In spite of these limitations, the model's forecast error is about 4 million tonnes. We may use the models with caution, until better models for prediction of the annual food production are developed.


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**Palynodebris accumulation characteristics of a sediment core from the eastern part of Lower Bengal Fan**

In the investigation of the Quaternary, the botanical parameter concerns itself with the building up of the history of the flora, reconstruction and alteration in the past forest communities in response to climatic and biotic factors. In this respect the botanical parameter becomes interdependent upon the other diverse disciplines and like them it has its own technicalities and limitations. Hence palynological study coupled with sediment dynamics will give the accumulation characteristics of the palynodebris in the Lower Bengal Fan.

Marine processes play a major role in segregating pollen according to the size and morphology. Larger and more diverse assemblages occur nearest to the coast

![Map showing location of the core sample (BC-1) collected from the Lower Bengal Fan.](image)

**Figure 1.** Map showing location of the core sample (BC-1) collected from the Lower Bengal Fan.

![Litholog of the box core-1 as observed onboard.](image)

**Figure 2.** Litholog of the box core-1 as observed onboard.
line and mangrove pollens are observed to increase offshore relative to other types although the absolute number of grains decrease\(^1\). Although palynological investigations of ocean bottom sediments have been carried out in many parts of the world, only a few reports are available from the Bay of Bengal. Eighteen spore and pollen taxa from the Port Blair Formation (Palaeogene) of Andaman Islands were reported\(^2\). The study of palaeoclimatic

**Figure 3.** Photographs showing the identified spores and pollen grains from the BC-1. a. Tricolporites sp.; b. Polypropaeasporites sp.; c. Lycopodiumsporites sp.; d. Laevogatoxipites sp.; e. Spinozonocolpites hulbous; f. Polypodiisporites sp.; g. Polycopites sp.; h. Corresporis sp.; i. Virkipollenites; j-1, fungal spores. Magnification $\times$ 1000.
changes from the pollen analyses of site 717 core of ODP south of Sri Lanka has led to the identification of three zones as X (warm), Y (cold) and Z (Holocene-warm). A detailed study undertaken on gravity core collected from the sea bed, west of Narcondam Island has revealed rich assemblage of spores and pollen. In the present study an attempt has been made to bring out an accumulation characteristic of palynodebris in the core collected from Lower Bengal Fan.

A 4-m length box core was collected at a depth of 3246 m (lat. 10°43′43″N, long. 90°27′44″E) during ORV 72nd Sagarkanya Cruise in Bay of Bengal (Figure 1). From the recovered core, eighty subsamples were made in 5 cm interval. Figure 2 gives the lithological observations made onboard.

Approximately 25 to 30 g of powdered samples were taken and treated with acids – 60% HCl, HF and 60% HNO3 in sequential order according to the established procedure. Examination of the prepared residue mounted on microslides from the box core shows scanty presence of spore and pollen in the depths between 45 and 120 cm. At the other depth levels spores and pollen are completely absent. Spores and pollen encountered are mostly pteridophytic, along with few grains of fungal spore. The following spores and pollen were identified from the core: Tricolporites sp., Polypodiaceaeasporites sp., Lygodiumsporites sp., Lavegatisporites sp., Spinoconuloptes bulbous, Polypodiisporites sp., Polycalptes sp., Corrusporites sp. and Virkipollenites (Figure 3 a–i).

Monocotyledonous angiosperm, Nypa (Figure 3 a) identified in the core, generally colonizes lagoon and river muds, where the tidal rise and fall are considerable, but the water is less saline. Occurrence of this taxa suggests prevalence of an intertidal mangrove swamp environment of the transported sediments. Re-worked pollen, Virkipollenites (Figure 3 i), an important monosaccate gymnosperm pollen characteristic of Taleirir and Barakar sediments, has been identified in the core at a depth of 75–80 cm. This indicates that the river draining the Gondwana terrain of Mahanadi Basin has transported and deposited the pollen grains in the delta and which was later transported by the turbidity currents to the deep sea and deposited in the Lower Bengal Fan.

A larger number of pteridophytic spores, diverse morphological types and increased numbers of altered grains are recorded at the depth ranging between 45 and 120 cm of the core. Few fungal spores are present along with the pteridophytic spores (Figure 3 j and k), indicating that pteridophytic spores and pollen only survive such a distance of travel with high turbulence and agitation of water mass during the transportation of sediments in the Bay of Bengal. The studies on stable isotopes4 and R.E. geochemistry6 show higher intensity of terrigenous sediments at depth interval of 45–120 cm and this zone falls in the Woodfordian (LGM) substage of Late Pleistocene7. During this period, the rate of sedimentation in the studied core is 6 cm/1000 years50. The results indicate that accumulation of pteridophyes is more in the studied core compared to that of angiosperms. This may be due to high sediment turbulence and transport by turbidity currents during Late Pleistocene. It also suggests greater atmospheric moisture and increased stream activity during the time of deposition of these sediments45.

Microsections studied from 45 to 120 cm depth intervals of the core show good preservation of woody cuticles and spores in the sediments. Petrographic studies of these sections for the percentage distribution of organic material show average content of humic substances – fusinite and semifusinite, 35%; biodegraded terrestrial substances, 25%; structured woody material, 25%; sapropelic substances – finely divided organic matter, 10%; amorphous material, 5%.

These results indicate the presence of humic substances around 85% and sapropelic substances around 15%. Hence the sediments are land derived and deposited in humic-charcoal facies. Sharp increase in charcoal abundance in LGM (45–120 cm) in the studied core points to fire being a critical factor for the accumulation of such a type of palynodebris. This could be due to normal forest fire or the result of an volcanic eruption. Occurrence of forest fire in the nearby source region of the study area seems to be remote, as the conditions necessary for forest fire are not expected in a tropical and moist habitat. Since Narcondam is a volcanic island in the Andaman, it is plausible that during 18,000–20,000 BP, volcanic activity caused burning of forests, resulting in the production of pyrofusinite which got deposited in the sediments around the island4. This factor is mainly responsible for the rich accumulation of fusinite material at 1.10–1.15 m depth of the cores studied when compared to the normal forest fire due to glacial–interglacial climatic changes.

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