

Two acrocarpous mosses (*Calymperes tahitense* and *Fissidens rombinsonii*), additions to Main land India

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Abstract

Two acrocarpous mosses, *Calymperes tahitense* and *Fissidens rombinsonii*, collected from the forests of East Godavari district, Andhra Pradesh State, are new distributional records to Mainland India.

INTRODUCTION:

During our explorations for bryophytes in Andhra Pradesh in the past three years, we could collect few curious acrocarpous moss plant specimens from Amruthadara Waterfalls located on the way from Maredumilli to Bhadrachalam in East Godavari district. Critical examination of these specimens revealed that these specimens belong to *Calymperes tahitense* (Calymperaceae) and *Fissidens rombinsonii* (Fissidentaceae).

Calymperes Sw. comprising 95 species (World flora online 2018, Tropicos.org) are represented by 19 species in India (Dandotiya et al., 2011 & Alam, 2015). *Fissidens* Hedw. comprising 729 species (World flora online, 2018, Tropicos.org) are represented by 87 taxa belonging to 77 species (Dandotiya et al., 2011 and Uwe Schwarzi, 2014). Perusal of literature (Gangulee 1969-72; Ellis 1989; Dandotiya et al., 2011; Uwe Schwarzi 2014; Alam 2015 Manjula & Manju 2016; Sreenath & Ravi Prasad Rao 2019) revealed that *Calymperes tahitense* and *Fissidens rombinsonii* are recorded only from Andaman and Nicobar Islands and nowhere from other localities of Mainland India (excluding Andaman and Nicobar Islands).

Hence the present collections of the both the species form new distributional records to Mainland India.

MATERIALS AND METHODS:

The plant specimens were collected by using sharp edged knife and terrestrial specimens were scraped by using manually bent and sharpened flat spoon. The collected specimens were placed in zip lock polythene cover with labeled field number. Field observations were recorded in the field notes and live photographs were taken by using Nikon D3300. Collected material brought to the laboratory, made it air dried at room temperature and preserved them in brown paper packets (12 x 18 cm) with detailed label (10 x 17cm). Critical examination of the specimens was done by using temporary slides and plant parts were separated by using micro forceps (Varin) VR-15 curved, VR-11 straight with fine sharp edges. Slides were observed under light micro scope (Olympus CH20i) and measurements were taken by using ocular micro meter (ERMA) 19 mm, 100 segments in 1 cm. Photographs were taken by using Moto g3 turbo equipped with 13 MP camera, 4x wide digital zoom, different dimensions were measured and identification of the specimens by using

standard floras. Description, Habitat and Ecology, distribution, voucher specimen information, field photographs and microscopic photographs are provided for the species. Voucher specimens are deposited in the Sri Krishnadevaraya University Herbarium, (SKU) Ananthapuramu. Abbreviations used for the collectors are: AS (Ananthaneni Sreenath) and BR (B. Ravi Prasad Rao).

Results

Systematic descriptions:

Calymperes tahitense (Sull.) Mitt. J. Linn. Soc., Bot. 10: 172 1868; *Calymperes andamense* Besch. Ann. Sci. Nat., Bot., Ser. 8. 1: 272, 276. 1896 & Gangulee, Mosses of E. India and adjacent regions 1. 2: 622-623. 1971; Ellis in J. Bryol. 15:718-721. 1989. (Figure 1 A-M).

Plants terrestrial or lithophytic, small to medium sized, robust, loosely tufted or forming mats to 0.9 - 2 cm high, 0.6 - 0.8 mm wide with leaves, yellowish-green to dark green. Stems usually not branching or sometimes branching at base, without a central stand. Leaves curled when dry, erect to spreading when moist; dimorphic. Both gemmiferous and non-gemmiferous leaves canaliculate, long ligulate – lanceolate from slightly wider ovate base which covers ¼ of the leaf length; leaves up to 5 mm long, 0.65 mm wide at base and 0.5 mm at middle lamina, leaf apex extended with the costa, lamina margin thick, serrate at top. Costa prominent, up to 80 µm wide at base. Cancellinae of 10 to 11 rows each side of costa base, cells large, rectangular, hyaline up to 37 × 25 µm. Perichaetial leaves obovate to oblong ligulate, up to 2.5 mm long, 0.4 mm wide at base and 0.7 at middle lamina, apex not clearly extended with costa. All leaves cells unipapillose at apex and middle, papilla reducing towards base, apical middle cells 6 -14 µm × 4 -12 µm; quadrate, hexagonal to rounded, basal cells 14 - 43 µm × 6-8 µm. Gemmae green, radiating stellate, clustered at costal apex, and 130 - 180 × 33 - 54 µm, with shiny transparent margins and cells having thick chlorophyll. Capsules not seen.

Habitat and Ecology: Terrestrial or lithophytic or corticolous found near waterfall areas and in deep shady places, associated with *Fissidens robinsonii* (Fissidentaceae).

Specimens examined: India, Andhra Pradesh, East Godavari district, Amruthadhara Waterfall, 22-November, 2018. 55804A; 55807; 55811B & 55816C, SKU, BR & AS.

Distribution: India: Andaman Nicobar Islands. **World:** Australia, China, Comoros, Domestic Republic of the Congo, Madagascar, Papua New Guinea, Philippines, Reunion.

Fissidens robinsonii Broth. Philipp. J. Sci. 13: 204 1918 & Gangulee, Mosses of E. India and adjacent regions 1. 2: 534-535. 1971. (Figure 1 N-X).

Plants terrestrial, small, to 9 mm long and to 2.6 mm wide with leaves, whole plant yellowish-green to golden-green. Stems not branching, without a central stand, plants stiffer, curled when dry and erect much spreading when moist. Leaves up to 17 pairs (about 2.9 leaves per mm of stem). Leaves ligulate – lanceolate, 1.2 - 1.68 × 0.2 - 0.28 mm wide with sheathing lamina. Sheathing lamina almost above ½ of the leaf length, to 0.7 - 0.9 × 0.12 - 0.14 mm wide. Leaf tip narrowing, acuminate spiny at tip. Sheathing lamina crispate with incurved hook like tips when dry. Some leaves show axillary glands between the sheathing lamina. Dorsal lamina base suddenly rounded and decurrent on the nerve base with single layer of cells. Costa prominent, excurrent with spiny aristate apicules. Border of limbidium absent, margin slightly crenulate by the outer cell walls. Leaf cells irregularly rounded to hexagonal, thin walled with highly mamilllose to conical papillae but not obscure, middle, apical cells, to 6 - 10 µm wide and basal cells 15 - 18 µm, some cells larger to 21 - 23 µm near at costa base. Perichaetial leaves longer than other leaves to 1.8 mm equal sheathing lamina, narrow at middle of the leaf. Sporophytes present on apical portion of the plant, seta geniculate up to 3.6 mm long, with erect capsule to 0.6 mm long and 0.3 mm in diameter wide. Spores are not fully developed.

Habitat and Ecology: Terricolous, plants gregarious, found on moist soil near tree trunk or soil covered rock substratum near waterfall areas and deep shady places, associated with *Calymperes tahitense* (Calymperaceae).

Specimens examined: India, Andhra Pradesh, East Godavari district, Amruthadhara Waterfall, 22-November -2018. 55801A; 55804B & 55811B, SKU, BR & AS.

Distribution: India: Andaman and Nicobar Islands. **World:** China.

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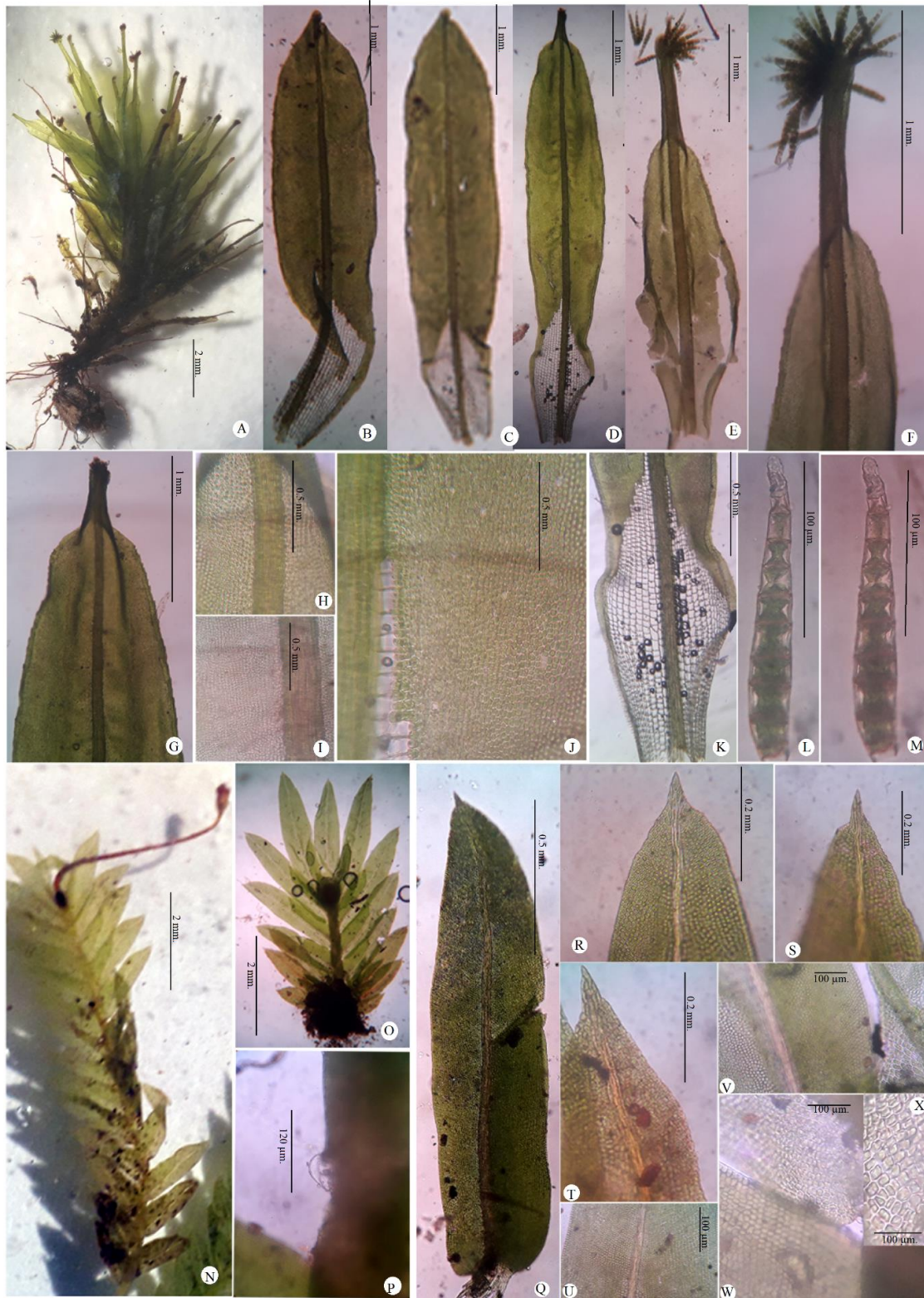


Figure 1: A-M. *Calymperes tahitense* (Sull.) Mitt. A. Single plant, B, C & D. Old non-gemmiferous leaves, E. Young Perichaetial gemmiferous leaf, F. Magnified view of Gemmiferous leaf tip, G. Magnified view of non gemmiferous leaf tip, H. Leaf apical cells I. Leaf middle cells, J. Leaf middle cells near basal Cancellinae, K. Leaf basal cells and Cancellinae, L&M. Gemmae. N-X. *Fissidens robinsonii* Broth. N. Single plant with Sporophyte, O. Single plant without sporophyte, P. Axillary gland, Q. Magnified view of leaf, R, S&T. Magnified view of leaf tips with apical cells, U. leaf middle cells, V. Vaginate lamina basal cells, W. Dorsal lamina leaf basal cells, X. Magnified view of dorsal lamina leaf basal cells.

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