmiferous leaves. Cells of the midrib rectangular, elongated. Basal part of the midrib becomes flat higher up circular with one row of deuter or water conducting cells. There are two steroidal bands above the deuter cells. A star-like cluster of clavate gemmae present at the tip of the excurrent midrib of the leaves. Gemmae transversely septate and light green in colour.

Distribution:

Found on bark of trees near Gorai beach and common on coastal line of Western

4. *Erpodium magniferae* C., Muell., *Linnaea* 37:178.1872; *Erpodium bellii* Mitt., *J. Linn. Soc.* 13:307, 5 B., 1873 fide; Dix., *J. Bot.* 47:160. 1909:

Height 1.0–1.5 cm, rhizoids on the lower side throughout, laxly tufted, prostrately branched stem. Branches irregularly pinnate, elongated, dense and rounded leaves. Branches julaceous when moist. Leaves imbricate, appressed when dry, erecto-patient to patent, when moist oval-ovate, concave 1 mm long, margin entire, leaf apex acute to sub-acute. Costa absent. Leaf cells wide, smooth, parenchymatous, somewhat elongated; 6-sided, nearly twice as long as broad, in the upper marginal region. Leaf (Laminar) cells rounded hexagonal, small, towards the margin they form longitudinal rows of cells, rectangular to 6-sided, upto 25 x 15 μ . Sporophyte not seen.

Distribution :

Epiphytic on the bark of Mango and Banyan trees at Sanjay Gandhi National Park, Borivali, Mumbai, at Mahabaleshwar⁴ and Khandala (Dabhade, 1969). This species which is common at many places in India is widely distributed in tropical regions of the world.

5. *Stereohyllum tavoyense* (Hook.) Jaeg.:

Plants slender, tufted, light green to dark green, glossy on the bark of trees. Primary stem creeping, 2 to 3 cm long. Secondary branches of stem erect, nearly as long as primary stem, flat, leafy. Leaves appressed when dry and widely spreading when moist. Ligulate to lanceolate acuminate, 1.5 mm of

long. Nerve upto the middle leaf concolorous. Leaf (Laminar) cells rhomboidal to linear, thick cell walled. Leaf margin entire, slightly undulate. Alar cells quadrate to rectangular thick walled.

Sporophytes on secondary stems 1 to 1.5 cm in height. Foot cylindrical, 1 mm, seta long, brownish, 5-9 mm high, capsule cylindrical. Peristome double, outer teeth 16, yellowish brown; and inner ones 16, cilia colourless. Each tooth lanceolate, densely cross-stripped. Spores rounded to oval, brown, papillose, 15 – 18 μ in diameter.

Distribution:

Growing on the bark of trees at Sanjay Gandhi National Park, Borivali, Mumbai, Mahabaleshwar⁴, Khandala (1967).

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