

Order Lunulariales (Marchantiophyta) discovered from Meghalaya, North-east India

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ABSTRACT

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Lunularia cruciata (L.) Dumort. ex Lindb. (Lunulariales: Lunulariaceae), a phylogenetically significant species of Marchantiophyta (liverwort), is discovered from Meghalaya, North-east India.

Key-words: *Lunularia cruciata*, Lunulariales, Marchantiophyta, new record, Meghalaya, North-east India.

INTRODUCTION

Lunularia cruciata (L.) Dumort. ex Lindb. was initially described by Linnaeus (1753) in the name of *Marchantia cruciata* from Europe. After the establishment of genus *Lunularia* Adans. [*Lunularia* Adans., Fam. Pl. 2: 15; Jul - Aug 1763], *M. cruciata* was placed under it and was designated as its type species. *Lunularia cruciata* is the sole species of the genus till date. This species is phylogenetically significant, based on it a monogeneric family Lunulariaceae H. Klingrr. was erected which was formerly treated as a member of order Marchantiales due to similarity in possessing gemmae and the ventral scales. However, because of its crescent-shaped gemma receptacles and elongate massive seta exerted from a tubular involucre it differs from all other Marchantiales and a new order Lunulariales was established by Long (2006).

Since inception, this species is recorded from Europe (Macvicar 1926, Grolle 1983, Paton 1999), North to South Scandinavia (Bischler-Causse et al. 2005), Fennoscandia (Arnell 1956), the Mediterranean area, Macaronesia, East and South Africa (Bischler-

Causse et al. 2005, Arnell 1963, Wigginton 2009), the Mascarenes, Afghanistan to India (Bischler-Causse et al. 2005), Nepal (Pradhan & Joshi 2009), Sri Lanka (Bischler-Causse et al. 2005, Abeywickrema & Jansen 1978), China (Piippo 1990), Taiwan (Wang et al. 2011), Iran (Akhani & Kürschner 2004), Japan (Yamada & Iwatsuki 2006), Turkey (Kürschner & Erdağ 2005), Russia (Konstantinova et al. 2009), Hawaii (Staples & Imada 2006), New Zealand (Campbell 1965), Australia (McCarthy 2003), North America and South America (Schuster 1992, Bischler-Causse et al. 2005).

In India, this species was first recorded by Kashyap (1929) based on collections made by Tirunarayanan from Darjeeling and Prof. Iyengar from Madras and Ootacamund. Kashyap (1929) also remarked that this species may also occur in Western Himalaya. Srivastava (1967) studied the fertile plants collected by Prof. Ram Udar in 1965 from Ootacamund. Singh and Singh (1969) reported it again from Ootacamund. Naidu (1969) studied fertile plants from Kodaikanal. Gaur and Nautiyal (1981) recorded it from Dum Khola, near Srinagar, Uttarakhand. Dash

and Saxena (2009) reported this species from Khandadhar Hill Ranges, Orissa, Eastern Ghats, India. Chhetri et al. (2009) studied the enzyme activities of this species based on plants collected from Darjeeling. Manju and Rajesh (2011) reported this species from Parambikulam Tiger Reserve in the Western Ghats. But this species is not yet reported from North-east India, particularly from Meghalaya, though a comprehensive work has been published on Hepaticae of Khasi & Jaintia Hills recently by Singh and Nath (2007).

Recently, in the year 2011, during the studies on Hepaticae of North-east India, the author found two new localities of its occurrence, i.e. Lady Keane College campus, Shillong, East Khasi Hills and Garo Hills in Meghalaya. Hence, the report of this taxon from Meghalaya constitutes first record of order Lunulariales in North-east India. The plants are found near human habitation, at the base of damp walls and sandy soil, growing in pure population or intermixed with *Marchantia paleacea* Bertol.

TAXONOMIC DESCRIPTION

Lunularia cruciata (L.) Dumort. ex Lindb., Not. Sällsk. Fauna Fl. Fenn. Förh. 9: 298. 1868. *Marchantia cruciata* L., Sp. Pl. 1137. 1753. subsp. *cruciata*

Plate 1, figures 1-9

Description: Plants light-green to green, dichotomously branched, 30-60 mm long, 7-12 mm wide, lobes oblong to quadrate, deeply notched at the apex and with sinuated and hyaline margin. Dorsal surface of thallus often appears somewhat glossy and slightly concave; epidermal pores distinct, under microscope slightly raised, marked out into polygonal areas and bounded by 3-4 concentric rings of 6-8 cells each; dorsal epidermis consists of colourless cells, sometimes walls are thin but often those of centrally placed have trigones; below the epidermis, photosynthetic tissue consisting of a single layer of air-chambers separated by green, uniseriate partitions and occupied by numerous, erect, green 3-5 cells high filaments; the compact storage region 18-35 cells high in the midrib region, gradually becomes thinner towards the wings and composed of colourless cells with pitted

walls. Ventral surface of the thallus green and with a row of delicate, hyaline, or occasionally partially purplish scales on each side of the midrib; scales 1.5-2 mm long and broadly lunate, with a hyaline, or rarely partly purplish, reniform appendage, appendage 0.4 mm in diam.; both scale and appendage with scattered oil cells and club-shaped mucilage-cells. Rhizoids of two types, i.e. smooth-walled and tuberculate. On dorsal surface of thallus, a group of disc-shaped gemmae lie in a crescent-shaped cupule or gemma cup (characteristic of the genus) located near middle portion; cupules margin almost entire; Gemmae attached by a short unicellular stalk, circular, biconvex with thin, entire and two lateral notches.

Specimen examined: North-east India, Meghalaya, Garo Hills, 02.03.2011, Ramesh Kumar 118793; East Khasi Hills, Lady Keane College campus, Shillong, 01.07.2011, S. K. Singh 118795.

Remarks: The biology of this species is very interesting as the fertile plant is usually extremely rare, even in other continents as well (Srivastava 1967). The reason behind it may be the development of antheridia and archegonia which is not always synchronised. Female thalli in late autumn, even when green and fleshy and bearing young sporophytes, do not continue apical growth but regenerate from adventitious thalli which, after producing gemma cups, produce archegoniophores in monsoon while male plants behave differently as, even when dried out, they often grow again from the resistant apex once the rains commence in late autumn and new antheridiophores arise and old ones revive and continue development (Campbell, 1965). During the observation, it was found that plant materials from Garo hills bear young archegoniophores while those of the East Khasi Hills are sterile and as such are under observance.

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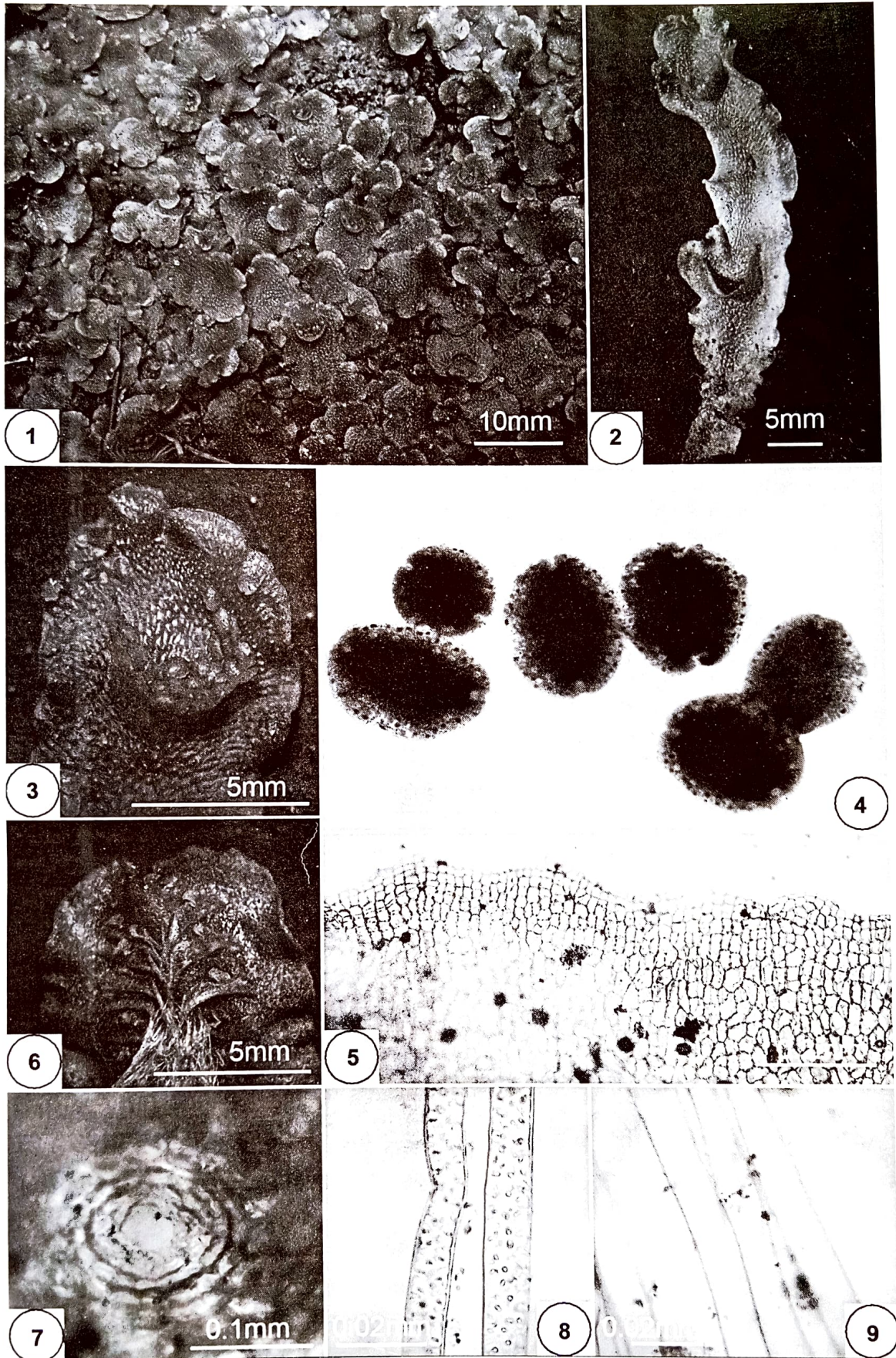


Plate 1

1-9. *Lunularia cruciata* (L.) Dumort. ex Lindb. 1. A population of plants. 2. Single plant. 3. A portion of plant showing gemmae filled in crescent-shaped cupule. 4. Gemmae. 5. A portion of cupule margin. 6. A portion of plant in ventral view showing ventral scales. 7. An epidermal pore. 8-9. Rhizoids (tuberculate and smooth walled).

specimens collected from Garo Hills and to Dr. C. S. Rao, Head, Department of Botany, St. Anthony's College, Shillong for the help in locating plants in Shillong.

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