Supria Roy[4] reported three types of Jocobsites from this area: (1) Homogenous Jocobsite, (2) Jocobsite with Hausmannite and (3) Rose brown Jocobsite, with cell dimensions of $a = 8{\cdot}506$ A, $8{\cdot}483$ A, and $8{\cdot}410$ A, respectively. The franklinite now examined is deep olive green with lamellar hausmannite, and the cell dimension is, $a = 8{\cdot}392 \pm 0{\cdot}001$ A.

The spectrographic and chemical analysis of manganese ore of Koduru by Krishna Rao,[2] Roy[5] and Fermor[1] show some amount of zinc in Vredenburgite and pyrolusite. Such zinc can be said to be due to the alteration of franklinite in the area. Franklinite has been formed along with other manganese minerals by metamorphism of original iron, manganese and zinc hydroxides.

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A NOTE ON THE TERTIARY CLAYS IN BIRBHUM DISTRICT, WEST BENGAL*

SEDIMENTARY clay beds have been recorded in Maldihi, Puratangram, Ranipur, Makhdumnagar, Digalgram, Supalkuri, Kharbona, Chaknurai and Dhanmara areas, to the north of Suri in the Birbhum District, West Bengal. In recent years the Geological Survey of India carried out exploratory drilling proving the nature and extent of clay deposits. The clays are white to grey coloured with stains of yellow, pink and violet and are plastic in nature. They are intercalated and interbedded with loose and friable sandstone and the sequence is found to vary from 20 metres to as much as 60 metres. The beds are covered by laterite and alluvium.

The clay beds overlie the Archæan metamorphics to the south of the Dwarka river, while to the north, Rajmahal Traps from the basement. From the field relations, it is deduced that the clay deposits are of post-Trappean age.

Dark clay samples were selected from bore holes drilled in the above areas and were studied for their pollen and spores. Polycolpate pollen, characteristic of the Lower Eocene and other porate and colporate pollen with pteridophytic spores are present. The pollen grains belong to the families Palmæ, Magnoliaceæ, Betulaceæ, Aceraceæ, Fagaceae and Aquifoliaceæ. Trilete spores belonging to the families Schizæceæ, Parkeriaceae and Cyatheaceae are identified. Conifer pollen grains constitute a low percentage in the assemblage. The presence of Hystrichospherids indicates lacustrine or lagoonic conditions of environment during deposition. The palynological data of the samples indicate a Lower Tertiary age to the clay beds.

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AN INCIDENCE OF VERY HIGH PHOSPHATE CONCENTRATIONS IN THE WATERS AROUND ANDAMAN ISLANDS

IN the course of our investigations on the distribution of phosphate in the Bay of Bengal and the Andaman Sea during the Cruises of INS *Kistna* in September, 1963 as part of the Indian Programme of International Indian Ocean Expedition, we encountered abnormally high concentrations of inorganic phosphates in the samples collected from the vicinity of the Andamans. The location of INS *Kistna* stations at which we detected high values of phosphates is given in the figure (Fig. 1). The samples for analysis were obtained from all standard depths from the surface down to 200 metres and estimation of phosphates was done following the method of Robinson and Thompson (1948).[1]

An examination of the results obtained shows the following features, *viz.*, (1) Concentration of phosphates exceeding 12 μg at/L were found at all the depths at the stations close to the coast (315 to 318). At other stations

these high concentrations were confined to only a fewer depths at random. (2) The vertical distribution of phosphates in the 200 metre column does not appear to correspond to any regular accepted pattern. (3) All the samples having the abnormally high phosphate concentration were found to be highly turbid and having milky-white appearance. It was suspected that the turbidity might be due to the presence of carbonate but qualitative tests proved negative.

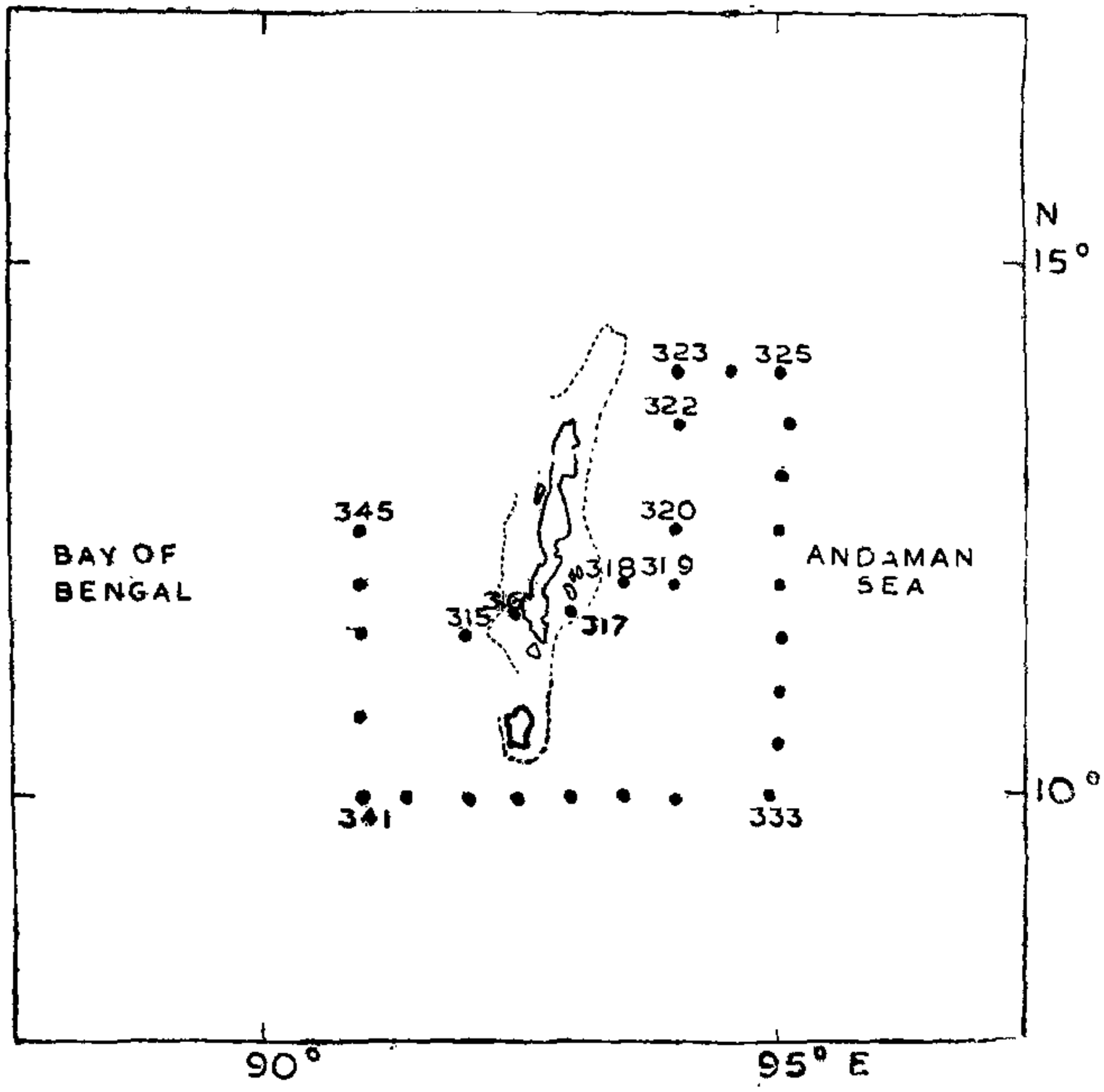

FIG. 1. Map showing INS *Kistna* station locations.

Since this is the first time this type of studies were carried out in this region any explanation for this phenomenon at this stage could at best be considered as purely tentative.

A detailed examination of the general hydrographical features of the Andaman Nicobar regions might however provide some answer to this very interesting phenomenon. We have been examining the possible sources of this abnormally nigh phosphate waters. It is found that along the western edge of the continental shelf of Andaman Islands which is wider than the eastern shelf, there are a number of coral banks and as stated by Sewell (1925)[2] during the south-west monsoon period these coral banks are subjected to the effect of rough sea leading to the formation of the large amount of coral detritus. Nair *et al.* (1966)[3] in the course of work in Angria Bank region of the Arabian Sea which also contains several coral banks and islands have come across waters of abnormally high concentration of phosphates. It is therefore suggested that there is some kind of association between the occurrence of coral banks and occurrence of water with abnormal concentration of phosphates. Examining further about the other chemical and bio-chemical factors it has been found (Zernova and Ivannov, 1964)[4] that Andaman Sea is a region of highest production of phytoplankton in the northern Indian Ocean. Tipper (1911)[5] had reported about the occurrence of phosphatic nodules in the shelf regions around Andaman Islands. Sen Gupta and Pylee (1966)[6] have reported a very high specific alkalinity of these waters indicating high calcium content and this factor combined with high phosphate content might explain the turbidity of these waters presumably due to the precipitation of the calcium phosphate. That high calcium content may stimulate the precipitation

of phosphorous has also been reported by Bhushinski (1964).[7] It is also possible, as indicated by Emery and Dietz (1950)[8] as a result of their investigations off the California coast, that during certain times of the year the product of calcium and phosphate ions in these waters may exceed the solubility product of tricalcium phosphate thereby giving rise to precipitation of these compounds. We do not have sufficient data to support this view but the possibility of such a precipitation is not ruled out. It is further suggested that more detailed investigations in this area would help in a better understanding of this phenomenon.

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ON ANOMALOUS EMISSION OF ECHINOSTOME LARVAL STAGES AND THE INTRAREDIAL ENCYSTMENT OF CERCARIAE IN THE SNAIL *PILA GLOBOSA* SWAINSON

THERE appears to have been no previous report of cercarial infection in the apple-snail *Pila globosa* from India.[1] We have, however, observed that the snail collected locally harboured stages of a thirty-three spined echinostome (Fig. 1).

The cercaria like any other echinostome displays a well-marked collar but the minute spines are apparently indistinguishable. In the metacercaria the spines could be seen and counted clearly. An interesting but not an unusual phenomenon in some echinostomes is the precocious encystment of some cercariæ in the rediæ in the snail host itself. Another feature observed was the escape of cercariæ and metacercariæ through the fæcal pellets of the host (Fig. 2). Such anomalous emission of larval stages of *Fascioloides magna* has been reported by Campbell and Todd[2] in an experimental infection of the snail, *Stagnicola reflexa*.

FIG. 1. Echinostome cercaria from the snail *Pila globosa*.

It has been pointed out that this condition may be due to the unsuitability of the host as well as a result of heavy infection. Obviously the larvæ find their way out through perforations in the gut of the host. In the present case a similar situation like the one reported by Campbell and Todd could be envisaged.

It is well known that echinostomes lack host specificity both at the intermediate host and definitive host levels.[3,4] Thus the precocious encystment of cercariæ in rediæ although rare in the Digenea as a whole, appears to be common at least in some echinostomes which infect abnormal hosts. In recent years Lie and Umathevy[5,6] recorded intraredial metacercariæ in *Echinostoma audyi* and *Echinoparyphium dunni* and Lie and Basch[7] encountered them in *Echinostoma Barbosai*. Chernin[8] reported on metacercariæ within echinostome rediæ that have been transplanted into *Australorbis*