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Additional studies on *Polysiphonia* like red alga from non-marine Mesozoic cherts of Rajmahal Hills, India

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ABSTRACT

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Additional information is given on *Polysiphonia* like red alga described earlier from the Nipania locality in the Rajmahal Hills, Jharkhand, India. Filaments are straight or twisted, narrow (3–4 cells) or wide (8–10 cells) and each is enclosed by closely appressed 2–4 rows of narrow, aseptate tubular cells which may or may not have spiny outgrowths. Rows of tetrasporangia like bodies are present in pericentral siphonous cells. The central rows of cells are rectangular, squarish or little irregular in shape. In association of filaments are present many non-ciliated spores.

Key-words: Petrified polysiphonous filaments, Mesozoic, Rajmahal Hills, Jharkhand, India.

INTRODUCTION

Sharma and Harsh (1994) reported polysiphonous filaments from thin sections prepared of non-marine Nipania cherts collected from the Rajmahal Hills, Jharkhand. They also observed the beaded filaments and suspected them to be the fertile ones but not yet confirmed. Sharma et al. (2001) also described another kind of red alga bearing reproductive structures like cystocarps, carposporangia, carpospores and tetrasporangia in non-marine sediments of Sonajori, Rajmahal Hills. Existence of coenobial alga *Eudorina* (Sharma & Tripathi 1997) and a *Vaucheria* like siphonous green alga in the Nipania cherts (Sharma 2014a) confirms the non-marine nature of the Rajmahal Hills material. The present manuscript is based on study of additional slides prepared of the Nipania cherts.

MATERIAL AND METHOD

The material was collected from Nipania, 5 km north-west of the Amrapara, in Dumka district, Jharkhand. Sections were cut with a diamond edge wheel. Slides were prepared by the usual grinding and polishing methods and mounted in dilute canada balsam.

DESCRIPTION

Isolated, dark coloured filaments occur frequently in some of the thin sections prepared of silicified cherts collected from Nipania. The filaments are either narrow

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(3-4 cells wide) and straight with sub-opposite slightly curved spiny outgrowths (thick at the base and pointed at the tip) (Plate 1, figure B) or the filaments are twisted, 3-5 cells thick and have spiny outgrowths (Plate 1, figures B, F). In the lower (basal) portion of the filaments, the spiny outgrowths are either absent or sparsely placed (Plate 1, figure C). In the wider and straight filaments, the spiny outgrowths are comparatively closer and regular (Plate 1, figures D, E). There are many wider filaments without spiny outgrowths, i.e. with smooth surface (Plate 1, figures J–L). Every filament has a peripheral portion and the central body. The former consists of a number of closely appressed long, aseptate tubular cells (siphons) which may uncoil in some of the filaments (Plate 1, figure H) and look similar to aseptate, coenocytic hyphae of Phycomycetes (Plate 1, figure I). The inner central portion of such filaments is dark coloured and consists of undifferentiated dead cells (?). Such filaments are not common in occurrence. In normal vegetative filaments, there is a central row of long, rectangular cells (Plate 1, figures C, E, J) surrounding which are present rows of variable number of rectangular to squarish cells (Plate 1, figures E–G, J, K). These are pericentral siphons or the cortex cells comparable to that of the filament of an extant *Polysiphonia* (Bold & Wynne 1985, Kumar & Singh 1982). A long central siphon (empty), representing a row of central cells, surrounding which are present several rows of smaller sized squarish or little irregular cells has also been observed (Plate 1, figure G). The peripheral rows of siphonous cells are not visible in this filament. But a row of smaller sized rectangular cells is visible (arrow). This filament is broadly comparable to the longisection of a male (antheridial) branch (Sharma 1992, figures. 13.15 A, D). However, spermatangia are not visible. Sharp differentiation between the peripheral rows of cells and the central ones is also observed (Plate 1, figures J-K). Plate 1, figures K-L exhibit rounded (white) bodies in rows (arrow) in pericentral portion probably representing tetrasporangia, as seen in extant *Polysiphonia* (Iyangar 1950, Hollenberg 1968, Bold et al. 1987).

DISCUSSION

From the above description, it is clear that the extinct filaments are related to the order Ceramiales of the Division Rhodophycophyta (Bold et al. 1987). The filament has a central siphon surrounded by pericentral cells and rows of closely appressed peripheral tubular, aseptate cells with or without spiny outgrowths. These are not comparable to the trichoblasts of the extant taxon *Polysiphonia*. However, the position and presence of tetrasporangia in rows are comparable to some extent with that of the living material of Ceramiales. The reproductive bodies are yet to be discovered with the isolated filaments seen in thin sections of the Nipania chert.

It is interesting to note that some of the extinct red algae (otherwise marine) have been collected from the non-marine cherts of the Rajmahal Hills (Sharma & Harsh 1994, Sharma & Tripathi 1997, Sharma et al. 2001, Sharma 2014b). On the other hand, the collection of non-marine (fresh water) extinct coenobial alga *Eudorina* (Sharma & Tripathi 1997) and a *Vaucheria* like green siphonous alga (Sharma 2014a) in the Nipania cherts confirm the presence of non-marine conditions during the Late Jurassic and Early Cretaceous periods. Further investigations are required of the Nipania cherts for the collection of more and better peserved material of the extinct algae.

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Plate 1

A–L. Filaments of *Polysiphonia* like extinct red alga. A. Twisted filament. B. Thin straight filament. C. Non-twisted filament with basal portion. D. Straight filament with spiny outgrowths at regular intervals. E. Same. Enlarged showing distinct peripheral rows. F. Enlargement of figure A. G. A thick filament with several rows of cells. H. A dark filament with uncoiled peripheral cells. I. Same. Enlarged. J. Filament with distinct peripheral and central cells. K. Differentiation of peripheral and central cells. Young tetrasporangia (arrow). L. Filaments with distinct (whitish) tetrasporangia in a row (arrow). Bar (shown in figure A): A–D, H = 85μm; Bar (shown in figure F): E–G, I–L = 35μm.

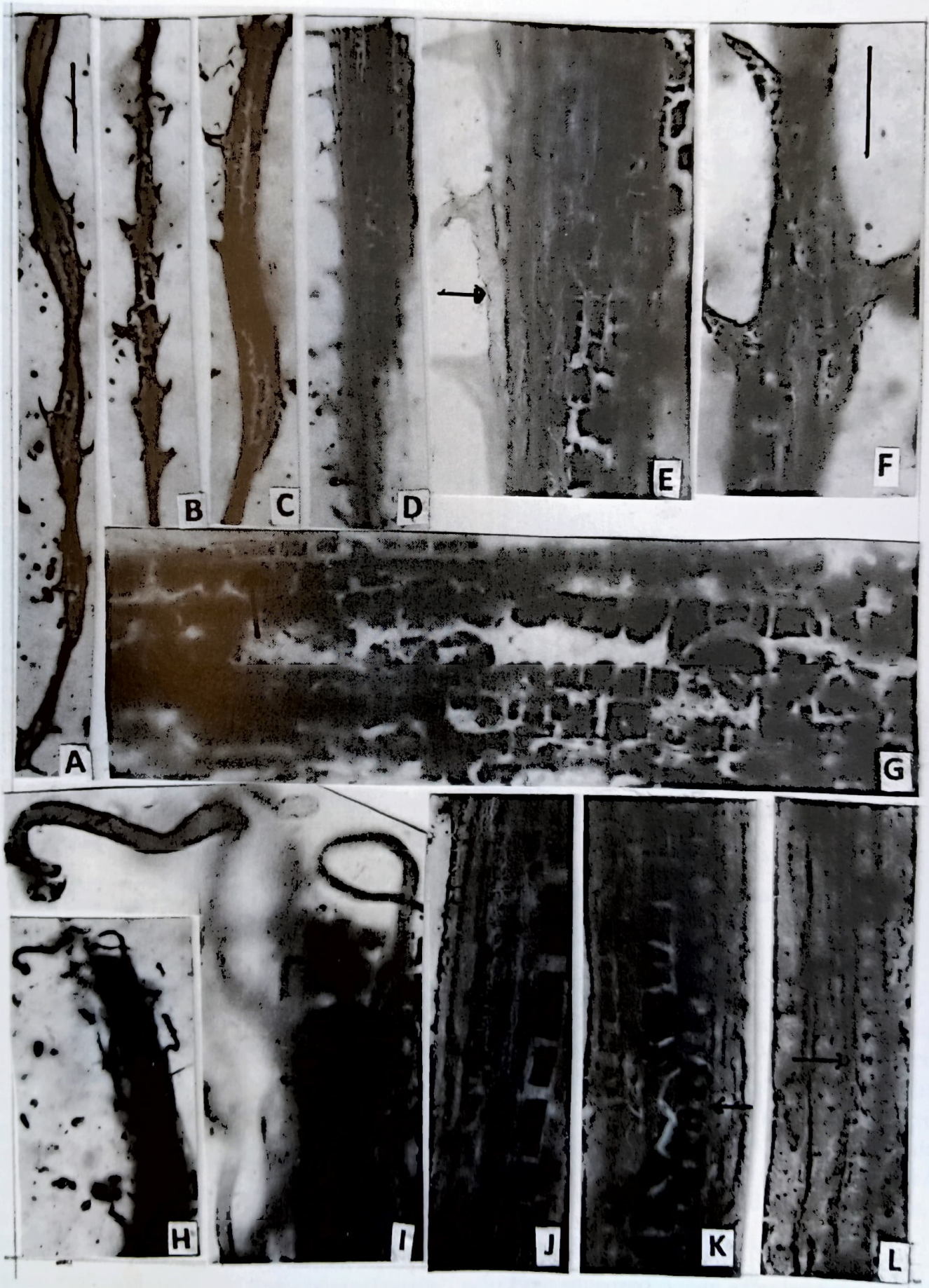

Plate 1

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