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REVISION OF SOME DINOFLAGELLATE CYSTS FROM MEGHALAYA, INDIA

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ABSTRACT

The microplankton part of the palynological assemblage described by Salujha and Kindra (1981), from Langpar Formation exposed along South Shillong Front, Meghalaya, is critically assessed. The morphotaxonomic status of five new species of dinocysts, viz., *Homotryblium giganteum*, *Homotryblium distinctum*, *Achomosphaera microreticulata*, *Hystrichokolpoma indica* and *Hystrichokolpoma robusta* proposed therein and that of others is discussed and revised. The stratigraphic significance of *Dinogymnium* is emphasised with the comment that a part of the section might represent topmost Upper Cretaceous.

INTRODUCTION

Recently Salujha and Kindra (1981) recorded some dinoflagellate cysts, acritarchs and miospores from the Langpar Formation sediments, shales and sandstones, exposed along the Umsoryngkew and Umiew river, on the southern edge of Khasi-Jaintia Hills, Meghalaya. The data reproduced by them is based on ten stratigraphically located samples. Out of these, four samples viz., G5, G6, G1 and G2 come from Umsohryngkew river traverse within a thickness of 150 meters and rest six viz., F_3, F_9, F_8, F_7, F_2 and F_6, all in ascending order, come from the Umiew river traverse within a thickness of 39 meters. They assigned Danian age to their Langpar palynoflora and identified the following microplankton taxa.

Acritarchs

Micrhystridium sp. in Salujha & Kindra, 1981 ; p. 50, pl. 1, fig. 41.

Veryhachium rustica Salujha, Kindra & Rehman, 1974 ; p. 50, pl. 3, fig. 57.

Dinoflagellate cysts

Homotryblium giganteum Salujha & Kindra, 1981 ; pp. 50-51, pl. 2, fig. 42.

Achomosphaera operculata Sah, Kar & Singh, 1970 ; p. 51, pl. 2, figs. 43-44.

Homotryblium distinctum Salujha & Kindra, 1981 ; p. 51, pl. 2, figs. 45-46.

Achomosphaera microreticulata Salujha & Kindra, 1981 ; p. 51 , pl. 2, figs. 47-48.

Cordosphaeridium sp., in Salujha & Kindra, 1981 ; p. 52, pl. 2, fig. 49.

Hystrichosphaeridium sp., in Salujha & Kindra, 1981 ; p. 52, pl. 2, fig. 50.

Achomosphaera sp., in Salujha & Kindra, 1981 ; p. 51, pl. 2, fig. 51.

Hystrichokolpoma sp., in Salujha & Kindra, 1981 ; p. 52, pl. 3, fig. 52.

Hystrichokolpoma indica Salujha & Kindra, 1981 ; p. 52, pl. 3, figs. 53-54.

Hystrichokolpoma robusta Salujha & Kindra, 1981 ; p. 52, pl. 3, figs. 55-56.

Gymnodinium sp. I, in Salujha & Kindra, 1981 ; p. 53, pl. 3, fig. 58.

Gymnodinium sp. II, in Salujha & Kindra, 1981 ; p. 53, pl. 3, fig. 59.

Deflandrea sp., in Salujha & Kindra, 1981 ; p. 53, pl. 3, fig. 60.

Stratigraphic comments : The litho-columns nos. 1 & 2 (Salujha & Kindra, 1981 ; Fig. 1) show different lithologies which is apparent from different symbols used though no legends are given to enable definitive lithotypes of the formation. The stratigraphic relationship of the two sections is also inassessable because section (traverse) no. 1 shows the occurrence of 150 m thick single litho-unit which towards the east thins out (Salujha & Kindra, 1981, p. 44) but the equivalent litho-unit is not marked in litho-column no. 2. Whether these sections represent facies variation or some sort of order of superposition, is not clear.

The relationship of sample numbers and slide numbers referred in Fig. 1 and in the explanation of plates nos. 2 & 3 respectively, is unknown. Due to the lack of any chart showing the stratigraphic distribution of microfloral constituents in the two sections, it is not possible to find out the evolutionary trend of microfossils to further apply the data in biostratigraphy.

Morphotaxonomic comments : The descriptions of the dinocyst species listed by Salujha & Kindra (1981, pl. 2, figs. 42-51 & pl. 3, figs. 52-56 & 58-60) do not tally with the illustrations. One of us (K.P.J.) re-examined the following figured and type slides provided to him by

Dr. Salujha at K. D. Malviya Institute of Petroleum Exploration, Dehra Dun ; B-2245(i), B-2245(iii), B-2245(ii), B-22 47(ii), B-2247(iii), G-1(ii) and F-3(i). Except for the two specimens illustrated in their pl. 2, fig. 51 and pl. 3, fig. 56, none of the figured specimen could be located.

The morphological re-interpretation of dinocyst taxa presented below is thus mainly based on the face value of the illustrations.

Taxonomic revision :

1. The holotype of *Homotryblium giganteum* Salujha & Kindra (1981, p. 50 ; pl. 2, fig. 42) is a badly preserved under macerated specimen. The important features like shape of the cyst, type of archaeopyle and distribution of paraplates in the illustration are indistinct. The processes are slendrical, distally open, expanded, at places fibrous. The process details suggest possible affinity with *Cordosphaeridium*. The name must, therefore, be restricted to holotype.

2. The forms identified as *Achomosphaera operculata* Sah *et al.*, in Salujha & Kindra (1981, p. 51 ; pl. 2, figs. 43, 44) and *Homotryblium distinctum* Salujha & Kindra (1981, p. 51 ; pl. 2, fig. 46) belong to *Achomosphaera ramulifera* (Deflandre) Evitt (1963). The figured specimens fall within the size range of holotype having hollow, distally trifurcate processes with bifurcating extremities. Other features are indistinct due to undermaceration. Recently Jain (1982) has transferred the holotype of *Achomosphaera operculata* Sah *et al.*, (1970) to *Operculodinium* sp.

3. The holotype of *Homotryblium distinctum* Salujha & Kindra (1981, p. 51 ; pl. 2, fig. 45) is a typical example of *Spiniferites ramosus* subsp. *ramosus* (Ehrenberg) Loeblich & Loeblich (1966) in possessing ovoidal central body bearing gonal and sutural processes with trifurcate distal ends. The new name *Homotryblium distinctum* is a junior synonym of *S. ramosus* subsp. *ramosus* and must, therefore, be rejected.

4. The holotype and paratype of *Achomosphaera microreticulata* Salujha & Kindra (1981, p. 51 ; pl. 2, figs. 47-48) are incomplete forms showing no conclusive indication of an archaeopyle or details of processes. The name must, therefore, be restricted to the holotype.

5. The illustration of *Cordosphaeridium* sp. in Salujha & Kindra (1981, p. 51 ; pl.2, fig. 49) shows marked presence of trifurcate process tips without proximal ridges, suggesting *Achomosphaera* affinity. Other features are indeterminable.

6. *Hystrichosphaeridium* sp., in Salujha & Kindra (1981, p. 52 ; pl. 2, fig. 50), possesses an elongate cyst body with long processes arranged in some what circular manner. The archaeopyle appears to be apical. These features suggest its nearest placement in *Tanyosphaeridium*, T. sp.

7. The description and illustration of *Hystrichokolpoma* sp. in Salujha & Kindra (1981, p. 62 ; pl. 2, fig. 52) does not indicate any feature of the genus *Hystrichokolpoma*. The paratabulation and archaeopyle type is indeterminable. The identification is highly doubtful.

8. The holotype of *Hystrichokolpoma indica* Salujha & Kindra (1981, p. 52 ; pl. 3, fig. 53) is an incomplete, very badly preserved form and does not provide any precise characteristic of the genus *Hystrichokolpoma*. Its placement in any known dinocyst is difficult. The name must, therefore, be restricted to the holotype only.

9. The description and illustration of *Hystrichokolpoma indica* Salujha & Kindra (1981, p. 52 ; pl. 3, fig. 54) does not possess any feature of the genus *Hystrichokolpoma* but indicates the presence of a precingular archaeopyle and distally expanded fibrous, short processes. The number and distribution of processes indicate paratabulation possibility. These characters bring the specimen closest to *Cordosphaeridium* and may be referred to *Cordosphaeridium* sp.

10. The holotype of *Hystrichokolpoma robusta* Salujha & Kindra (1981, p. 52 ; pl. 3, fig. 55) is characterised in having the following features : body spherical, endophragm and periphragm appressed, no parasutural features, processes nontabular, tubular, fibrous, simple and distally open, periphragm fibrous, archaeopyle probably precingular. These morphological characters of the cyst suggest its best placement under the genus *Amphorosphaeridium* Davey (1969). The species is provisionally transferred to *Amphorosphaeridium*, ?*A. robustum* (Salujha & Kindra) comb. nov. (=*Hystrichokolpoma robusta* Salujha & Kindra, 1981, p. 52 ; pl. 3, fig. 55).

11. Another specimen described and illustrated as *Hystrichokolpoma robusta* Salujha & Kindra (1981, p. 52 ; pl. 3, fig. 56) does not show any character of the genus *Hystrichokolpoma*, instead indicates the presence of short, solid processes with trifurcate distal ends. The other paratabular features are not preserved. The trifurcate process without proximal ridge suggests its closest affinity with *Achomosphaera* and may be referred as *Achomosphaera* sp.

12. The two specimens illustrated and described as *Gymnodinium* sp. I and *Gymnodinium* sp. II in Salujha & Kindra (1981, p. 53 ; pl. 3, fig. 58 and pl. 3, fig. 59 respectively) belong to *Dinogymnium acuminatum* Evitt *et al.*, (1967).

DISCUSSION

The revised dinoflagellate cyst assemblage recorded from the southern edge of Khasi-Jaintia Hills, South Shillong Front, Meghalaya, by Salujha & Kindra (1981)

is characterised by the dominance of *Achomosphaera*, *Spiniferites* and *Cordosphaeridium* followed by the poor occurrence of *Amphorosphaeridium*, *Deflandrea* and *Dinogymnium*. The assemblage is totally devoid of *Homotryblium* and *Hystrichokolpoma*.

The above mentioned dominance of *Achomosphaera* and *Spiniferites* elements along with *Dinogymnium* suggests its best comparison with Upper Cretaceous Jadukata and Mahadek assemblages described from Dawki area, Lower Assam (Jain *et al.*, 1975).

The biostratigraphic significance of dinocysts in the Meghalaya sections is marred due to the lack of their sample wise vertical distribution analysis and clubing of assemblages into a single unit.

The quantitative and qualitative abundance of *Dinogymnium* in Assam (Dawki and Cherrapunji areas) is well recognised in Jadukata Formation. Their frequency decreases in younger Mahadek Formation (Jain *et al.*, 1975). In Cauvery Basin Jain (1978) recorded a few *Dinogymnium acuminatum* cysts at the top of Maestrichtian which might represent the last phase of *Dinogymnium*. Jain (1978, p. 154) remarked "The equivalent of this assemblage is missing at Dawki and Cherrapunji in Assam area. However, the possibility of its occurrence elsewhere in Assam cannot be ruled out at present".

The poor occurrence of *Dinogymnium acuminatum* (=*Gymnodinium* sp.. I & sp. II) marked in Slide no. F-3(i) (Salujha & Kindra, 1981) is, therefore, significant. The slide no. F-3(i) might represent sample no. F3, which is situated at the base of the litho-column no. 2.

In view of the above discussion and restricted geologic distribution, not younger than Maestrichtian (Jain, 1977), of *Dinogymnium*, it seems most probable that some part of the litho-column (Salujha & Kindra, 1981 ; Fig. 1) might represent the topmost part of Upper Cretaceous.

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