

PRELIMINARY OBSERVATIONS ON TAR-LIKE MATERIAL OBSERVED ON SOME BEACHES

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ABSTRACT

This paper deals with the deposition of tar-like lumps, on beaches during the onset of the south-west monsoon, in association with various marine organisms. Algae formed the primary film for settlement and growth of stalked barnacle *Lepas anserifera* (Linn.). Indications are that these lumps must have existed in the open sea for a period long enough to allow settlement and growth of organisms.

1. INTRODUCTION

THE occurrence of tar-like lumps on the beaches of the Central West Coast of India in the environs of Goa was first noticed by Dr. N. K. Panikkar in 1970, during the south-west monsoon and again during the monsoon of 1971 in much larger quantities in Calangute, Baga and Vagator beaches. Owing to its special importance in problems of marine pollution, the National Institute of Oceanography, Panaji (NIO) has taken up this subject for detailed study. Deposits of this substance in considerable quantities were again observed during the current monsoon season of 1972. Material of similar nature has been reported from the Mediterranean sea and the Eastern North Atlantic Ocean (Horn *et al.*, 1970)¹. Investigations have been initiated by a team of scientists of the NIO, to study the source and intensity of this material in particular seasons of the year and their effect on beach ecology. Freshly deposited samples appear as black, sticky and oily material of irregular shapes and sizes. Zooplankton samples collected from 20 and 40 m off Karwar during March, 1972 have shown the presence of this material clogging and sticking to the net, but collections near Goa during the same season did not show this deposition. It is presumed that this pollutant is cast ashore from offshore areas during the monsoon months. This communication reports preliminary observations on several species of marine life associated with the deposits.

2. RESULTS AND DISCUSSION

Samples for investigations were collected from the beaches at Calangute and Ratnagiri in June, 1972. To study the intensity of barnacle depositions, the material was collected from 2 sq. metre area from the high tide level at Calangute beach. The shape and size of the lumps varied remarkably and maximum deposition occurred in the high tide level. The rate of deposition was measured at a few areas at high tide level which varied from 3.2 g to 375 g/m² (Figs. 1 and 2). Primary film was observed in most of the samples in the form of a slimy algal matrix. The only animal observed

was the Cirripede, *Lepas anserifera* (Linn.) Settlement of this stalked barnacle on the lumps was highest in the samples obtained from Calangute beach (Fig. 3). Shell length of the barnacle



FIGS. 1-3. Fig. 1. Deposition of the tar-like material brought in by the waves at Calangute beach, Goa. Fig. 2. Magnitude of deposition at the high tide level. Fig. 3. Lumps of tar-like material with the settlement of algae and stalked barnacle.

varied from 2.5 to 11.5 mm and shell breadth from 2.0 to 8.0 mm. The mean weight of the lumps collected was 1.062 gm, volume 1.228 ml/m² and density 0.432 g/m³.

Samples collected from Calangute and Ratnagiri beaches showed the presence of blue-green algae, diatoms, a few ciliates, yeasts and fungi as listed below :

Organisms on Samples from Ratnagiri Beach

Blue Green algae :

- Lyngbya baculum* (Gomont).
- Lyngbya pellucida* (Timezaki).
- Lyngbya aestuarii* (Mertens).
- Lyngbya majuscula* (Dillwyn).
- Lyngbya semiplena* (Agardh).
- Lyngbya confervoides* (Agardh).
- Coccochloris stagnina*.
- Schizothrix* sp.
- Kyrtuthrix* sp.
- Anabaena* sp.
- Calothrix* (Germinal cells).

Diatoms :

- Coscinodiscus gigas*.
- Coscinodiscus marginatus*.
- Navicula* sp.

Other forms :

- Yeast, *Rhodotorula* sp. and few Ciliates.

Barnacle :

- Lepas anserifera* (Linn.).

Organisms on Samples from Calangute Beach

In addition to almost all the species of *Lyngbya* listed above, the following blue-green algae also were observed :

- Coccochloris stagnina*.
- Dermocystis* sp.
- Anabaena* sp.
- Katagnymena* sp.
- Nostoc* sp.
- Hydrocoleum* sp.
- Entophysalis* sp.
- Schizothrix* sp. and
- Calothrix* (Germinal cells).

Green Alga :

- Enteromorpha* sp.

Diatoms :

- Asterionella japonica*.
- Coscinodiscus excentricus*.
- Coscinodiscus* sp.
- Rhyzosolenia* sp.
- Cyclotella* sp.
- Navicula* sp.
- Diploneis* sp.
- Amphipora* sp.
- Pleurosigma* sp.
- Thalassiothrix* sp.

Other forms :

The Yeast, *Rhodotorula* sp., the Ciliate *Stentor* sp. and some unidentified fungi were also observed.

Cirripede :

Lepas anserifera (Linn.) and few dead ostracod shells.

While all species of *Lyngbya* recorded were very dominant in the Ratnagiri beach samples, *L. aestuarii* mostly dominated in Calangute samples. In the Ratnagiri beach samples, *Calothrix* (germinal cells) were dense, whereas in the Calangute beach samples they were poorly represented. The blue-green algae, viz., *Dermocystis*, *Nostoc*, *Hydrocoleum* and *Entophysalis* sp. were not encountered in Ratnagiri beach samples. Although diatoms were few in both the samples, the Calangute samples showed a better representation of different genera. Of all diatoms, *Coscinodiscus* sp. was dominant in both samples. A few lumps, devoid of algal deposition, were found to have dense populations of bacteria and ciliates. The role of micro-organisms in the microbial modification of crude oil by self-purification of petroleum products in the sea has been discussed by Mironov (1969)². It is well known that oil in the sea affects marine life associated with the surface, and bacteria turn favourable to their growth and assist in dispersal, sinking and decomposition of oil (Spooner, 1971)³. Hobbie (1971)⁴ has mentioned that the type of abundance of phytoplankton gives important clues about the trophic level and state of eutrophication or pollution of aquatic systems. Lumps of crude oil residue floating on the sea surface of the Mediterranean Sea and the North Atlantic Ocean have been found to be in association with an isopod *Idotea metallica* and the goose barnacle *Lepas pectinata* (Horn *et al.*, 1970)¹. The size of the barnacles found on the lumps from the present investigation indicates that these were some months old; the lumps must have existed in open waters for a period long enough to allow the settlement and growth of organisms. It is possible that the occurrence of these lumps and their deposition on the west coast beaches with the onset of monsoon is probably due to the impact of coastal waters on the coast during this time. Further investigations to find out the nature, origin and extent of this pollutant are in progress.

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