

ON A BLOOM OF *TRICHODESMIUM THIEBAUTII* GOMONT IN THE  
GULF OF MANNAR AT MANDAPAM

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A bloom of the blue-green alga, *Trichodesmium thiebautii*, was observed during the last week of May 1968 in the Gulf of Mannar along the Mandapam Coast. The alga was found in abundance in various stages of disintegration in the glass tanks of the sea-water aquarium of the Central Marine Fisheries Research Institute, Mandapam Camp, which caused mortality of fishes kept for experimental purposes. However, no fish mortality was reported from the sea.

On May 25, 26 and 27, 1968, strong winds blew along the east coast in the region of Gulf of Mannar (Mandapam Camp) area. On 27 morning, the continuously running sea water in the aquaria of the Central Marine Fisheries Research Institute turned somewhat yellow and contained large quantities of suspended material, largely composed of disintegrating algae. Unpleasant odour emanated even from the room and the following fishes and crustaceans kept in the aquarium tanks for experimental purposes were found dead: Fishes: *Caranx carangus*, *C. russelli*, *Cephalopholis boenack*, *Gerres lucidus*, *Nemipterus furcosus* and *Selaroides leptolepis*; Crustaceans: *Alpheus crassimanus*, *Hippolismata vittata*, *Metapenaeus burkenroadi*, *Panulirus ornatus*, *Penaeus canaliculatus*, *P. indicus*, *P. monodon*, *P. semisulcatus*, *Periclimenes brevicarpalis*.

In addition to a number of echinoderms, molluscs, polychaetes and turtles which remained unaffected, the following fishes also survived in the aquarium: *Amphiprion* sp., *Caranx carangus*, *Chanos chanos*, *Chyloscyllium indicum*, *Heniochus acuminatus*, *Siganus* sp., *Spilotichthys pictus*, *Therapon* sp., *Tilapia mossambica* and *Upeneus tragula*.

Fresh sea water collected from a depth of about 0.5 m from the coast was found to contain large quantities of freely floating spindle-shaped clumps and filaments of the blue-green alga, *Trichodesmium thiebautii*<sup>2</sup> Gomont. This alga is not normally seen in such high concentrations in the coastal region. The same alga in various stages of disintegration was found in glass tanks. Freshly collected alga is pale yellow in colour and remains suspended in water,

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2. The author is thankful to Dr. R. Subrahmanyam for confirming the identification of the algae.

but on death and decay it turns greyish and begins to float at the surface as a thin film. The presence of large quantities of decaying organic matter accumulated as a result of the algal bloom probably polluted the water which caused the mortality of the fish in the aquarium.

Dr. R. Subrahmanyam informed the author that, according to his observations at Calicut, very high concentration of *Trichodesmium* is required before it could produce an adverse effect on either fish or any other animal, and adverse symptoms occur only when the volume of the alga reaches nearly 25% of the volume of the total water. Such occurrences in nature are not likely to be frequent. In the present situation of the bloom, the volume of the alga does not appear to have reached that concentration in the sea but its decay, pollution of limited quantities of water and settlement at the bottom of the glass tanks of the aquarium might have been responsible for the adverse effects caused to fishes.

The number of filaments of *T. thiebautii* in one ml of sea water was 1,204, 201, 460, 190, 42 and 20 on May 27, 28, 29, 30, 31 and June 1 respectively, and the number in one ml of plankton of standardised volume of 250 ml was 4,450, 24,000, 8,000, 2,200 and 1,000 on the dates May 28-June 1 respectively.

As the sea was rough, plankton samples could not be collected from outside the coast. However, a few 15 min. plankton hauls collected at 2 m depth, contained mainly the algae, a few copepods, polychaete larvae, echinoderm larvae, hydroid polyps, and medusae, ostracods, young ones of bivalves, foraminiferan shells, *Pleurosigma* spp., *Rhizosolenia* sp., *Biddulphia* sp., bits of sea grass of the genera *Cymodocea* and *Halophila*. Generally, zooplankters were scarce in the samples.

Water samples from the aquarium and the sea were analysed and the results are given in Table 1. While there were no significant changes in the

TABLE 1. Analysis of sea water samples from Gulf of Mannar and the aquarium

Date	Sample of sea water	Oxygen (ml/l)	Sal. (‰)	Phosphates (µg/l)	pH	Temp. °C	Colour/turbidity
27-5-68	Aquarium	0.91-2.78	35.4	2.21	7.70	30.6	Yellowish, suspended matter
	Sea	5.74	35.1	2.00	8.10	30.0	Turbid
28-5-68	Aquarium	2.74-3.29	35.1	1.13	8.00	30.5	Greenish-yellow, suspended matter
	Sea	5.29	34.9	1.00	—	29.9	Turbid
29-5-68	Aquarium	3.70-4.74	35.4	0.99	8.10	30.4	Pale yellow, suspended matter
	Sea	5.77	35.4	0.93	8.20	29.7	Turbid
30-5-68	Aquarium	4.18	35.2	0.95	8.20	30.6	Clear
	Sea	5.77	35.7	0.93	8.25	29.9	Turbid
31-5-68	Aquarium	4.03	35.1	0.91	8.25	30.5	Clear
	Sea	5.03	34.6	0.88	8.25	29.8	Clear

salinity, temperature and pH of water, the oxygen concentration was very low in the aquarium water on the 27 and 28 May as compared to the water from sea. The phosphate content was high on 27 May which gradually decreased thereafter. The high phosphate content indicates that these changes brought about in the sea during this time might have created conditions favourable for multiplication of the alga. The low level of oxygen might have been brought about by the decomposing alga.

Information gathered later indicated that the coastal waters at Kundugal channel (near Pamban, along the Gulf of Mannar coast) had a film of brownish matter composed of the same alga floating on the surface of water from the coast to about 3 km on 23 May 1968, indicating that the bloom had already begun on that date. During the period, dark brown patches formed by the alga were reported in the Gulf of Mannar up to 10 km off the coast between Mandapam and Kilakarai. No such bloom was noticed in the Palk Bay during the period.

Of particular interest with the bloom are reports of Chacko (1942), Chidambaram and Mukundan Unny (1944) and Chacko and Mahadevan (1956) who reported the swarming of *Trichodesmium erythraeum* almost the same time of the year, in the same area with the same effect including discolouration of water, production of offensive smell and mortality of fishes and other organisms. However, there was no report of mortality of fishes in the sea during the present bloom. Fishermen who are familiar with this recurring phenomenon of blooms in this area, term the blooms in Tamil 'Pukorai' (abundance of plant organisms in sea) and 'Pukarai' (bloom along shore). They are of the opinion that the blooms may not always be accompanied by mortality of fishes.

Qasim (1970) found that the bloom of *Trichodesmium* occurred in the Laccadives during a time when the sea was nitrogen-impooverished and did not sustain much phytoplankton and zooplankton. It is not possible, in the present instance, to identify the cause or causes leading to the bloom situation due to the limitations of observations.

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