

## OCCURRENCE OF CYANOPHYCEAN REMAINS FROM THE DECCAN INTERTRAPPEAN BEDS, MADHYA PRADESH

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### ABSTRACT

Cyanophycean remains, viz., *Huronispora* cf. *microreticulata* Barghoorn, *Microcystiopsis mohgaonkalaensis* gen. et sp. nov., *Palaeohydrococcus raoi* gen. et sp. nov. and *Neophormidium indicum* gen. et sp. nov. have been reported from Mohgaonkalan, Madhya Pradesh.

**Key-words** — Cyanophyceae, *Huronispora*, *Microcystiopsis*, *Palaeohydrococcus*, *Neophormidium*, Deccan Intertraps, Eocene (India).

### सारांश

मध्य प्रदेश की दक्खिन अन्तर्द्वीपी संस्तरों से सियॅनोफ़ाइसीय अवशेष — प्रदीप कुमार मिश्रा एवं प्रभात कुमार माइती

मध्य प्रदेश में मोहगाँव कलाँ से ह्युरोनिस्पोरा सजातीय माइक्रोरेटिकुलाटा वारघूर्न, माइक्रोसिस्टिऑप्सिस मोहगाँवकलाँयेन्सिस नव वंश व नव जाति, पेलियोहाइड्रोकोक्कस रावई नव वंश व नव जाति तथा निग्रोफोमिडियम् इन्डिकम् नव वंश व नव जाति नामक सियॅनोफ़ाइसीय शैवाल-अवशेषों का वर्णन किया गया है।

### INTRODUCTION

OCCURRENCE of fossil algae belonging to Cyanophyceae in Deccan Intertrappean beds was reported by Biradar (1977) and the specimens were described under the extant genus *Westiellopsis* Jannet (1941). Later Bande, Prakash and Bonde (1981) have compiled the earlier reports on the fossil algae of this area and described two rhodophycean forms namely *Peyssonnelia antiqua* Johnson and *Distichoplax raoi* Varma from the Mohgaonkalan in Chhindwara traps, Madhya Pradesh. However, while re-examining this slide (B.S.I.P. slide no. 6556) of the fossiliferous cherts, four types of Cyanophycean remains were observed and are being described here.

### SYSTEMATIC DESCRIPTION

FAMILY — CHROOCOCCACEAE

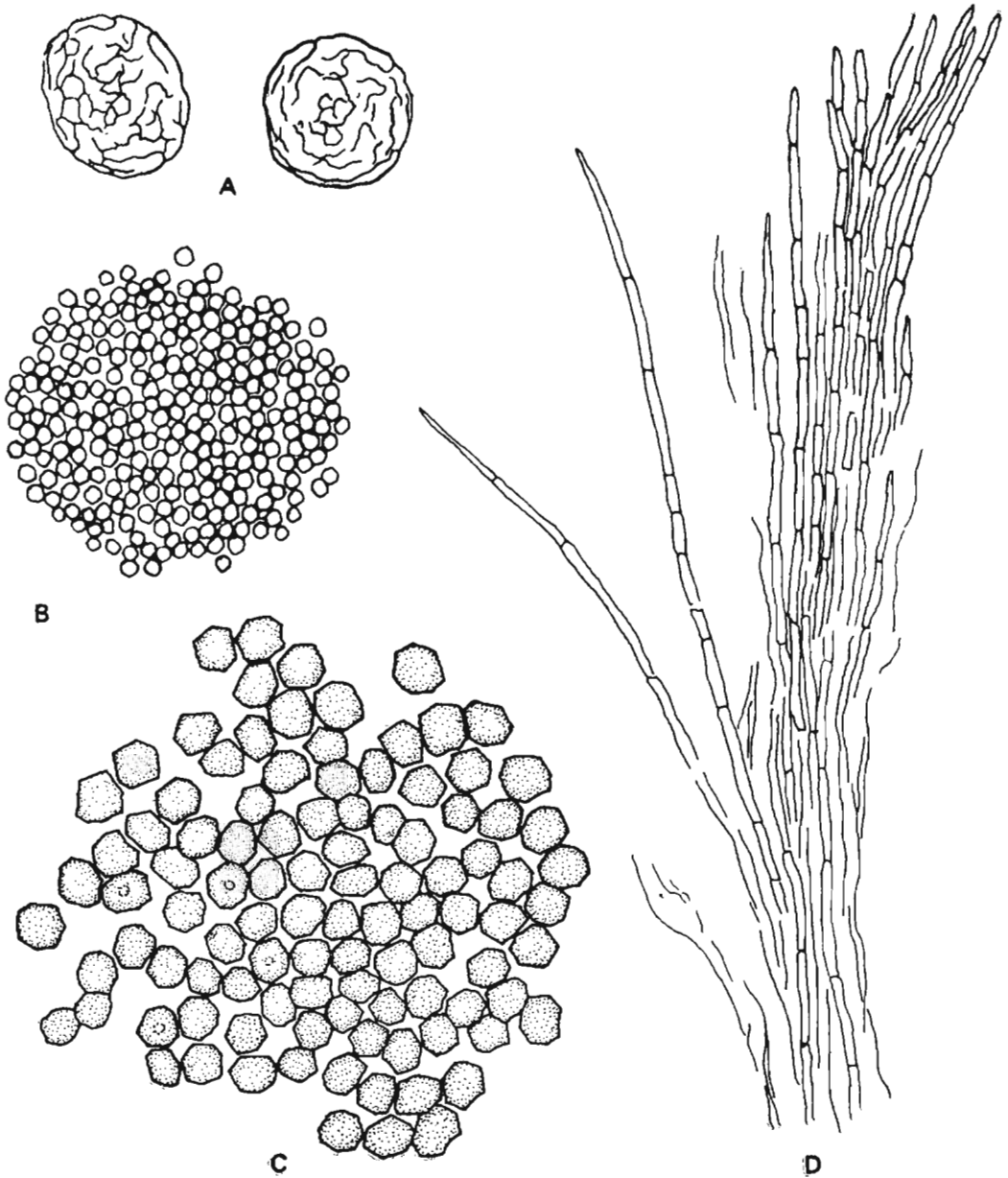
Genus — *Huronispora* Barghoorn, 1965

*Huronispora* cf. *microreticulata* Barghoorn, 1965

Pl. 1, figs 1, 8; Text-fig. 1A

**Description** — Cells rather large, more or less spherical, solitary or occurring in dyads, not surrounded by a mucilaginous sheath, cell wall thin and apparently reticulate, cells 6  $\mu$ m in diameter.

**Figured specimen** — B.S.I.P. slide no. 6556. Stage coordinate 105  $\times$  43 on Leitz-dialux microscope.



TEXT-FIG. 1 — A, *Hwonispora* cf. *microreticulata* Barghoorn; B, *Microcystiopsis mohgaonkalaensis* gen. et sp. nov.; C, *Palaeohydrococcus raoi* gen. et sp. nov.; D, *Neophormidium indicum* gen. et sp. nov. Figs. A-C,  $\times 3000$ ; Fig. D,  $\times 1500$ .

*Remarks* — Barghoorn (in, Barghoorn & Tyler, 1965) and Muir (1976, p. 147) have not mentioned the occurrence of solitary cells in this species as observed in the present specimen.

*Genus* — *Microcystiopsis* gen. nov.

*Diagnosis* — Cells very small,  $0.5-1.25 \mu\text{m}$  in diameter, without individual sheath, outline spherical to more or less polyhedral,

cells closely arranged into somewhat globular colonies, colonial mucilaginous sheath thin and indistinct.

*Type species* — *M. mohgaonkalaensis* sp. nov.

*Microcystiopsis mohgaonkalaensis* sp. nov.

Pl. 1, figs 2, 3; Text-fig. 1B

*Diagnosis* — As per the genus.

*Holotype* — B.S.I.P. slide no. 6556. Stage coordinate 104.8×43.5 on Leitz-dialux microscope.

*Locality* — Mohgaonkalan, Madhya Pradesh.

*Horizon* — Deccan Intertrappean beds (Eocene).

*Comparison* — In the presence of indistinct or diffuent colonial envelope and absence of sheath around individual cells, the present taxon is comparable with the modern blue-green alga *Microcystis* Kuetzing and is closest to a freshwater species *M. stagnalis* Lemm. (Desikachary, 1959, p. 95). Maithy (1975, p. 138) has described a fossil genus named *Palaeomicrocystis* from the Precambrians of Zaire, but the colonies in *Palaeomicrocystis* exhibit a filamentous habit with relatively much larger and overlapping cells, while in the present form the colonies are globular in outline. Moreover, the cells in the *Microcystiopsis* are smaller in size than the cells of *Palaeomicrocystis*. *Microcystiopsis* also shows resemblance with *Palaeoanacystis* Schopf (1968) and *Myxococoides* Schopf (1968) in the globular shape of colonies, but both of them differ from the present form in having well defined organic matrix around colonies and larger dimensions of cells.

#### FAMILY — HYELLACEAE

*Genus* — *Palaeohydrococcus* gen. nov.

*Diagnosis* — Cells 1.7-3.5  $\mu\text{m}$  in size, outline slightly to sharply polygonal with acute angles, cells loosely aggregated in formless colonial assemblage with indistinct mucilaginous sheath, some cells exhibit morphologically asymmetrical and more or less spherical inclusions, at places 3-6 peripheral cells of colony show linear arrangement.

*Type species* — *Palaeohydrococcus raoi* sp. nov.

*Palaeohydrococcus raoi* sp. nov.

Pl. 1, figs 4-7; Text-fig. 1C

*Diagnosis* — As per the genus.

*Holotype* — B.S.I.P. slide no. 6556; Stage coordinate 105×43.25 on Leitz dialux microscope.

*Locality* — Mohgaonkalan, Madhya Pradesh.

*Horizon* — Deccan Intertrappean beds (Eocene).

*Etymology* — The specific name has been derived after Prof. S. R. Narayan Rao for his contributions to the Indian fossil algae.

*Comparison* — In its shape, size and arrangement of cells within the colony and assumption of linear shape by peripheral cells the present taxon is comparable with the modern genus *Hydrococcus* Kuetz. and is nearest to *H. vulgaris* Kuetz. (Desikachary, 1959, p. 180). This living alga in older stages exhibits development of erect filaments from the colonial assemblage, though a faculty to form filamentous organisation is evident, well defined filaments are not exhibited by *Palaeohydrococcus raoi*. Oehler (1978, p. 340) has described a new cyanophycean fossil, *Nanococcus vulgaris*, in which the cells are loosely arranged in formless matrix but his specimen exhibits spheroidal to ellipsoidal cells which are much larger than that of present taxon. The present specimen resembles *Corymbococcus* Awramik & Barghoorn (Awramik & Barghoorn, 1977, p. 132) in the absence of sheath around individual cell and unlamellated colonial sheath but the Canadian form exhibits relatively large and spheroidal to ellipsoidal cells with thick walls and coarse surface texture.

#### FAMILY — OSCILLATORIAEAE

*Genus* — *Neophormidium* gen. nov.

*Diagnosis* — Plant body consisting of several filaments forming tough gelatinous bundles with torn margins, lower portion of thallus apparently attached and comprises rather closely packed and more or less parallel filaments, upper portion of thallus free and shows closely arranged filaments

with somewhat diverging apices, sheath thin and firm; filaments unbranched, narrow multicellular, slightly or not at all constricted at septa, apices straight, attenuated and noncapitate; cells long and cylindrical throughout the filament, 1-1.5  $\mu\text{m}$  broad, 2.25-7  $\mu\text{m}$  long.

*Type species* — *N. indicum* sp. nov.

*Neophormidium indicum* sp. nov.

Pl. 1, figs 9-12; Text-fig. 1D

*Diagnosis* — As per the genus.

*Holotype* — B.S.I.P. slide no. 6556; Stage coordinate 101.5 $\times$ 46 on Leitz dialux microscope.

*Locality* — Mohgaonkalan, Madhya Pradesh.

*Horizon* — Deccan Intertrappean beds (Eocene).

*Comparison* — In general habit this plant compares with the modern alga *Schizothrix* Kuetz. (Desikachary, 1959, p. 321) but the margins of the thallus in the present form which might be mistaken as common sheath around trichomes are in fact distorted filaments, which is evident by the presence of

sheath in the individual filaments at few places. Schopf (1968, p. 665) has described two new fossil taxa *Palaeolyngbya* and *Oscillatoriopsis* where uniseriate filaments comprise individual sheath but the former differs from *Neophormidium* in exhibiting thick mucilaginous sheath and rounded terminal cells showing somewhat granulate cross walls. Schopf and Blacic (1971, p. 950) have reported *Obconicophycus*, a member of Oscillatoriaceae showing uniseriate, unbranched filaments with attenuated apices but in this case median cells of the filaments are short and discoidal while in *Neophormidium* the cell morphology is uniform throughout the filament except at apices. The present specimen differs from all previously known cyanophycean remains belonging to family Oscillatoriaceae in its general habit, i.e. the filaments form a tough gelatinous assemblage in the form of compact bundles. The filaments are narrow with attenuated apices and also have a firm sheath. These characters suggest its close similarity with the modern blue green alga *Phormidium tenue* (Menegh.) Gomont (Desikachary, 1959, p. 259). This living form has been reported from both freshwater and marine habitats.

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## EXPLANATION OF PLATE

(Figured specimens 1-8 are in 1000 magnifications and 9-12 are in 500 magnifications; the negatives are preserved in Birbal Sahni Institute of Palaeobotany Museum, Lucknow).

1. *Huronispora* cf. *microreticulata* Barghoorn (shown with arrow) and colonies of *Palaeohydrococcus raoi* gen. et sp. nov.
2. *Microcystiopsis mohgaonkalaensis* gen. et sp. nov.—Globular colonies with closely aggregated cells.
3. *Microcystiopsis mohgaonkalaensis* gen. et sp. nov.—Showing arrangement of cells within the colony.
- 4-6. *Palaeohydrococcus raoi* gen. et sp. nov.—Showing general arrangement of cells; some peripheral cells arranged in somewhat linear fashion (marked with arrow).
7. *P. raoi* gen. et sp. nov.—Few cells with asymmetrical inclusions (marked with arrow).
8. *Huronispora* cf. *microreticulata* Barghoorn.
- 9-12. *Neophormidium indicum* gen. et sp. nov.
9. Habit of the plant showing several filaments forming tough gelatinous bundles.
- 10, 11. Showing filaments slightly or without constrictions at septa with attenuated apices.
12. Thalli apparently attached on lower side and free on upper half.



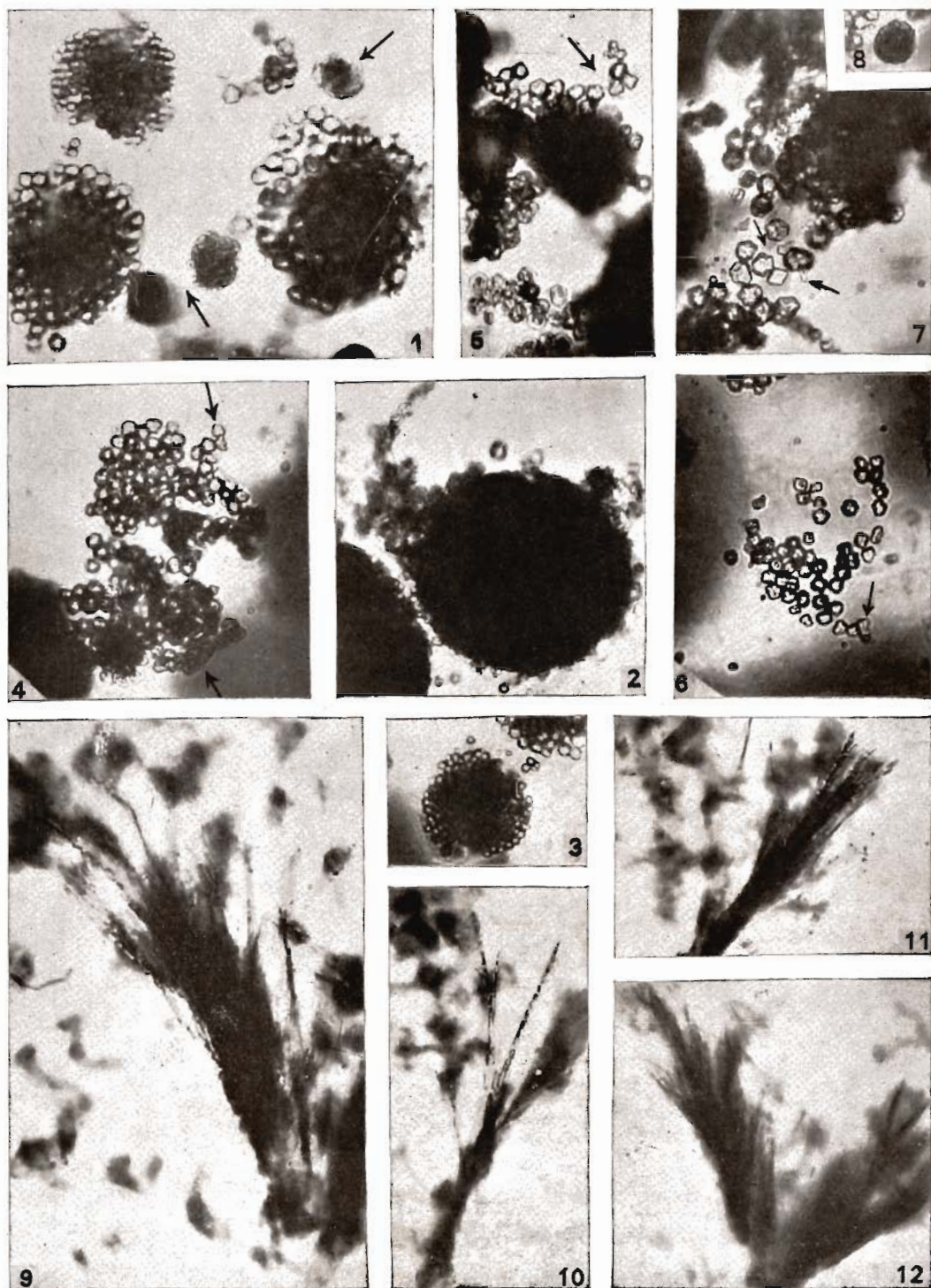


PLATE 1