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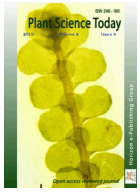

Research Article

Pallavicinia lyellii (Hook.) Gray, (Pallaviciniaceae): an addition to the hepatic flora of Maharashtra, India

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Abstract

Pallavicinia lyellii (Hook.) Gray, is reported for the first time from Tillarinagar forest, Western Ghats of Kolhapur District, Maharashtra. Its synonymy, description, range and phytogeographical details are provided.

Keywords
Hepaticae; Pallaviciniaceae; *Pallavicinia lyellii*; Western Ghats

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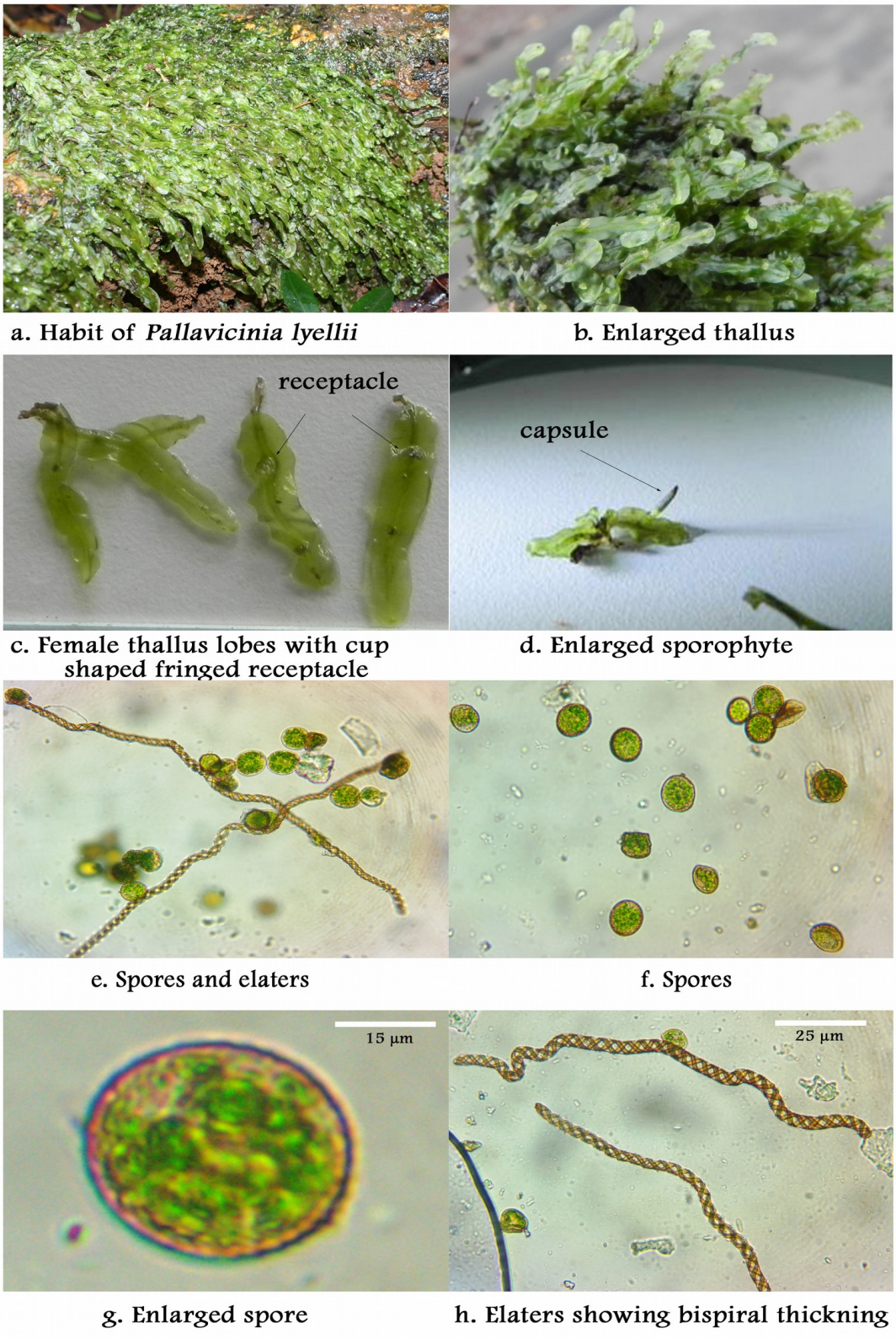
Introduction

India is one of the 12 mega-biodiversity centers in the world, possesses a large area and a variety of phyto-climatic conditions within its different bio-geographical zones, contribute to the great diversity of the flora (Singh, 1997; 2001). The Western Ghats is identified as one of the 25 'hotspots' in the world (Myers *et al*., 2000). It comprises about 27% of the country's flora (Nayer, 1996). The flora of this region has been studied with emphasis on the flowering plants and even the Pteridophytes (Nair and Daniels, 1986). However, our knowledge on the taxonomy, ecology and distribution of bryophytes is far from adequate and still relies on the work done during the late 19th and early 20th centuries. So far about 850 species of liverworts belonging to 140 genera and 52 families and 2000 species of mosses belonging to 342 genera and 54 families are reported to occur in India (Vohra and Aziz, 1997). From the West coast and the Western Ghats 121 species of liverworts with 10 endemic and 682 species of mosses with 190 endemic have been reported (Singh, 1997).

Indian bryo-flora represents 2489 taxa of bryophytes comprising 675 species in 121 genera of liverworts and 25 species in 6 genera of hornworts. Nearly 340 bryophytes species are endemic to India of which 67 are of liverworts and 4 are of hornworts and 133 species are rare of which 53 are liverworts (Dandotiya *et al.*, 2011).

Systematic studies on hepatic flora of different localities have frequently been persuaded in various parts of the world as well as in India. After the sporadic work done by Kashyap (1929), Kashyap and Chopra (1932), Chopra (1943) and Udar (1976), in recent years floristic studies and taxonomic revisions of selected groups of Indian Hepaticae and Anthocerotae have received considerable attention by Asthana and Srivastava (1991), Singh (2002), Asthana and Srivastava (2003), Nair *et al.* (2005), Chaudhari *et al.* (2006), Singh and Nath (2007), Chaudhary *et al.*, (2008), Singh and Singh (2009), Alam and Srivastava (2012), Dey and Singh (2012), Daniels and Daniel (2013), Sandhya Rani *et al.* (2014). Even now there are vast areas of country



a. Habit of *Pallavicinia lyellii* b. Enlarged thallus

c. Female thallus lobes with cup shaped fringed receptacle d. Enlarged sporophyte

e. Spores and elaters f. Spores

g. Enlarged spore h. Elaters showing bispiral thickning

Plate 1

on which we have very little or no information on hepatic flora (Udar, 1976; Singh, 1997; Singh, 2001). In Maharashtra also the Bryo-floristic studies are very fragmentary. Bryologists like Apte and Sane (1942), Gupte (1945), Mahabale (1971), Joshi and Biradar (1984), Joshi (1987), Lavate (1999), Shirke (2002), Chaudhary *et al.* (2008) have studied the liverworts and hornwort flora of Maharashtra especially from Western Ghats.

Again the work on bryophytes from Kolhapur District is quite meager. Lavate (1999), Dongare (2004), Lavate *et al.* (2014) have been made attempts to study liverworts and hornworts till date.

The present paper deals with a new hepatic taxon *Pallavicinia lyelli* (Hook) Gray collected for the first time from Tillarinagar Village in Chandgad Tahsil of Kolhapur district in Maharashtra. Kachroo (1956) for the first time given detailed morphological account of

the genus *Pallavicinia* in India. There are 7 species of *Pallavicinia* in India (Chopra, 1943). According to current data there are 6 species of *Pallavicinia* in India viz., *P. ambigua* (Mitt.) Steph., *P. crispata* (Mont.) Steph, *P. himalayensis* Schiffn., *P. indica* Schiffn., *P. levieri* Schiffn., *P. layelli* (Hook) Carruth., (Bapna and Kachroo, 2000; Manju and Rajesh, 2011; Schwarz, 2013). The previous record of Joshi and Biradar (1984), Joshi (1987), Shirke (2002), Chaudhary *et al*. (2008), Bagwan and Kore (2012) reveals that this genus and species was not reported from Maharashtra. It turns out as a new record of the genus and species to the Western Ghats of Maharashtra, hence reported here.

Materials and Methods

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 Tillarinagar Village in Chandgad Tahsil of Kolhapur District growing on the bank of water sources. 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. 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 (Kachroo, 1956; Joshi and Biradar, 1984; Bapna and Kachroo, 2000; Singh and Nath, 2007; Shirke, 2002; Nair, *et al*., 2005 and 2008; Daniels, 2010; Dandotiya *et al.* 2011; Daniels and Daniel, 2013; Schwarz, 2013, Sandhya Rani *et al.* 2014).

Observation

Pallavicinia lyellii (Hook) Gray, Nat. Arr. Brit. Pl. 1:775. 1821; Carruth, J. Bot. Brit. Foreign 3: 302.1865. Kachroo, Proc. Natl. Inst. Sci. India 22B: 6. 1956. Bapna and Kachroo, Hepatic. India 2: 349: 2000; Nair *et al*., Bryophyt. Wayanad: 42. 2005. Singh and Nath, Hepatic. Khasi Jaintia Hills: 300. 2007. Daniels and Daniel, The Bryofl. South. W. Ghats, India: 259.2013; Sandhya Rani *et al*., Bryophyt. A.P.: 71. 2014. *Jungermannia lyellii* Hook., Brit. Jung. Pl. 77.1816. *Dilaena lyellii* Dumort., Commennt. Bot.114.1822. *Symphyogyna oblonga* G. L. and N., Syn. Hepat. 483,1846. *Pallavicinia canara* Steph., Spec, Hepat. 6: 62.1924; Pande and Srivastava, J. Indian bot.Soc. 32: 179.1953. (Fig. 1).

Thallus green or pale green 3-6 cm long and 4-5 mm broad, simple or innovating from ventral side of midrib; margins entire or irregularly lobed, undulate. Midrib 12-15 cells thick in the middle sharply delimited from unistratose wing, midrib with a central strand of narrow thick-walled lignified cells; central strand cells in 33 longitudinal rows, thick walled, 7×10 µm, the marginal cells of lamina thin walled, elongated, 5-6 angled. Rhizoids numerous from midrib, pale brownish. Dioecious. Involucre short unequally laciniate, each lacina thinner and forked, pseudoperianth cylindrical, 5-7 mm long, with ciliate mouth. Capsule cylindrical reddish-brown, wall two layered, but only one layered when mature. Spores 14-24 µm red brown, finely reticulate. Elaters brown, with 2-3 spirals. Male plants smaller, antheridia in one row on each side of midrib, each covered by imbricate dentate scale.

Species Examined: India, Maharashtra, Western Ghats: Kolhapur District, Chandgad Tahsil, Tillarinagar ca 500-800m, on bank of water stream, Aug, 2014. Lavate, R.A. (LAVATE, MMMPPL).

Habitat: Thallus terricolous and rupicolous grows on moist soil covered rocks, banks of fresh water streams, cut surfaces in association with other leafy liverworts at ca 500-800m, with 20-21° C temperature and 70-80% relative humidity.

Distribution: World: Cosmopolitan. Africa, America, Bermuda, Brazil, Cuba, England, Europe, Jamaica, Japan, Java, Kansaie, Moluccas, New Zealand, Philippines, Ryukya, Singapore, Sri Lanka, West Indies.

India: Eastern Himalaya (Meghalaya: East Khasi Hills; Mawsmai forest in Cherapunji, Shilong), Western Himalaya, North-East India (Assam, Gauhati, Shillong and Meghalaya), Andhra Pradesh (Kashipatanam, Galikonda and Talakona), Madhya Pradesh- Pachmarhi) and Western Ghats of Karnataka (Agumbe, Bangalore, Kanara, Kotegudda, Sujigudda), Kerala (Hairpin area, Kaimaram, Tholpetty range in Wayanad, Travancore) and Tamilnadu (Kanyakumari, Madurai, Nilgiri, and Tirunelveli).

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

Result and Discussion

Pallavicinia S. F. Gray. is the only typical genus of the family Pallaviciniaceae present in India. The genus is represented by total 57 species out of which 13 are accepted species in the world distributed mostly in tropical-subtropical or temperate regions (www.tropicos.org and *www.theplantlist.org*). Kachroo (1956) for the first time given detailed morphological account of the genus *Pallavicinia* in India. There are 7 species of *Pallavicinia* in India (Chopra, 1943). According to current data there are 6 species of *Pallavicinia* in India viz., *P. ambigua* (Mitt.) Steph., *P. crispata* (Mont.) Steph, *P. himalayensis* Schiffn., *P. indica* Schiffn., *P. levieri* Schiffn., *P. layelli* (Hook) Carruth., (Bapna and Kachroo, 2000; Manju and Rajesh, 2011; Schwarz, 2013). In India *Pallavicinia layelli* (Hook) Gray is earlier reported from Assam (Srivastava, 1961), Karnataka (Pande and Srivastava, 1953 as *P. canara* Steph.), Kerala (Pande and Srivastava, 1953 as *P. canara* Steph.), Meghalaya (Singh and Nath, 2007), Madhya Pradesh (Pande and Srivastava, 1953 as *P. canara* Steph.), Tamil Nadu (Montagne, 1842 as *Diplolaena crispata*), West Bengal (Schiffner, 1899 as *P. indica*).

Out of ten genera in the family Pallaviciniaceae from the world, only *Pallavicinia* (Hook) Gray. is the typical genus reported in India which was not reported earlier from Maharashtara. *Pallavicinia layelli* (Hook) Gray is distributed in five bryogeographical regions of India viz., Western Himalaya, Eastern Himalaya, Central India, Western Ghats, Eastern Ghats and Deccan Plateau (Singh, 2001). It is reported from North-East India (Assam, Gauhati, Shillong), Andhra Pradesh (Kashipatanam, Galikonda and Talakona), Madhya Pradesh-Pachmarhi, Meghalaya) and Western Ghats of Karnataka (Agumbe, Bangalore, Kanara, Kotegudda, Sujigudda), Kerala (Hairpin area, Kaimaram, Tholpetty range in Wayanad, Travancore) and Tamilnadu (Kanyakumari, Madurai, Nilgiri, and Tirunelveli) (Alam, 2011; Alam and Srivastava, 2012; Bapna and Kachroo, 2000; Dandotiya *et al.*, 2011, Daniels, 2010; Daniels and Daniel, 2013; Aruna and Krishnappa, 2014; Sandhya Rani *et al.*, 2014). It is newly reported from Maharashtra part of the Western Ghats of India.

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