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Research Article

Riccia atromarginata Levier (Ricciaceae" Marchantiophyta) – A New Addition to India

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Abstract

The bryophytic distribution is common in moist places. The survey revealed that newly and rarely distributed Ricciaceae, Marchantiophyta were collected from the Kappath hill Gadag district region of Karnataka state in India. This species was investigated through standard articles and collected several shreds of evidence, later the specimen based on morphology study clarifies that is *Riccia atromarginata* Levier, which is rarely distributed and even it has not been recorded from India, therefore, the present article introduces, the newly distributed bryophyte or Marchantiophyta, belongs Ricciaceae that is *R. atromarginata* from India.

Keywords: *Darker margins, Non-Rosette, Undulate, Papillae, Sea green thallus, Apolar spores.*

Introduction

As we know the evolution of bryophytes, evolved during a pivotal moment in the history of life on earth and has persisted for hundreds of millions of years (Renzaglia, *et al.*, 2007). The bryophytic distribution is very broad all over the world and they consist of about 25,000 Species (Shawn K. & Kevin E. I. 1891), India represents 2562 taxa, in that the 1636 species are from mosses, 887 are from liverworts and 39 hornworts. In India, the Bryophytes are distinguishably by having two genera and 168 species of liverworts, 19 species of hornworts and 547 species of mosses, which are endemic to India. The well-distributed moss indicates several environmental factor variations as many similar actions of lichens (Ecological indicator) are useful in the pollution indication and monitoring. The vital ecosystem in forming soil, habit modification and nutrient recycling barrier. Most of the rainforest area covered all types of mosses, liverworts and hornworts (ENVIS Resource Partner on Biodiversity, Govt of India, 2021).

The liverworts are most common in moist deciduous forests even also distributed in the Deccan plateau, rain forests, dry deciduous forests and deciduous forests. Marchantiophyta is one of the divisions in the non-vascular plants (Bryophytes) and includes 13 families under the order of Marchatiales (Limpricht, G.K. 1877). Ricciaceae is a major family by the order of Marchantiales in India (Rudolf, S. M. 1992; Singh, S. K. 2014). The *Riccia sp* are most common at all sites or types of forests in India and are about 36 accepted species. As the Bryo-geographic distribution has been analysed by some scientists in India. The regions and the species census are Western Himalaya has 18 species record list, Eastern Himalaya 16 species, Punjab and West Rajasthan 17 Species, Gangetic plains 14 Species, Central India 11 Species, Eastern Ghat & Deccan Peninsula 7 Species, Andaman & Nicobar Islands 1 Species and Western Ghats 18 Species recorded, some scientists have not been collected non-valid data regarding the mentions, which has been rejected by Indian census records (Singh, S. K. 2014).

The survey revealed that the collected *Riccia sp* was taken for observation with worldwide standard evidence or data for the study of

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morphology, later get to know the specimen through several key characters shown as *Riccia atromarginata*. Leviar (Levier, 1889). Which is rare and distributed even in India. The present article deliberates the newly and rarely distributed bryophyte from India, *Riccia atromarginata*. Leviar a member of Ricciaceae belongs to the order Marchantiales. Collected it from kappath Hill (Deccan plateau or Dry deciduous Forest - Yashpal K. & Sonal V.; Kotresha K. & Sidanand V. K.) region Gadag district Karnataka State from India **(Fig: 01)**. The place itself has high wind and saw electric generators at top of the hill seem highest wind and even the substrate shows less soil on brown rocks, 2015/17 forest conservation act by Karnataka State Government obligates or amendment on the Kappath hill range as reserved forest. The collected specimen showing *R.atromarginata* features as the description of Podgorica region from Montenegro (a Country in the Balkans) showing similar characteristics as compared with Cyprus. All descriptions followed by the various article evidence conclude that the collected specimen was *R.atromarginata*. The collected specimen was photographed under the microscope for detailed structural characterization of the individual and represented below **(Fig: 02 & 03).**

Materials and Methods

Study Area

Kappath Hill is located near Mundargi Taluk, Gadag District, and Karnataka State, India. Latitude and Longitude 15°13'55.6"N 75°43'33.6"E region shows rich biodiversity with highly medicinal plants has been listed. Gadag district is considered in the Deccan zone, which has a dry climate, high temperature, and low rainfall. The forest type is dry deciduous and scrub types of forests are distributed mainly along Kappathgudda or Kappath hill ranges. The spot of the specimen or Kappath hill is now declared Wildlife Sanctuary, and the area is about 60,000 acres.

Specimen Examined: The specimen was observed by *Prashant Karadakatti*, at the region Kappath hill range, Mundargi Taluk, Gadag district, KARNATAKA, INDIA. 15°13'55.6"N 75°43'33.6"E. Dated: 21/07/2021, 25/07/2022, the department of botany, Karnataka University Dharwad gave permission to collect the specimen for observation during post-graduation degree, Specimen *Collector number: 0010*, Herbarium submitted in the University of Agriculture Science Bangalore, Herbarium Accession Number: UASB 5452.

Taxonomic Treatment

Riccia atromarginata Levier. spec. nov. Nuovo Gior Bot. 21: 291–292. 1889; Müller, Karl. 1 – 870. 1906 - 1911; Jovet-Ast 7.3: 278-431. 1986; Schuster 408–710. 1992; Dragićević, Snežana, *et al*. Bioloski Institut Jovana Hadzija. Hacquetia. 20 (1): 49-56. 2021.

Description: The *Riccia atromarginata* belongs Ricciaceae family in the order of Marchantiales, in which the individual plant or thallus segment width is about 0.5 – 1.2 mm and height 0.7 – 1.5 mm, thallus segments are ovate to oblong and blunt at the tips and papillae like structure on the upper surface of the thallus, loosely arranged individuals not in a rosette form and found somehow the dens groups present, rarely distributed, lithophyte, thallus colouration is sea green (Ocean green) or bluish green at the upper side of mature thalli, deep purple or darker margins visible on the dorsal surface of the thallus, showing undulate outgrowth, line mosaic on the surface of dark margins. Ventral half scales at the thallus tips or apices are smaller, slightly turning deep purple to transparent and disappearing at the thallus's centre. Marginal thallus sharp to obtuse. Thallus's section shows the dorsal region consists of epidermal cells with no Cilia and below the epidermal layer, the chlorenchymatous cells (have discoidal chloroplasts) arranged in vertical rows and have regular assimilatory region or air canals between each row and both edges of thallus has darker cells. The ventral part of the thallus section has transparent simple parenchymatous cells with no intercellular space and lower epidermal cells with unicellular rhizoids **(Fig: 03)**. Epidermal cells are globose with much variability, as the

cross-section results that the youngest thallus segments are wider than the old or base thallus.

As the species consideration was taken over by scientist Jovet-Ast, (1986). Levier, (1889) statement that "planta ut videtur dioica" means "looks like dioicous." Based on that thallus from Kappath hill shows that sporulate in all living samples. Apolar-type brown or black mature spores were found, The spores observed under the light microscope shows a similar structure, even though there are no poles at the proximal, distal and equatorial side and the spores are globose rather than looks triangular structure found in other *Riccia sp*. Nearly 25 – 30 spores were observed and showed spore sizes of about 70 - 90 µm **(Fig: 03)**.

Season: July to September.

Distribution: Algeria, Argentina, Cyprus, Egypt, France, Greece (Crete), Iran, Israel, Italy (Sardinia & Sicily), Jordan, Libya, Madagascar, Mexico, Morocco, Oman, Pakistan, Portugal (Medeira & Cape verde), Saudi Arabia, Spain (Beleares & Canary island), Syria, Tunisia, Turkey, United Arab, Emirates, United States of America, Yemen (Söderström. L, *et al*., 2019), India (Karnataka) **(Fig: 01)**.

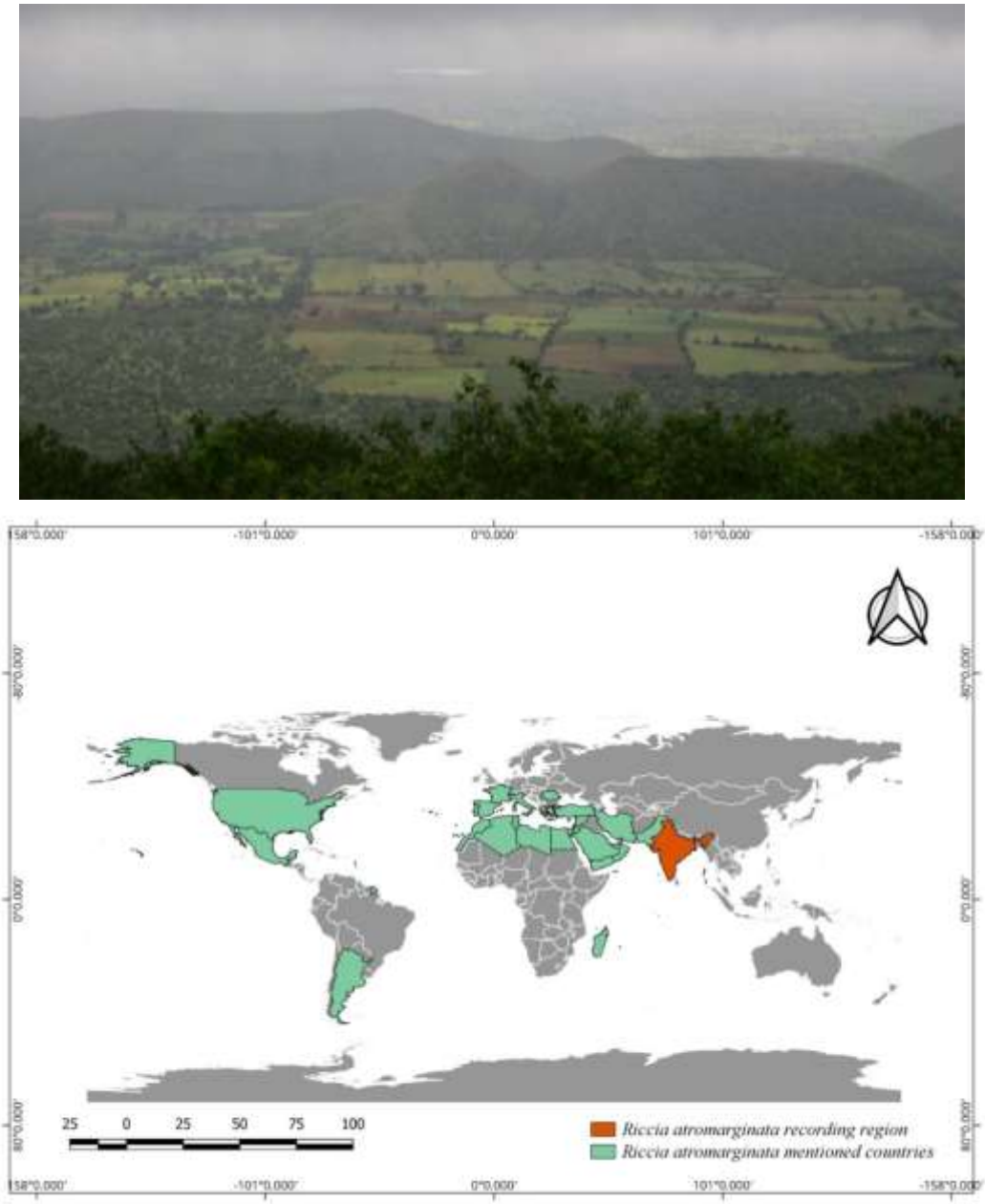

Figure 1: Above image shows the Kappath Hill region, Gadag, Karnataka, INDIA & below image shows *Riccia atromarginata* Distribution in the world

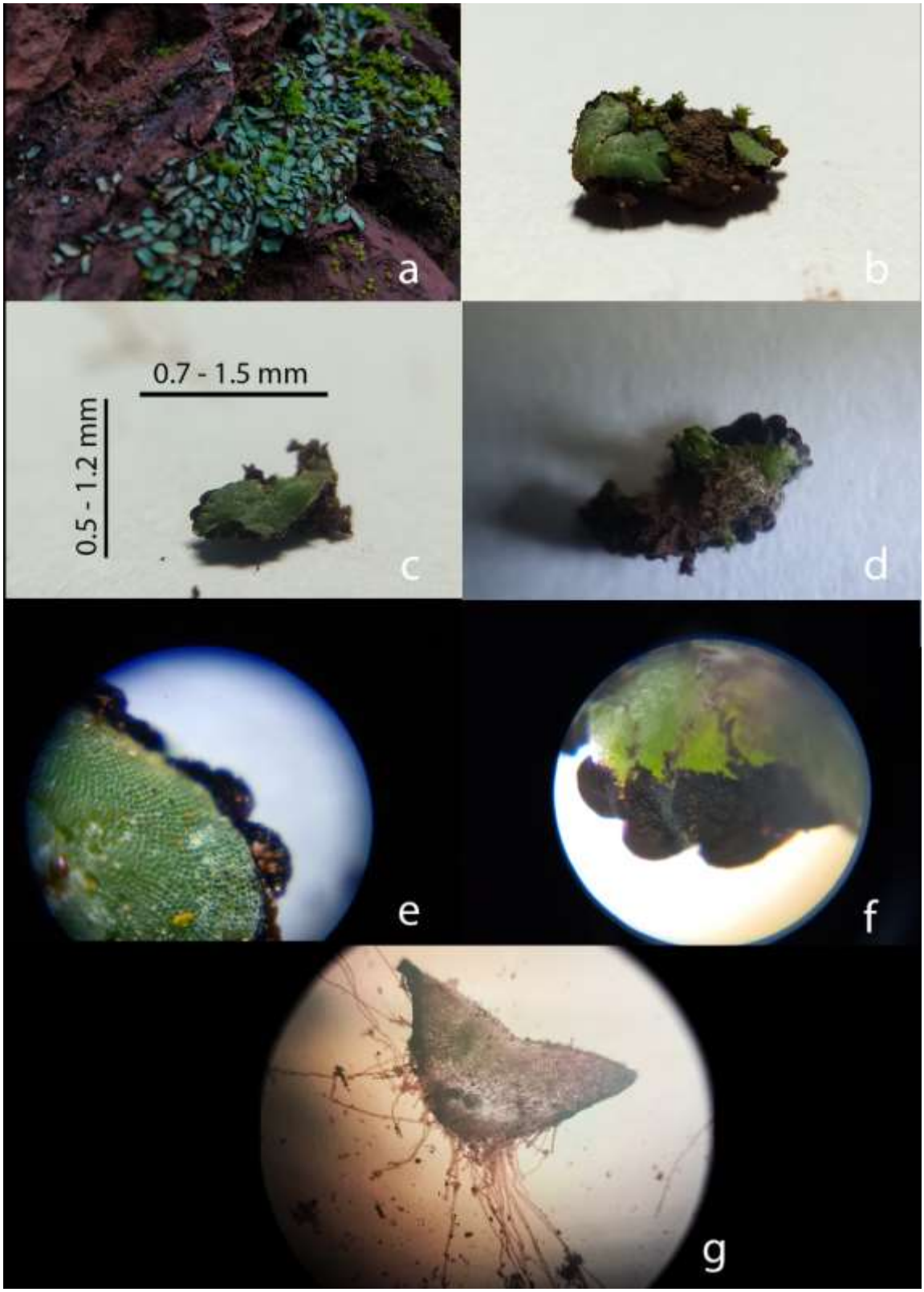

Figure 2: *Riccia atromarginata*. a. Habit of thallus, b. Individual Thallus, c. Ventral view, d. Dorsal view, e. Dark margins (Violet in colour) microscopic ventral view, f. Dorsal view, g. Section of the thallus

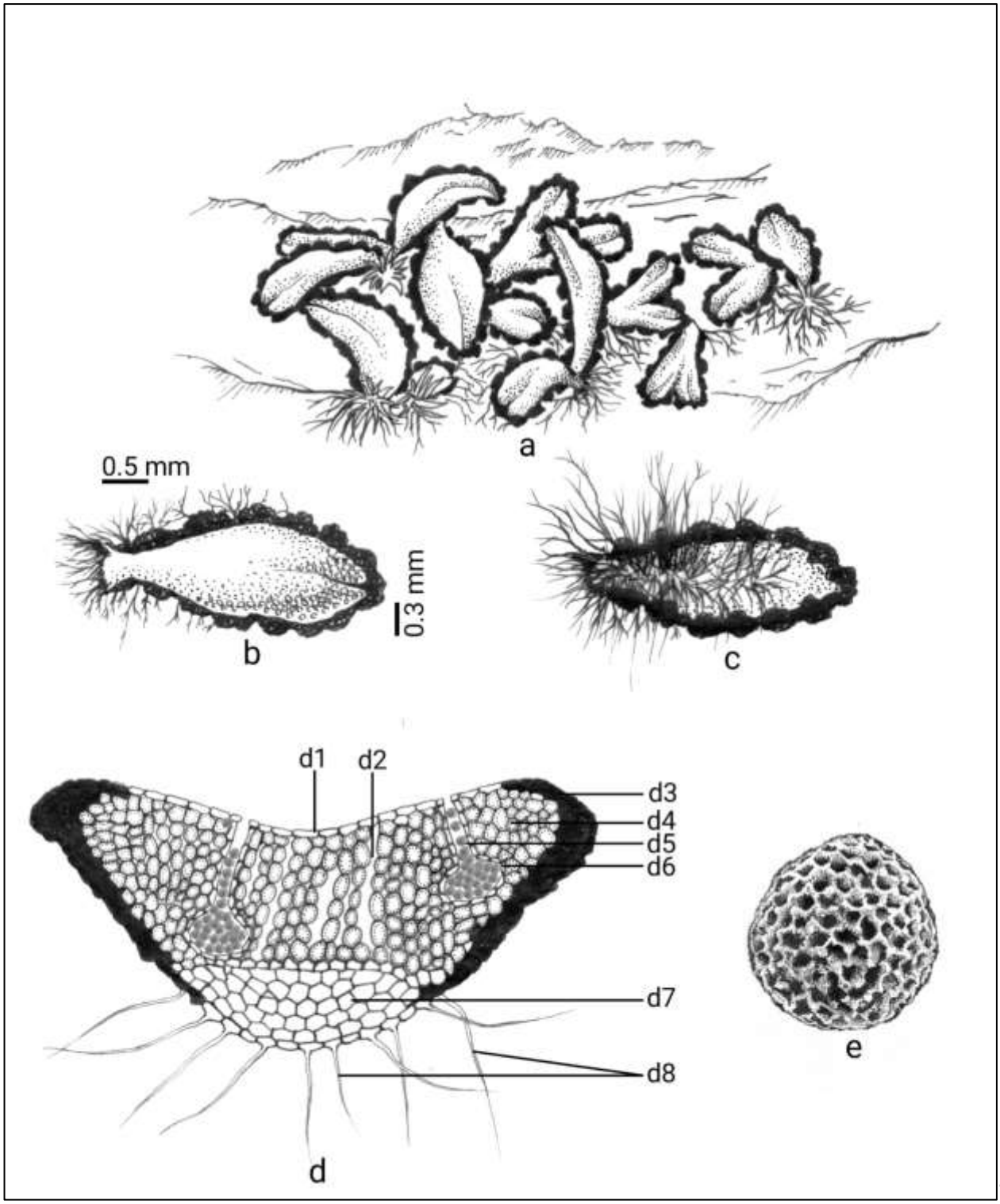

Figure 3: *Riccia atromarginata.* a. Thallus habit, b. Dorsal view, c. Ventral view, d. Cross section of thallus showing d1. Upper epidermal cell, d2. Assimilatory region (Air chamber), d3. Dark margin layer, d4. Chloroplast containing cells, d5. Apolar Spore, d6. Archegonium, d7. The lower epidermis, d8. Rhizoids, e. Apolar Spore (Enlarge)

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