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Mannia Fragrans (Balb.) Frye & Clark - New Record From Eastern Himalayan Part Of West Bengal, India

A. B. DE

Department of Microbiology, The University of Burdwan,
Burdwan, West Bengal, India

Abstract: ***Mannia fragrans (Balb.) Frye & Clark, a member of the family Aytoniaceae (Marchantiophyta), is recorded for the first time from West Bengal, India lying in the Eastern Himalayas at the elevation of 1,675 meters from MSL (mean sea level) with an average annual rainfall of 200-250 cm and relative humidity 83%. Mannia fragrans (Balb.) Frye & Clark is distinguished from any other species of Mannia Opiz for apex of its thallus which is bearded by scales.***

Keywords: Mannia fragrans, West Bengal, Eastern Himalaya

I. INTRODUCTION

Bryophyte is the second largest group of plants, consisting of nearly 960 genera and 24,000 species (Rajan 2000). India is rich in bryophytic flora. There are about 2,489 species of bryophytes in India (Dandotiya et al. 2011, Sathish et al. 2013). In a visit to Loleygaon, West Bengal, India lying in the Eastern Himalayas some bryophytes were collected in September, 2016.

This site has an average annual rainfall of 200-250cm, relative humidity 83%, annual average temperature 11-20°C and the elevation from MSL (mean sea level) is 1,675 meters.

II. MATERIALS AND METHODS

The bryophytes collected from forest soil of Loleygaon (Eastern Himalayas), West Bengal, India were fixed in formaldehyde/ acetic acid solution (Johanson 1940). These fixed thalli were washed thoroughly in running tap water for clearing adhered soil and debris from them. Hand cut sections of these thalli were stained and mounted in glycerine. Slides were then sealed and photographed

One of the bryophytes collected from Loleygaon, West Bengal, India was identified as *Mannia fragrans* (Balb.) Frye & Clark. A short description of *Mannia fragrans* is given based on the specimens collected from Loleygaon.

III. RESULT

MANNIA FRAGRANS (BALB.) FRYE & CLARK

Thallus leathery, small, 2.0-2.5 cm long, rather narrow, up to 0.5 cm wide, green, dichotomously branched, apex broader, rounded with apical notch, dorsal side of thallus without gemma receptacle (Fig.1).

Upper surface smooth, slightly concave, pores visible with hand lens as white dots (Fig.2). Margins without hairs, purple, when dry strongly inrolled, tubular and black. Rhizoids are of 2 types—smooth-walled (Fig.3) and tuberculate (Fig.4), hyaline, covering ventral surface of midrib of thallus. Ventral scales purple to reddish, in 2 rows on each side of midrib (Fig.12), longer than wide with 1 (Fig.6), 2 (Fig.7,8,9) or 3 (Fig.10) appendages, appendage apex long, acuminate, tip of appendage often composed of a single row of cells, scales not extended to margin (Fig.5) but brush of scales found at the ends of thalli (Fig.2) as stated by Caners (2011).

Epidermis unistratose (Fig.11,12,14), dorsal epidermal cells thick-walled (Fig.15,16), epidermal air pores simple(Fig.14), slightly elevated , surrounded by 3 concentric rings of 7-8 cells in each (Fig.13). Assimilatory tissue loose, with one upper row of big vertically oriented air chambers (Fig.11,12) containing a few erect chlorophyllose filaments, the top cells of which are globose containing many chloroplasts (Fig.14) or without any chlorophyllose filament.

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Below these air chambers there are 1-2 layers of smaller more rounded air chambers (Fig.11,12) and their cells containing chloroplasts. Midrib cells purple and thick-walled (Fig.11,12). The region overarching midrib is composed of compactly arranged cells devoid of chloroplasts (Fig.11,12).

Figure 1: Upper surface of thallus

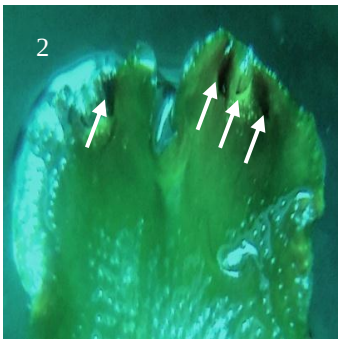

Figure 2: Apex of thallus (upper surface) with brush of scales (arrowed) and air pores (white dots)

Figure 3: Smooth walled rhizoid

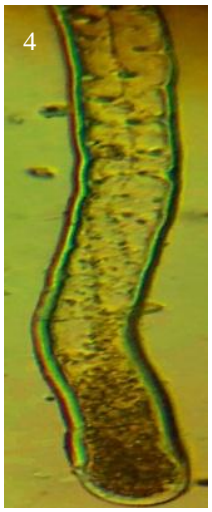

Figure 4: Tuberculate rhizoid

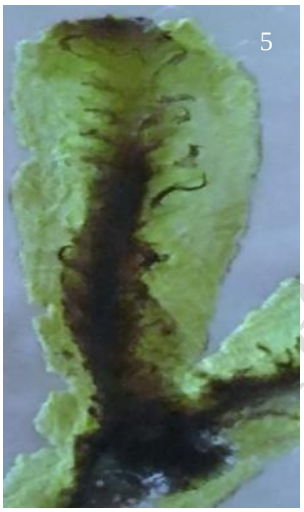

Figure 5: Lower surface of thallus

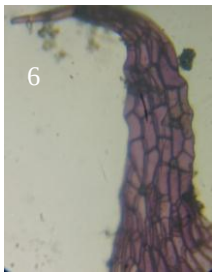

Figure 6: Scale with 1 appendage

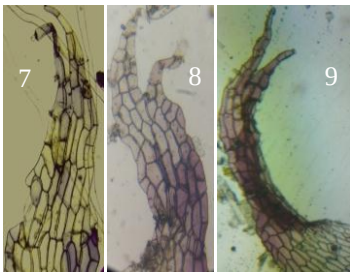

Figure 7, 8, 9: Scales with 2 appendages

Figure 10: Scale with 3 appendages

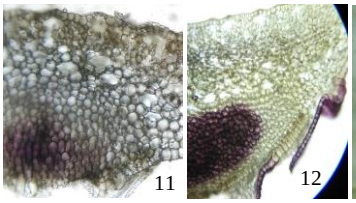

Figure 11, 12: T.S.of thallus with midrib (purple coloured)

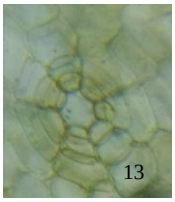

Figure 13: Air pore (surface view)

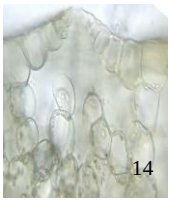

Figure 14: An air chamber with simple pore and chlorophyllose filaments

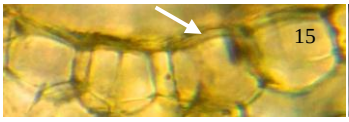

Figure 14: An air chamber with simple pore and chlorophyllose filaments

Figure 15, 16: Epidermal cells with thick wall (arrowed)

Figure 1-16: Mannia fragrans (Balb.) Frye & Clark

IV. DISCUSSION

The genus *Mannia* Opiz contains 6 species according to Engel (1990) but Schill (2006) recognised 7 species.

From literature (Dandotiya et al.2011) it is evident that in India there are 5 species of *Mannia* Opiz and these are- *Mannia androgyna* (L.) A.Evans, *Manna foreaui* Udar & Chandra, *Mannia fragrans* (Balb.) Frye & Clark, *Mannia indica* Kachroo *and Mannia perssonii* Udar & Chandra. But in a detail study on *about 1600* specimens of *Mannia* Opiz, Schill (2006) found no difference among *Mannia californica* (Gottsche ex Underw.) L.C.Wheeler, *Mannia foreaui* and *Mannia indica* and he concluded that *Mannia foreaui* [*nom.inval*. (Art.36.1)] and *Mannia indica* [*nom.inval*. (Art.33.2)] are synonymous to *Mannia californica*. As *Mannia californica* (=*Mannia foreaui*= *Mannia indica*) is the valid name of this bryophyte, therefore, it can be stated that in India the genus *Mannia* Opiz is represented by 4 species and not by 5, which are- *Mannia androgyna, Mannia californica, Mannia fragrans* and *Manina perssonii*.although Schill (2006) considered *Mannia perssonii* collected from Gangotri, Western Himalayas is "possibly a synonym of *Mannia siberica"* and further studies may resolve whether *Mannia perssonii* is a distinct species or synonymous to *Mannia siberica* (Mull.Frib.) Frye & Clark.

However, none of these 4 species was collected earlier from the Eastern Himalayas (Dandotiya et al. 2011).

Therefore, this collection of *Mannia fragrans* from Loleygaon is the first report of any species of *Mannia* Opiz from the state of West Bengal and it is the sole representative of the genus *Mannia* Opiz which has so far been found to grow in the Eastern Himalayas.

It may be mentioned here that *Mannia fragrans* is known to possess 2 rows of scales (Schill 2006) but our specimen of *Mannia fragrans* has been found to possess 4 rows of scales, 2 rows on either side side of midrib. Similar type of observation was made in case of *Mannia androgyna* where Schill (2006)

observed 2 rows of scales but Borovichev et al. (2014) reported 4 rows of scales.

Mannia fragrans is distinguished from all other species of *Mannia* Opiz by characteristic feature of apex of its thallus which is bearded by its scales (Schill 2006).

Muller (1954) used epidermal cell wall thickness as the first character in his key to distinguish *Mannia fragrans* from *Mannia androgyna*. In *Mannia fragrans* they are thick-walled while those of *Mannia androgyna* they are thin-walled.

Assimilation tissue of *Mannia androgyna* and *Mannia californica* is compact with small air chambers which differ from *Mannia fragrans* that has loose assimilation tissue with large air chambers. Again, *Mannia androgyna* possesses pale grayish oil bodies but *Mannia californica* possesses dark brown to black oil bodies.

A key to the identification of all the valid species of *Mannia* Opiz occurring in India is given below:

Thallus apex not bearded, assimilation tissue compact with small air chambers

Oil bodies pale grayish

Mannia androgyna

Oil bodies dark brown to black

Mannia californica

Thallus apex bearded, assimilation tissue loose with large air chambers

Mannia fragrans

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