



MARCHANTIA LINEARIS LEHM. ET LINENB. (MARCHANTIOPHYTA, MARCHANTIACEAE): A NEW REPORT FROM THE WESTERN GHATS OF MAHARASHTRA, INDIA

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ABSTRACT

Marchantia L. is the typical genus of the Marchantiaceae. *Marchantia polymorpha* L. is the only species recorded from North Konkan of Maharashtra. *Marchantia linearis* Lehm et Lindenb. is little known previously only from Lakkidi palam in Western Ghats of Kerala is newly reported from Maharashtra part of the Western Ghats of India.

KEY WORDS: Maharashtra, *Marchantia linearis*, Hepaticae, Marchantiaceae, Western Ghats.

INTRODUCTION

Marchantia L. is the typical genus of the Marchantiaceae widely distributed in all the bryogeographical regions of India. The genus is represented by 36 species in the world distributed mostly in tropical-subtropical or temperate regions (Bischler-Causse, 1998; Stotler and Crandall-Stotler, 2005). There are 12 species of *Marchantia* in India (Bapna and Kachroo, 2000). Out of 23 binomial/trinomials recorded under the genus from India so far, only 10 are currently accepted (Singh and Singh, 2012). Singh (1966, in Udar, 1976) gave illustrated taxonomic details together with range of distribution in India of seven species of *Marchantia* including *M. linearis* Lehm. et Lindenb. The checklist of Daniels (2010), monograph of Daniels and Daniel (2013) reveals that the species is not recorded in Tamilnadu. Checklist of Schwarz (2013) reveals that even genus in Karnataka is absent. *Marchantia linearis* Lehm. et Lindenb. is distributed in Darjeeling, Assam, Sikkim, Khasia hills, Bengal, Peninsular India (Dandotiya *et al.*, 2011). *Marchantia linearis* Lehm. et Lindenb. is little known previously only from Lakkidi palam in Western Ghats of Kerala (Nair, *et al.*, 2005, 2008), is newly reported from Maharashtra part of the Western Ghats of India. The previous literature survey of Joshi and Biradar (1984), Shirke (2002) reveals that there is no any early record of genus from Maharashtra. Chaudhary *et al.* (2011) recorded *Marchantia polymorpha* L. is the only species recorded from North Konkan of Maharashtra. Recently we have collected *Marchantia linearis* for the first time from Gudal Village in Radhanagari Tahsil of Kolhapur district in Maharashtra. It turns out as a new record of this species to the Western Ghats of Maharashtra, hence reported here.

MATERIAL AND METHODS

Field studies were conducted for the collection and observations during the monsoon season from July to October in 2013 and 2014. The species was collected from Gudal Village in Radhanagari Tahsil of Kolhapur District growing on brick wall. The material was brought to the laboratory in polythene bags. A part of the material was cleaned and preserved in 4% formalin and a part was air dried to prepare the herbarium which was deposited in the Department of Botany, Shivaji University, Kolhapur. For revealing the natural habit and habitat the colour photographs were taken on the spot, by using a NIKON-COOLPIX P100 digital camera having 12.3 megapixel and wide 26x optical zoom.

For histological studies free hand sections of fresh material were cut and normal staining techniques were employed. Mature gemma cups were selected. Mature gemmae were collected and acetolised in cavity slides. Spores were mounted in glycerin jelly. Photomicrography was done by using MfAKS system of JENEVAL Carl Zeiss microscope. Determinations were carried out using different previously reported checklists, relevant monographs, books and floras (Joshi and Biradar, 1984; Bapna and Kachroo, 2000; Singh and Nath, 2007; Shirke, 2002; Nair, *et al.*, 2005; Daniels, 2010; Dandotiya *et al.* 2011; Daniels and Daniel, 2013; Schwarz, 2013 and Sandhya Rani *et al.*, 2014).

RESULTS

Taxonomic Treatment:

Kingdom: Plantae, Phylum: Marchantiophyta, Class: Marchantiophyta, Order: Marchantiales, Family: Marchantiaceae, Genus: *Marchantia*, Species: *linearis*

Description of the Genus:

Marchantia L. Spec. Pl. ed 1: 1137, 1753.

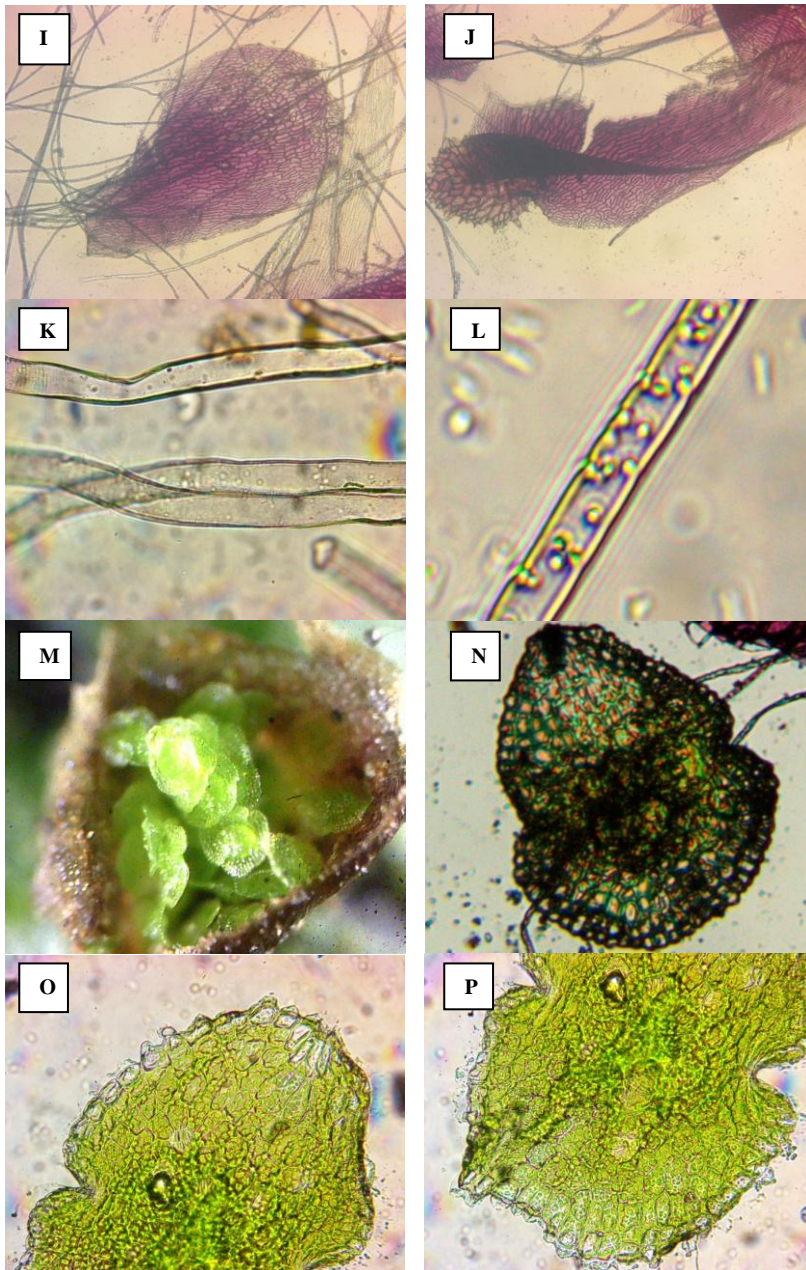
Thallus prostrate, usually dark green, slightly purplish at margins, repeatedly dichotomously-monopodially branched with broad midrib and hexagonal areolae and notched apex. Ventral branches absent. Thallus margin entire or slightly lobed. Dorsal surface areolate; epidermal cells often devoid of chlorophyll; surrounded by 4-8 superimposed circles of cells. Air chambers, beneath the upper epidermis in a single horizontal layer, devoid of supplementary partitions; chlorophyllose with branched assimilatory filaments; each air chamber separated by single layered partition, 2-5 cells high and opens outside by compound barrel shaped pore of 4-8 superimposed tiers of concentric rings, each ring of 4-5 cells. The uppermost cells usually in contact with epidermis; storage region parenchymatous. Ventral surface with scales and two types of rhizoids. Scales in 4-6 rows, in each side of midrib, inner row of scales towards midrib large, appendiculate, obliquely inserted, middle and outer or lateral rows of scales without appendages and more or less ligulate or ovate or obovate; appendages conical, obovate or oblong. Gemmae discoid in gemma cups with margins fringed, ciliate, lobed or entire; always present on the dorsal surface; Dioecious.

Plate I: *Marchantia linearis* Lehm et Lindenb.



A: Habit, B: Dichotomy and Apical region, C: Gemma Cup with gemmae, D: Air Pores, E: Single Pore, G: T. S. of Thallus, H: Habit- Ventral Side, I: Habit- Ventral Surface enlarged.

Plate II: *Marchantia linearis* Lehm et Lindenb.



**I-J: Scales and Rhizoids, K: Smooth Walled Rhizoids,
L: Tuberculate Rhizoid, M: Gemmae in Gemma Cup.
N: Single Gemma body, O & P: Gemma body in enlarged views**

Antheridia and archegonia are borne on special stalked branches, antheridiophores and archegonio-phores respectively. Male receptacle terminal, stalked, stalk with 2-4 rhizoidal furrows on anterior side, disciform, disc weakly or not convex above, distinctly 2- 4-8 lobed. Upper surface of disc with air chambers opened with barrel-shaped pores, photosynthetic filaments and antheridial chambers, each chamber with an antheridium. Archegoniphore stalk with 2-4 rhizoidal furrows, on anterior side and air chambers on posterior side, receptacle or disc stellate with 4-10 or ^{rarely} more elongated rays, each with a rhizoid canal underneath. Involucre (perichaetium) 2 lipped (fimbriate) pendent fringed sheath, alternating with the rays enclosing several archegonia; each surrounded by delicate, membranous, campanulate pseudoperianth (perigynium). Seta long; capsule spherical, dechiscing by irregular valves. Capsule wall of one layer of



cells with annular-spiral bands. Spores small, thin walled, tetrahedral, globose. Elaters simple, long, attenuate, with bispiral thickenings.

Description of the Species:

Marchantia linearis Lehm. *et* Lindenb. in Lehm., Nov. Stirp. Pug. 4:8. 1832; Mitt, J. Proc. Linn. Soc. 5:125. 1861; Steph., Spec. Hep. 1:187. 1900; Bapna and Kachroo, Hepatic. India 2: 433. 2000; A. P. Singh and V. Nath, Hepatic. Khasi and Jaintia Hills: 322. 2007; M.C. Nair *et al.* Bryophyt. Wayanad, 35. 2005; S. Sandhya Rani *et al.* Bryoph. Andhra Pradesh: 55-57. 2014.

Thallus small, thin, dorsiventral, dorsal region light green-dark green; 15-30 mm long, 3-7 mm wide, profusely dichotomously branched with adventitious ventral shoots, crowded together; midrib narrow, convex, prominent, with black median streak; margin entire, apex slightly concave-emarginated (Plate 1:A, B). Epidermal cells 4-6 angled, thin walled, angles not thickened; pore scars small, numerous, present at the center of epidermal cells, elevated with 5-6 superimposed concentric rings, each ring of 4-6 cells; 2-3 rings of cells above the epidermal level and 2-3 rings of cells projecting below into the air chamber, inner pore bounded by 4-5 cells, quadrate-sub quadrate (Plate 1- B, C, E and F). Dorsal surface areolate, air chambers single layered, with barrel shaped air pores, assimilatory filaments 2-4 cells high, storage tissue parenchymatous, cells small, 0.1-0.2 x 0.1 mm (Plate 1- B, C, D & E). Ventral surface brownish purple at the midrib with scales and rhizoids (Plate 2- G, H). Scales in 2 rows on each side, median scales fixed by a long decurrent base, appendiculate, appendages small, rotundate or lanceolate, constricted at base, toothed on margin, acute-acuminate at apex; laminar scales ovate-quadrate or ligulate; margin irregular; marginal scales absent; apical region hairy with sockets of involucre; involucre hyaline, margin lobed; lobes short ciliate (Plate 2- H, I & J). Rhizoids hyaline both smooth walled and tuberculate (Plate 3- K and L). Gemma-cups present on dorsal surface, soft, globose, abundant near the apex (Plate 1- A, C), compressed in the middle, margin fringed, dentate with many gemmae (Plate 2- C, Plate 3- M); gemmae discoid, biconvex 0.30-0.40 mm long and wide (Plate 3- M, N, O & P). Reproductive structures not seen (Plate 1- A and B).

Species examined: India, Maharashtra, Kolhapur District, Radhanagari Tahsil, Gudal Village (altitude about 550 msl), on brick wall, Patil S. B. (LAVATE, MMMML)

Habitat: Terrestrial on brick wall.

Distribution:

World: Cosmopolitan. India, Indonesia, Java, Malacca, Mauritius, Nepal, Pakistan and Sri Lanka.

India: This species is distributed in five bryo-geographical regions of India *viz.*, Eastern Himalaya, Punjab and Western Rajasthan, Western Ghats, Central India and Andaman and Nicobar Islands (Singh and Singh, 2012). It is distributed in Andhra Pradesh (Chinthapalli, Kandamardi, Paderu), Assam, Cherapunji, Darjiling, Elephant falls, Himachal Pradesh, Khasia hills, Madhya Pradesh, Meghalaya, Sikkim, Kerala (Lakkidi palam), Langkyrdum-Dawki road and West Bengal. (Bapana and Kachroo, 2000; Singh and Nath, 2000; Nair, *et al.*, 2005, 2008; Dandotiya *et al.*, 2011; Sandhya Rani *et al.*, 2014).

Maharashtra: The present collection is a new record for Maharashtra.

DISCUSSION

Marchantia L. is the typical genus of the Marchantiaceae widely distributed in all the bryo-geographical regions of India. The genus is represented by 36 species in the world distributed mostly in tropical-subtropical or temperate regions (Bischler-Causse, 1998; Stotler and Crandall-Stotler, 2005). Siregar *et al.* (2013) reported seven species in Mount Sibayak, North Sumatra, Indonesia. There are 12 species of *Marchantia* in India (Bapna and Kachroo, 2000). Out of 23 binomial/trinomials recorded under the genus from India so far, only 10 are currently accepted (Singh and Singh, 2012). Singh (1966, in Udar, 1976) gave illustrated taxonomic details together with range of distribution in India of seven species of *Marchantia* including *M. linearis* Lehm. *et* Lindenb.

The checklist of Daniels (2010), monograph of Daniels and Daniel (2013) reveals that the species *M. linearis* Lehm. *et* Lindenb is not recorded in Tamilnadu. Checklist of Schwarz (2013) reveals that even genus *Marchantia* is absent in Karnataka. *Marchantia linearis* Lehm. *et* Lindenb. is distributed in Darjeeling, Assam, Sikkim, Khasia hills, Bengal, Peninsular India (Dandotiya *et al.* (2011). *Marchantia linearis* Lehm. *et* Lindenb. is little known previously only from Lakkidi palam in Western Ghats of Kerala (Nair, *et al.*, 2005, 2008), is newly from Maharashtra part of the Western Ghats of India. Sandhya Rani *et al.* (2014) reported it from Andhra Pradesh.



The previous literature survey of Joshi and Biradar (1984), Shirke (2002) reveals that there was no any early record of genus from Maharashtra. Chaudhary *et al.* (2011) recorded *Marchantia polymorpha* L. is the only species recorded from North Konkan of Maharashtra. Recently we have collected *Marchantia linearis* for the first time from Gudal Village in Radhanagari Tahsil of Kolhapur district in Maharashtra. It turns out as a new record of this species to the Western Ghats of Maharashtra. *M. linearis* is characterized by the presence dark black streak or line in the midrib and gemma cups at the apical regions.

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