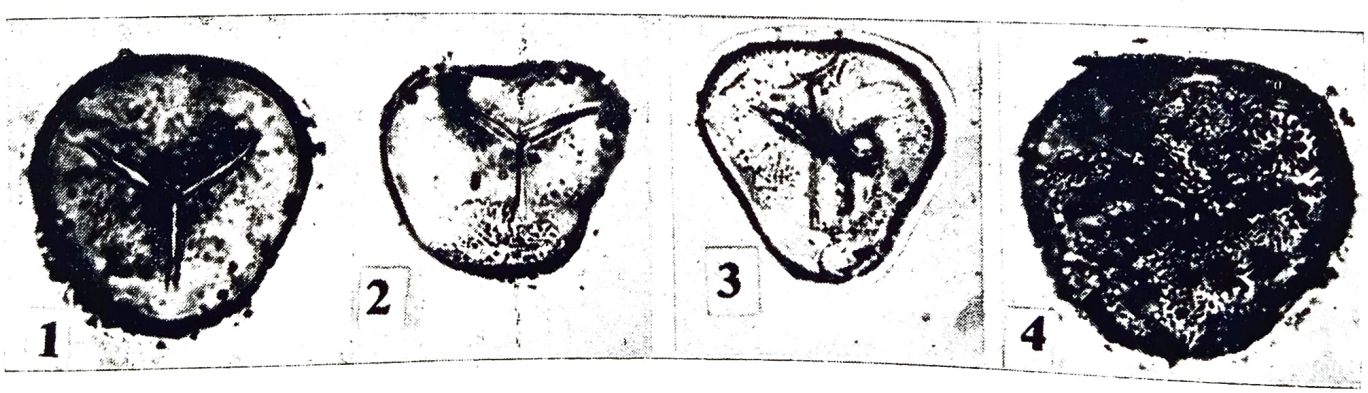
BIOLOGICAL DEGRADATION OF TRILETE FERN SPORES FROM HOLOCENE OF BENGAL, INDIA

During the course of pollen analytical investigation of a Holocene profile from Kolara, W. Bengal, a large number of trilete, smooth-walled fern spores showing symptoms of corrosion have been encountered. The corrosion of trilete spores has been attributed as due to the microbial action over the spores (GOLDSTEIN, 1960 ; GRAHAM, 1962 ; FAEGRI, 1971; SKVARLA & ANDEREGG, 1972). The occurrence of saprophytic fungi has been well documented in the Holocene profile from W. Bengal (GUPTA, 1970).

Micro-organisms closely allied to bacteria and fungi have been well demonstrated to be one of the agents of exine corrosion right from Precambrian to Quaternary. MOORE (1963) has reviewed the literature and described effects of microbiological attacks on Palaeozoic fossils. The nature of exine degradation and its possible cause has been discussed. ELSIK (1966a) has reported the total decay of arci of *Alnus* pollen during Tertiary Period due to the possible attack by fungi. ELSIK (1966b, 1968) has demonstrated various kinds of fungal scars over pollen and spores from Lower Cretaceous and Tertiary of Mississipi and lignite beds of Texas, U.S.A. KAR (1970) has reported some degradation on laevigate spores showing circular perforations from Raniganj Coalfield (Lower Triassic) in India.

Because of the morphology of local sites of corrosion on exines of fossil pollen and spores from sediments that include evidence for a past history of biological activity, ELSIK (1966b) has assumed that the localized destruction was caused by fungi and/or bacteria. My observations of micro-organisms associated with fossil spores corroborate that conclusion. There is nevertheless, a good deal of controversy as to whether sporopollenin is a part of diet of micro-organisms. SKVARLA AND ANDEREGG (1972) have demonstrated in an experiment that sporopollenin of cedar pollen infested by *Rhizophidium* did not appreciably degenerate. They have further concluded that sporopollenin is not the nutritive source for *Rhizophidium*. GOLDSTEIN (1960) is of the opinion that pollen cytoplasm is the principal nutritive source for the micro-organisms.



Numerous trilete fern spores were found infested with the micro-organisms in Kolara profile and the pattern that may have been produced by these micro-organisms consists of circular (Pl. 1, Figs. 1-2) and rosette to branched perforations (Pl. 1, Fig. 3). In some cases

it has been observed that the spores have multiple perforations (Pl. 1, Fig. 4) that completely deform the exine remnant. In extreme cases of degeneration the spore is reduced to fragments or results in removal of part of the exine from the spores making identification difficult or impossible.

The localized degradation patterns seen in the walls of some spores and pollen grains are not readily explained by chemical, e.g., oxidation, or physical processes. Physical degradation might be expected to grind down one sector or the entire exine. Chemical reaction would be unlikely to produce localized sites of destruction but would reduce the thickness of the entire exine as HAVINGA (1964, 1971) finds to be the case in a biological soil, e.g., podsolized sand soil.

Extremely degenerated type of spores pose an enigmatic problem to the pollen analyst as to how to assign them to their proper taxonomic position. These spores or exine remnants cannot be identified to their respective species, genera or even to families. If identified wrongly they will give not only a distorted but also a misleading picture of the palaeoflora. In view of the above difficulties it would be congenial to suggest that neither such type should be considered as one of the identified taxon nor be discarded altogether. And hence, such extremely degenerated forms should be kept under a separate type, indicating all the possible characters seen. The recognition of such evidence in the fossil state would definitely reflect upon the differential preservation of spores as suggested by ANDERSEN (1970).

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