

MICROBIOTA FROM STROMATOLITE-STRATIFERA OF THE BILARA GROUP (MARWAR SUPERGROUP), WESTERN RAJASTHAN

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ABSTRACT

Three types of microbiota referable to *Nanococcus vulgaris*, *Huronispora psilata* and *Kakabekia umbellata* are reported from the stromatolite—*Stratifera* collected from near Bhadora. The biota suggests that the stratified stromatolite may have been formed due to exogenic activities of the recorded algae.

Key-words— Microbiota, *Nanococcus*, *Huronispora*, *Kakabekia*, Marwar Supergroup, Precambrian (India).

सारांश

पश्चिमी राजस्थान में बिलारा समूह (मारवाड़ महासमूह) के स्ट्रोमेटोलाइट-स्ट्रेटिफेरा से सूक्ष्मजीविता - प्रभात कुमार माइती

भदौरा के समीप से एकत्रित स्ट्रोमेटोलाइट-स्ट्रेटिफेरा से नैनोकोकस वल्गेरिस, ह्यूरॉनिसपोरा साइलेटा एवं काकाबेकिया उम्बेलेटा से निरूपणीय तीन प्रकार की सूक्ष्मजीवितायें अभिलिखित की गई हैं। प्राप्त सूक्ष्मजीविता से यह प्रस्तावित होता है कि स्तरित स्ट्रोमेटोलाइट अभिलिखित शैवालों की बाह्यजनित गतिविधियों के परिणाम स्वरूप बने हैं।

INTRODUCTION

THE Marwar stromatolites are best developed in the Jodhpur and Nagaur districts, although they have also been found in parts of the Jaisalmer and Pali districts. Their lateral distribution is considerable as they cover about 50,000 km² area on the western side of the Aravalli range. The stratigraphic succession is summarised as follows.

Badhaura Formation

..... Unconformity

Nagaur Group	{ Tunkalian Formation Nagaur Formation
Bilara Group	{ Pondlo Formation Gotan Formation Dhanapa Formation Giar Bhakar Formation
Jodhpur Group	{ Soina Formation Pokaran Boulder Bed

The stromatolites occur only in the Bilara Group. The thickest stromatolite deposits are found in the Dhanapa Formation. According to Burman (1980) and Verma and Burman (1980) the records of stromatolites are *Collenia*, *Colleniella*, *Conocollenia*, *Cryptozoon*, *Irregularia*, *Stratifera* and *Oncolites*.

In the present paper, it is aimed to record the microbiota found in the stromatolite-*Stratifera* collected from near Bhadora from the Dhanapa Formation. The material was studied in thin sections obtained along the plane of vertical deposition.

DESCRIPTION

TYPE 1

Large circular enveloping sheaths (Pl. 1, figs 1-3), measuring up to 60-180 μm, encompassing hundreds of circular cells with

smooth surface, arranged in irregular groups, measuring $\pm 3 \mu\text{m}$. At times cells are also found without enveloping sheath, either scattered or in groups due to disorganisation of the enveloping sheath (Pl. 1, figs 4, 5).

This form is identical to *Nanococcus vulgaris* Oehler (1977) recorded from the H.Y.C. Pyrite Shale Member, Australia (1500 m.y.).

TYPE 2

Spherical cells, solitary (Pl. 1, figs 6, 7) or in groups of 2-3 cells, measuring 10-20 μm , surface smooth, enveloping sheath or lamellated organic matrix around cells absent.

The present forms compare with *Huronispora psilata* Barghoorn (1965) recorded from the Gunflint Iron Formation, Canada (1900 m.y.) and *H. psilata* by Muir (1976) from the Amelia Dolomite, Australia (1500 m.y.).

TYPE 3

Spherical cells with a narrow neck-like body expanding into umbrella like-structure (Pl. 1, fig. 8). Spherical cells measuring 8-10 μm , neck 2 μm broad and umbrella 4-8 μm long.

The specimens resemble *Kakabekia umbellata* Barghoorn (1965) recorded from the Gunflint Iron Formation.

DISCUSSION

Biota from the Prephanerozoic stromatolite has been reported by Awramik (1977)

from the stromatolitic sequence in the Gunflint Iron Formation, Canada (1900 m.y.). According to his observations the microbiota plays an important role in the deposition of stromatolites. Further in *Stratifera*, the microbiota is dominated by coccoidal cells comparable with *Huronispora* Barghoorn whereas on the other hand in columnar stromatolite the filamentous form, comparable with *Gunflintia* Barghoorn, is dominant. The present study supports the fact that the stratified stromatolites are formed by the biogenic activity of the Chroococcacean type.

Schopf *et al.* (1977) described microbiota from the algal laminated sediments of cf. *Stratifera* from the Shorikha Formation (approximately 900 m.y.) in the Nizhnyaya Tunguska River Valley, U.S.S.R. and also from the Minyar Formation (approximately 700 m.y.) about 5 km upstream from the village of Bakeyev, U.S.S.R. Two principal types of microfossils, (a) solitary algal unicells containing some intracellular organic bodies, and (b) filamentous microfossils, tubular and unbranched comparable to extracellular sheaths produced by modern mat building Oscillatoracean blue-green algae have been identified. Though, the stromatolitic biota from Bhadora resemble in the presence of solitary algal unicells but differs in the absence of filamentous microfossils.

The presence of *Kakabekia* and other Chroococcaceans suggests that the organosedimentary structures have been deposited in shallow water and in anoxygenic conditions.

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EXPLANATION OF PLATE

(All photomicrographs are $\times 1000$; figured slides are preserved at the Birbal Sahni Institute of Palaeobotany Museum; Stage coordinate on Leitz-Dialux Microscope)

- 1-3. Type 1. cf. *Nanococcus vulgaris* Oehler, slide no. 6934; Stage coordinates 21.6×102.5 (fig. 1), 21.4×102.4 (fig. 2) and 22.1×100.6 (fig. 3).
4, 5. Isolated cells of *Nanococcus vulgaris* Oehler, slide no. 6935; Stage coordinate 42.9×96.7 .
6, 7. Type 2. cf. *Huronispora psilata* Barghoorn, slide no. 6935; Stage coordinates 42.0×103.5 (fig. 6) and 46.4×101 (fig. 7).
8. Type 3. cf. *Kakabekia umbellata* Barghoorn, slide no. 6936; Stage coordinate 42.1×95.4 .

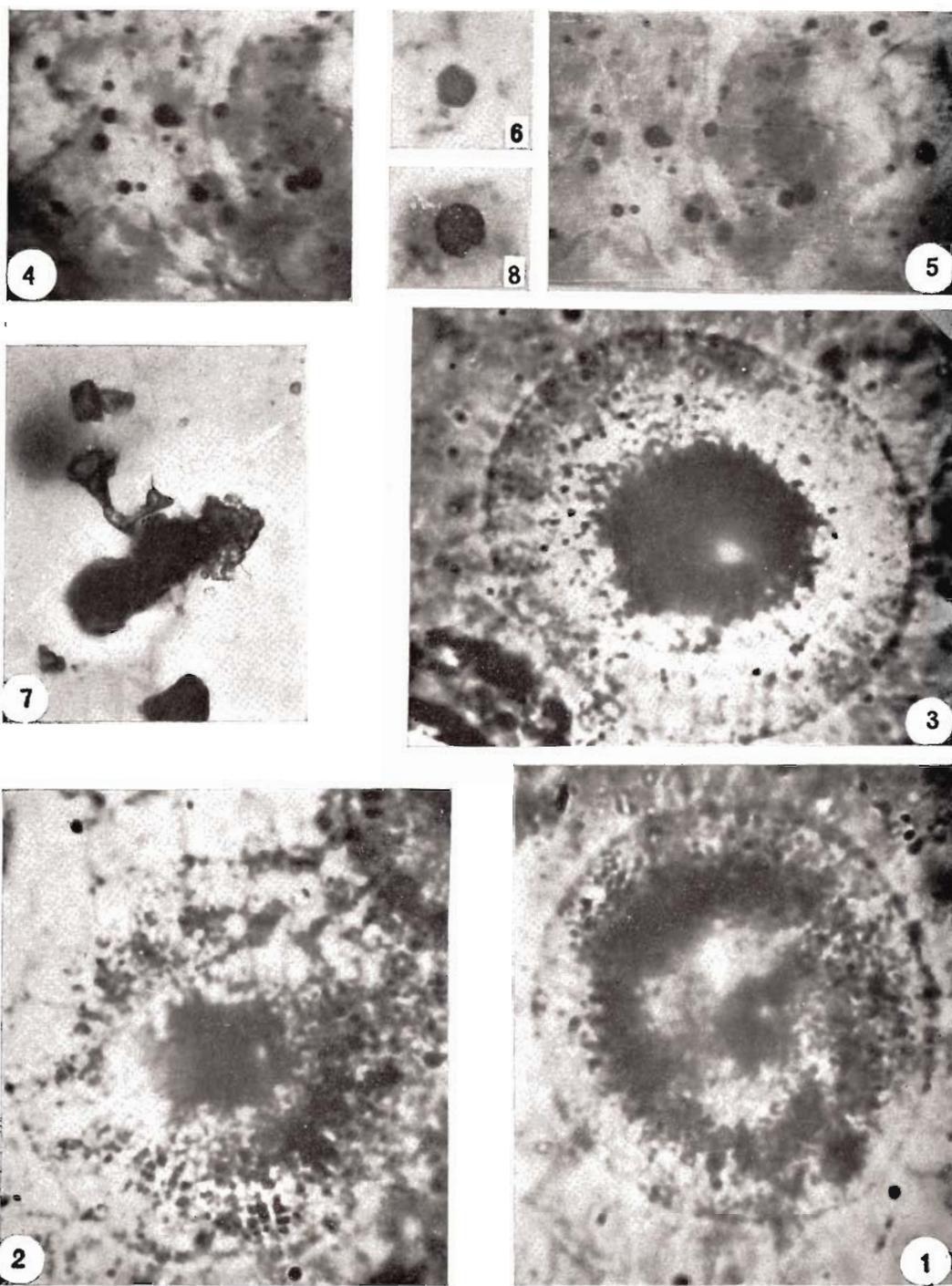


PLATE 1