

***Riccia thongjaorokensis* – A New Fossil Liverwort from Oligocene Beds of the Tertiary, Northeast India**

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Abstract: A fossil gametophytic thallus, resembling *Riccia* L., from the Barail Sandstone (Early Oligocene) of the Thongjaorok Stream section (24°27'41"N and 93°44'40"E) of Manipur in Northeast India is reported as a new species – *Riccia thongjaorokensis*. Description of this new taxon is based on a cluster of 5-6 well preserved gametophytic thalli. This paper deals also with the paleoecology of the area.

Keywords: *Riccia*, Oligocene, Thongjaorok, Manipur.

INTRODUCTION

Fossil recovery of liverwort is very rare, attributed chiefly to the remote possibility of their fossilization – both bryophytes as well as liverworts being herbaceous and delicate in texture. The thalli of these plants neither possess lignified wood nor cutinized epidermis and therefore are very susceptible to mechanical and biological fast degradation as compared to the vascular plants. Hence, the recovery of their fragments is even worth describing if they exhibit any diagnostic features as they reflect sometimes the history and distribution of this plant group in the past.

The genus *Riccia* L., with more than 138 species, is one of the most widely distributed members of the bryophyte family Ricciaceae distributed in tropical and temperate regions of the world (Mitra et al. 1990). In the Indian sub-continent only one fossil species *Riccia chitaleyii* has hitherto been reported from the Deccan Intertrappean beds of Mohgaon-Kalan, Madhya Pradesh (Sheik and Kapgate, 1982). There is no earlier report of any fossil liverwort so far from the Tertiary of Northeast India.

MATERIALS AND METHODS

In-situ material was collected from the sandstone of lowermost division of the Barail Group, the Laishong Formation, at Thongjaorok Stream course of Bishnupur foothill on the Southwest of Imphal along the NH-150 (Fig.1). The collected specimens comprise mainly *Riccia* impressions.

The collected specimens and their photographs are

preserved in the repository of Imphal College Geological Museum under the catalogue number TRF (Thongjaorok *Riccia* Fossil).

DESCRIPTION OF THE FOSSIL BEARING ROCKS

The lowermost division of the Barail Group in the study area is characterized by thin to moderately thick bedded sandstones, sandy and silty-shales and shales displaying typical turbidite characters at places. The sandstones are fine to medium grained and light grey to light brown in colour. The host rock associated with the *Riccia* fossils is weathered medium grained sandstone of Laishong Formation of Early Oligocene age. The *Riccia* fossils along with the host sediments are found bioturbated to certain extent with *Skolithos verticalis*. The *Skolithos* pipes are about 3-5 mm in diameter and 50-60 mm in length.

SYSTEMATICS

Phylum : BRYOPHYTA
Class : HEPATICOPSIDA
Order : MARCHANTIALES
Family : RICCIACEAE
Genus : *Riccia* (Mich.) L

Riccia thongjaorokensis sp. nov.

Holotype: Specimen No. TRF 1101.
Paratype: Specimen No. TRF 1102-1104

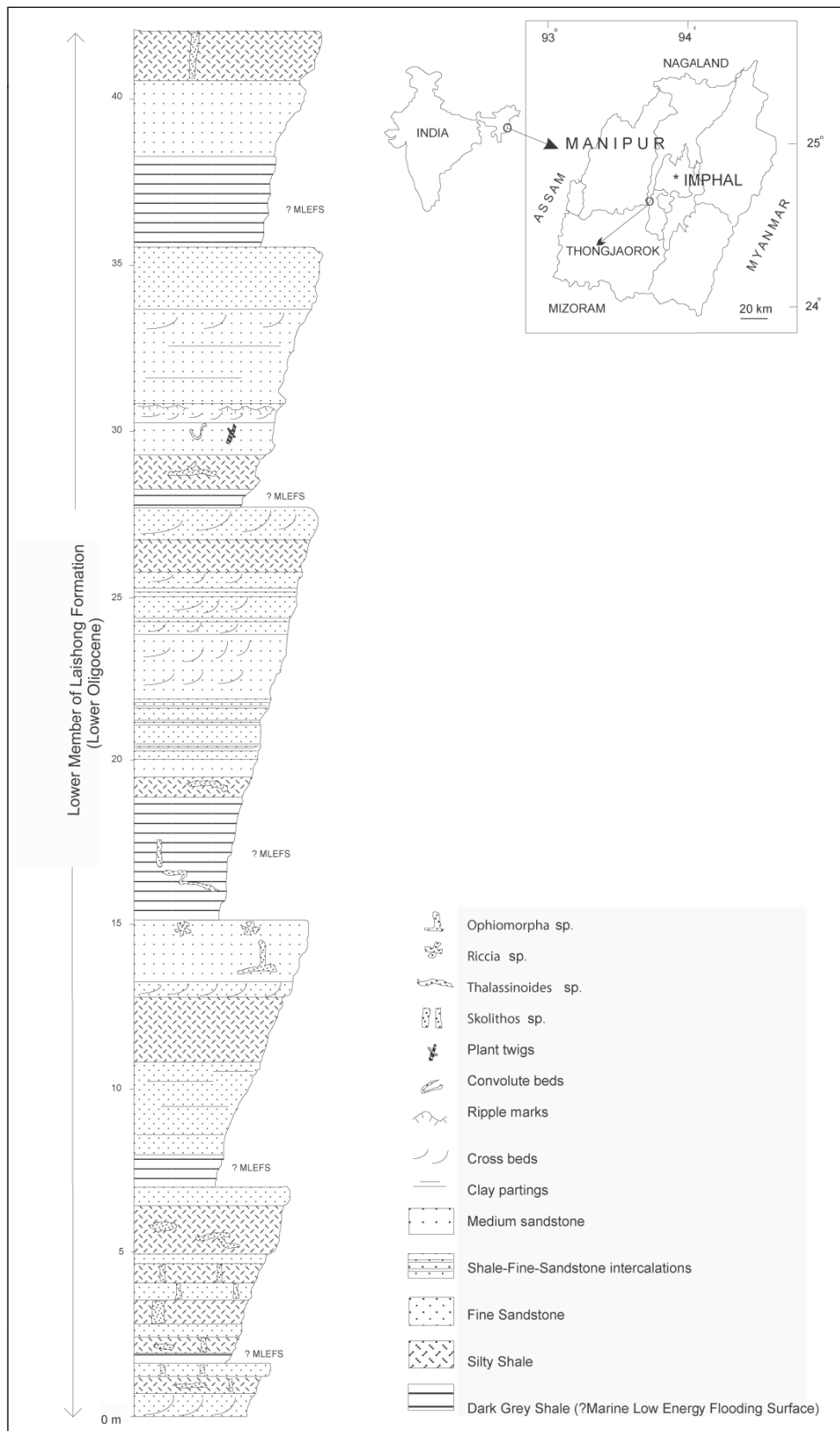


Fig.1. Lithological column of the section along Thongjaorok stream where fossil *Riccia thongjaorokensis* has been recorded. Trace fossils and sedimentary structures associated are also shown.

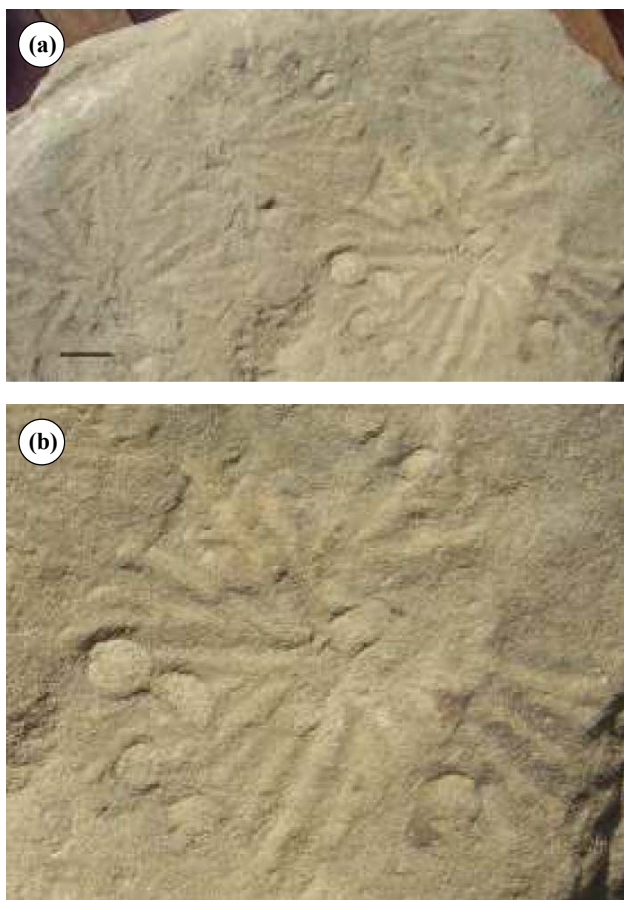


Fig.2. (a) Photograph showing the *Riccia* fossil specimens which are preserved on the bedding plane. The circular spots are transverse section of *Skolithos verticalis* (black bar is 1 cm). (b) Close-up of a.

Locality: Sandstone of Laishong Formation of Barail group of early Oligocene epoch, Thongjaorok Stream (24°27'41"N and 93°44'40"E), Imphal Valley.

Description of the Specimens

The description of the new taxon is based on four specimens with well preserved impressions. The robust gametophytic impression is a typical rosette of several

dichotomous branches close to one another (Fig.2) and has an average diameter of 75 mm. Each branch has an average width of 10 mm and is traversed on the dorsal surface by a wide longitudinal groove which ends in a depression towards the tip. The rosettes appear to be overlapping.

Comparison with Extant Taxa

The dichotomous branching of obcordate thalli with deep median furrows on the dorsal surface resemble closely to *Riccia* sp. Genus *Marchantia* can be easily ruled out as there are no gamma cups or antheridiophore/archiophore on dorsal surface of the thalli. Moreover, the dorsal furrow is not so deep in case of *Marchantia*.

DISCUSSION

The genus *Riccia* has mostly terrestrial species which generally grow in moist sediments (Inoue, 1960; Volk and Perold, 1986), distributed widely both in tropical and temperate regions of the world (Mitra *et al.*, 1990).

Palaeoclimatic conditions around the site of retrieved *R. thongjaorokensis* is referred to be possibly warm and humid identical to more or less the paleoclimate interpretations made for *Riccia* sp. by Sahito and Nizamani (1989) and Venkatachala and Rawat (1973).

It is further implied that the bed which contained *R. thongjaorokensis* might have been very close to sea-level. This inference is corroborated by the presence of cross-bedded and ripple-marked strata just above the stratum containing *R. thongjaorokensis*. The presence of trace fossils like *Skolithos verticalis* in that particular bed containing *R. thongjaorokensis* may also proved that the depositional basin in which the Laishong sediments get deposited was very shallow, around 100-200 m deep.

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