

# ON THE OCCURRENCE OF MICROREMAINS FROM THE VINDHYAN FORMATIONS OF INDIA

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## ABSTRACT

The present paper deals with the occurrence of 'acritarchs', *Leiosphaeridia*, *Protoleiosphaeridium*, *Retisphaeridium*, *Tasmanites* and an algal remain *Gloeocapsomorpha* from the Kaimur Series (Vindhyan) of Ramapura, Madhya Pradesh. With this some remark on the age of Vindhyan is put forth.

## INTRODUCTION

THE formations constituting the Vindhyan System are among the oldest sedimentary rocks of India. The vast strata of sandstones cover 14,000 feet and are almost barren of organic remains. The paucity of fossil record is significant for the strata exhibit little evidence of metamorphism and other structural disturbances, and are thus well suited to the preservation of life.

Oldham (1856) proposed the name 'Vindhyan System'. The system has been included by Holland (1926) within his 'Purana' group. This group was instituted for all unfossiliferous peninsular formations resting above the Archaean-Dharwar complex and is regarded as Pre-Cambrian in age. Verdenburg believed the Vindhyan system to be Cambrian on the basis of rough lithological resemblance between the fossiliferous Cambrian strata of Salt range (Holland, 1926). From the point of view of homotaxis great interest attaches to the occurrence of fossils in Vindhyan. A few remains have been found which, there, is good reason to believe, are really organic. It has been suggested that, if that is so, at least a part of Vindhyan System may have to be included in the Cambrian (WADIA, 1939; REED, 1949).

The Vindhyan System has been divided into four main series, named as follows:

Upper Vindhyan — { Bhandar Series  
Rewa Series  
Kaimur Series  
Lower Vindhyan — Semri Series

There are two distinct facies. The Semri Series is marine and mainly calcareous.

The Bhandar, Rewa and Kaimur Series are mainly arenaceous of fluvial or estuarine origin.

## EVIDENCES OF MICROREMAINS IN VINDHYAN SYSTEMS

In past there are several records of the occurrence of microremains from the Vindhyan formations of India. Many of them are subject of controversy of today. Ghosh and Bose (1950) first recorded microfossils from the olive shales belonging to the Upper part of Semri series. The microfossils comprise carbonized fragments of woods with either simple or bordered pits, non-carbonized bordered pitted elements with rays, and several monoete spores. Sitholey, Srivastava and Varma (1953) recorded the remains of algae, fusiform bodies, round bodies, disc-like forms, filamentous bodies and fungal spores from the Sibru and Suket shales of Ramapura. Bose (1956) recorded the occurrence of microreticulate, punctate monoete, cingulate trilete, monosaccate and disaccate striate spores from the Olive Shales (Semri Series), Porcellanites rocks (Semri Series) and Baijagarh Shales (Kaimur Series).

In the present paper 'Acritarchs' and algal remains recovered from the Suket Shales of Ramapura are described.

## MATERIAL AND METHODS

The material for the present investigation was collected from (1) the nala cutting behind the Chauki village, 4 miles from Ramapura and (2) Culvert of the Tilsoi river, about  $\frac{1}{2}$  mile from Ramapura dak banglow. The shales belong to the Suket Shales of Kaimur Series (Upper Vindhyan). The colour of the shales varies from a drab or buff to dark chocolate, purple or green tints in the river bed section.

For the isolation of the microfossils 300 samples were macerated. The shale samples

were first washed under running water. Before putting the sample for dissolution in acid, the external surface of the rock samples was charred by burning after soaking them in alcohol. After this the rock was either directly put into Hydrofluoric acid or was boiled in Hydrochloric acid for an hour and then left for the treatment in Hydrofluoric acid for 3 to 4 days. The acid was removed by gradual decantation using distilled water. The slides were prepared of unsorted residue and also of specially picked up individuals in canada balsam or glycerine jelly.

**DESCRIPTION**

**'Incertae Sedis'**

**Group — *Acritarcha* Evitt, 1963**

**Sub-group — *Leiosphaeridae* Eisenack, 1954**

(=*Leiosphaeridae* Eisenack 1954 and *Sphaeromorphitae* Downie et al., 1963)

**Genus — *Leiosphaeridia* (Eis.) Downie and Sarj., 1963**

Pro Synon: *Leiosphaeridium* Timofeev, 1959 ex Staplin, 1961

Type Species: *Leiosphaeridia baltica* Eisenack, 1958

*Leiosphaeridia* sp.

Pl. 1, Fig. 3

*Description* — Vesicles circular in outline, without processes and without pylome. Occasionally irregular folds are developed. Wall thin, exine intramicropunctate. The size vary from 50-140  $\mu$ .

*Comparison* — This species is somewhat comparable to *Leiosphaeridia perforata* Eisenack (1938) recorded from the Upper Silurian of Bohmens. However, the present forms differ in having comparatively much less dense puncta than *L. perforata* Eisenack.

**Genus — *Protoleiosphaeridium* Timof. (1959) 1960**

*Type Species* — *Protoleiosphaeridium conglutinatum* Timof, 1959

Timof, 1959, p. 26, Pl. 1, Fig. 6; designated in Timof, 1960a, p. 31.

*Protoleiosphaeridium* sp.

Pl. 1, Figs. 1, 2

*Description* — Vesicles  $\pm$  circular in outline; small, 17-35  $\mu$  in size, irregular folds may have developed due to compressions. Body exine is very thin and  $\pm$  smooth without any ornamentation. The colour varies from light brown to yellow in colour.

**Sub-group — *Herkomorphitae* Downie et al., 1963**

**Genus — *Retisphaeridium* Staplin et al., 1965**

*Type Species* — *Retisphaeridium dichamerum* Staplin et al.

*Retisphaeridium vindhyanensis* sp. nov.

Pl. 1, Figs. 4, 5

*Diagnosis*: Size range 100-210  $\mu$ , outline  $\pm$  circular, wall sculptured with a mesh work of costae, costae prominent at marginal region, size of meshes bigger towards margin and comparatively much small towards centre. Exine of vesicles intramicroreticulate structure.

*Holotype* — Slide No. 2805, Birbal Sahni Institute of Palaeobotany, Lucknow and Sample No. 27090/274.

*Type Locality* — Nala cutting behind Chauki Village, 4 miles from Ramapura, Madhya Pradesh.

*Horizon* — Suket Shales, Kaimur Series, Vindhyan.

*Description* — The fossils are yellowish-brown to dark brown in colour. In all the meshes are bigger towards the margin, 12-16  $\mu$  and towards centre are comparatively smaller 4-8  $\mu$ . Muri towards margin is 4-6  $\mu$  thick whereas towards centre, it is 2  $\mu$ . The exine of the vesicle is finely intramicroreticulate.

*Comparison* — This species differs from *R. dichamerum* Staplin et al. (1965) in its bigger size, prominent marginal fold and the reticulate meshes being smaller towards the centre and bigger towards the margin.

Sub-group — *Tasmanititae* (Sommer) Staplin *et al.*, 1965

Genus — *Tasmanites* (Newt.) Eis., 1958

Type Species — *Tasmanites punctatus* Newt. 1875.

*Tasmanites* sp.

Pl. 1, Figs. 6, 7

*Description* — Vesicles circular, 500-1000  $\mu$  in size, ornamentation consisting of exclusively of numerous puncta or pores that appear as shallow depressions when observed under higher magnification, distributed uniformly over the entire surface, sometimes more concentrated in the central part of the disc producing the appearance of outer ring that is lighter in colour.

*Comparison* — Much controversy has centred around the nature of these discoidal remains. Jones (1909) expressed the view that these fossils might belong to the genus *Obolella* or *Chuaria circularis* described by Walcott from the Pre-Cambrian of Arizona or they may be the operculum of *Hyolithellus*. Howell (1928) tried inceration tests and tentatively assigned them to the blue green algae, comparable to Walcott's genus *Morania* of Cambrian age. Chapman (1934) examined these carbonaceous discs in detail and identified them as true brachiopods. In the same year Sahni (1935) examined the specimens of Chapman and came to the conclusion that these fossils did not exhibit any character which would enable their assignment to brachiopoda, there being no evidence whatsoever of a pedicel apex or growth lines, as suggested by Chapman. Sahni and Srivastava (1954) on the basis of their discovery of the discs intimately associated with broad filaments suggested the algal nature.

In contrast to this Misra and Dube, and Misra and Awasthi (1957) considered these bodies as inorganic remains on the basis of the strength of inceration tests and the great variability of their size and shape. He regards them as simple mineral encrustations. He further supported their inorganic origin by the observation that they increase in size with the increasing coarseness of the embedding shales, thereby implying that it was progressively easier for mineral matter to be injected in coarser rocks. The present study of these disc-like bodies shows

that they closely agree to the genus *Tasmanites* (Newton) Eisenack (1963), which has been regarded as residual envelope of some algal form.

## ALGAE

Genus — *Gloeocapsamorpha* Zal., 1916

Type Species — *Gloeocapsamorpha prisca* Zal., 1916.

*Gloeocapsamorpha* sp.

Pl. 1, Figs. 8, 9

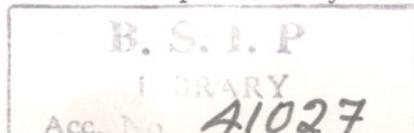
*Description* — Cells circular-oval in outline, contiguous to each other, forming colonies of irregular shape. Colonies may be circular, oval or globoid. Each cell is thick-walled with microverrucose exine.

*Comparison* — These forms show close comparison to *Gloeocapsamorpha prisca* recorded by Eisenack (1960) from the Ordovician of Munnals, Estland. However, in want of more specimens it is described here without any specific designation.

## DISCUSSION

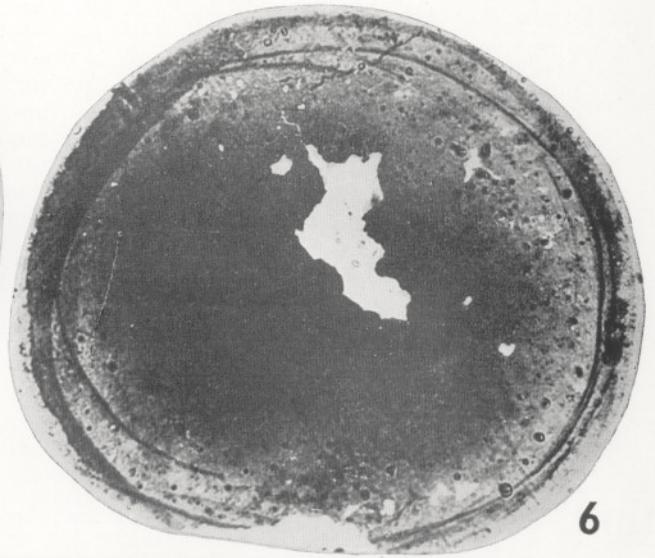
### Remarks on the age of the Vindhyan

The age of the Vindhyan has been a debated problem. It may not be, therefore, out of place to say a few words in this regard. Howell (1956) remarked "A comparison of the plants and animals that have been found in the beds of Vindhyan System with similar Cambrian and older fossils found elsewhere and the absence of trilobites and undoubted brachiopods from Vindhyan beds, indicate that some at least of the Vindhyan beds are Proterozoic age, although others may be Cambrian". On the basis of the algal records from Vindhyan, Sitholey, Srivastava and Verma (*l.c.*) remarked that at least a part of the Vindhyan System should be included in Cambrian. In contrary to this on basis of the algal evidences Misra and Awasthi (1962) stated "... the age of Lower Vindhyan may be assigned as Ordovician, and we can, therefore, safely bring the entire Vindhyan sequence to at least the Ordovician". In the present study 'Acritarchs' and other

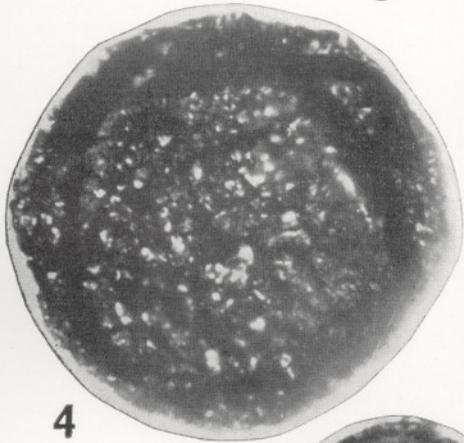




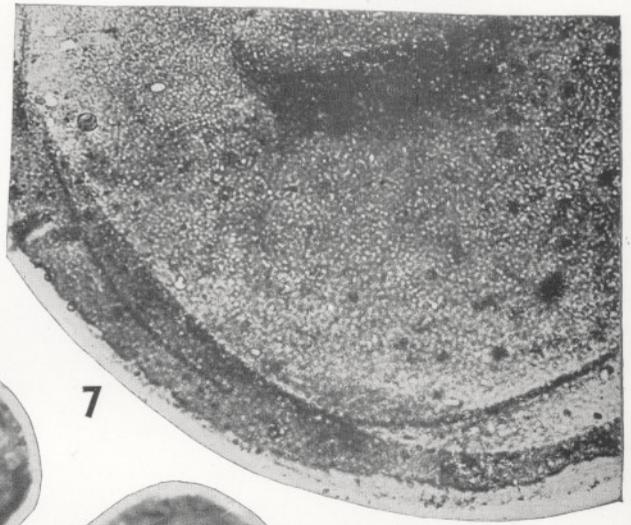
5



6



4



7



1



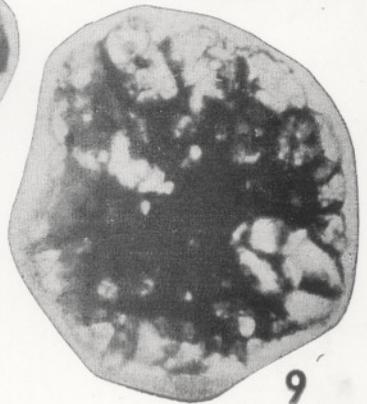
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3



8



9

algal remains have been recovered. These are commonly known only from the Ordovician stratas. Therefore, from these records it is evident that the whole of the Vindhyan formation is not Pre-Cambrian in age as was originally thought by Holland (1926) and at least some of the strata are definitely younger in age. In future more evidences of plant life may throw significant light on this problem.

ACKNOWLEDGEMENTS

The author is deeply indebted to Prof. K. R. Surange for entrusting this problematical work and the encouragement during the course of investigations. Thanks are due to Dr. B. S. Venkatachala for valuable suggestions and to Miss S. D. Kulkarni for helping me with the maceration of samples and preparation of slides.

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EXPLANATION OF PLATE

(All slides are preserved at the Birbal Sahni Institute of Palaeobotany, Lucknow)

PLATE 1

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|--|---|
| 1, 2. <i>Protoleiosphaeridium</i> sp. × 2000. Slide No 2800, B.S.I.P. Collection.          | 6. <i>Tasmanites</i> sp. × 15. Slide No. 2804. B.S.I.P. Collection.                   |
| 3. <i>Leiosphaeridia</i> sp. × 500. Slide No. 2805. B.S.I.P. Collection.                   | 7. A portion of the <i>Tasmanites</i> enlarged. 200.                                  |
| 4, 5. <i>Retisphaeridium vindhyanse</i> × 500, Slide No. 2803 & 2805. B.S.I.P. Collection. | 8, 9. <i>Gloeocapsamorpha</i> sp. × 500. Slide Nos. 2801 & 2802. B.S.I.P. Collection. |