

cowpea) leaf was then inserted through the refill and the vial was filled with water and closed with lid. This was kept horizontally inside a petri dish (15 cm in diameter) blackened on the outer surface. The whole set-up was kept inside a bigger glass tray and water added to 0.5 cm height in the outer tray to confine both predatory and phytophagous mites. Care was taken to avoid floating of the petri dish to prevent the mites from escaping if the petri dish touches the edge of the glass tray. The whole arrangement was covered with a glass plate.

A known number of predatory mites, *P. persimilis* was allowed on blackgram leaves infested heavily by carmine spidermite, *Tetranychus cinnabarinus* (Boisduval) served as food for the predatory mite. The tetranychid prey was given once in 3 or 4 days. The glass vial was filled with water once in 10 days and when necessary the leaf was also changed.

The predatory mites fed on the tetranychid mites and the eggs were laid on both the leaf surfaces. The rate of multiplication was faster even at the room temperature. Krishnamoorthy⁵ provided a strip of wet cotton for egg laying. But in the present study, eggs were laid directly on the leaves which facilitated faster multiplication.

This method can also be successfully used for studies on pesticide residual toxicity to the target and non-target organisms. In predatory mites, the leaves from different treatments can be inserted in the glass vial over which they prey and the predatory mites can be released and the effect of the substrate on these mites can be evaluated.

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ON THE OCCURRENCE OF 'GREEN TIDE' IN THE ARABIAN SEA OFF MANGALORE

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AN unusual phenomenon of intense green coloration and soup-like consistency of the coastal waters of the Arabian Sea off Mangalore was reported around the last week of January 1987. Since the phenomenon persisted even beyond a week, an investigation was taken up. The daily observations confirmed the earlier reports and strangely enough the phenomenon continued with some degree of fluctuations till the end of May 1987. The phenomenon in its full intensity was reported to extend from Someswar in the south to Suratkal in the north.

It is generally known that the 'red tide' phenomenon is brought about by the blue-green alga *Trichodesmium erythraeum*^{1,2}. On the other hand, the phenomenon presently noticed displayed intense green colour and could, therefore, justifiably be termed as 'green tide'. Samples collected off Hoige Bazaar and Panambur in the inshore areas and in the Gurpur and Netravathi estuaries near their entry into the sea showed the presence of an extremely dense bloom of the dinoflagellate *Noctiluca mularis*. The only other organism present in the samples was a small euglenoid flagellate (possibly *Protoeuglena*) in very large numbers, both inside and outside *Noctiluca*. The green coloration of the water was due to this green-coloured flagellate. The plankton samples showed only these two organisms to the complete exclusion of all other phytoplankters and zooplankters.

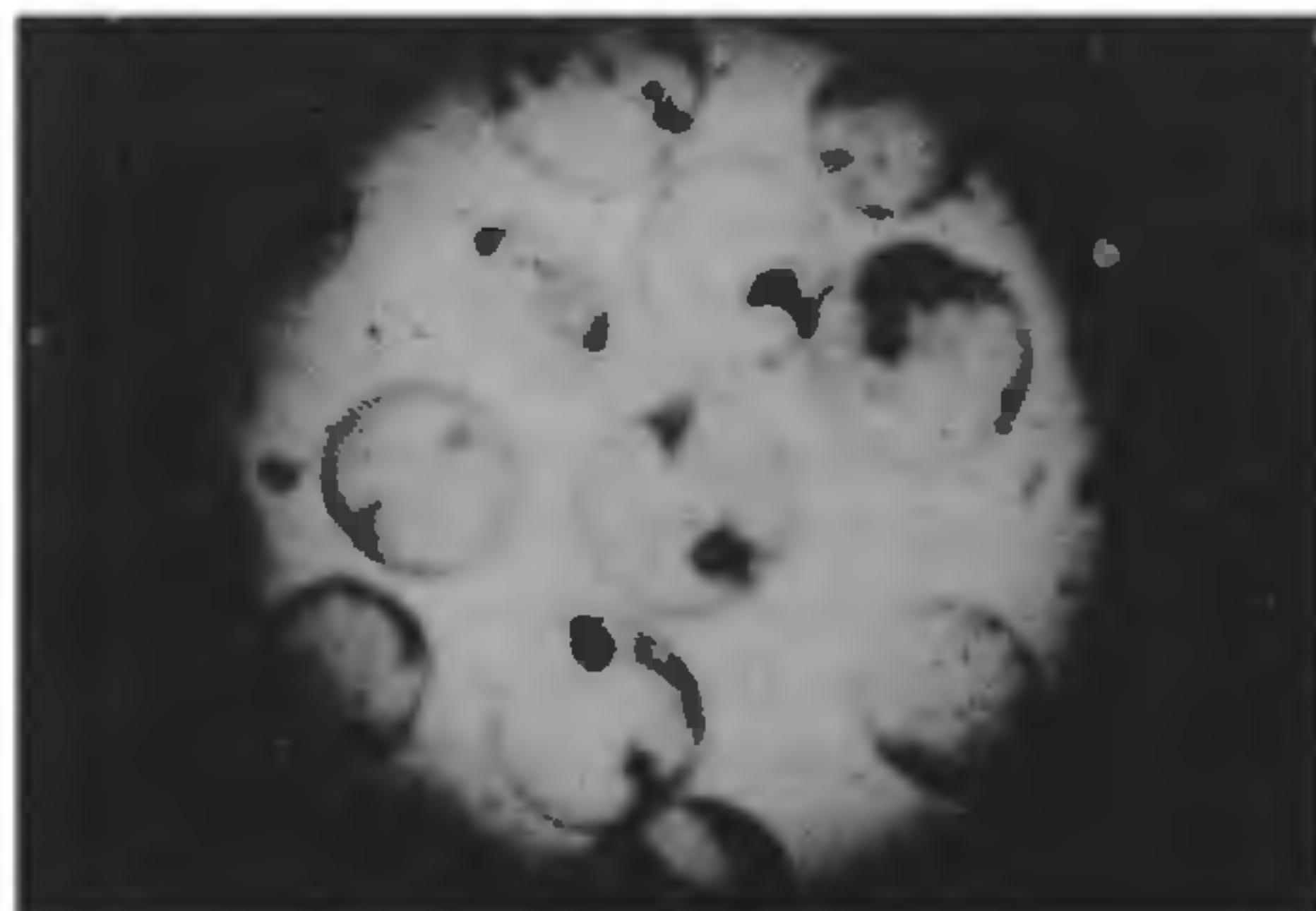


Figure 1. Photomicrograph of plankton sample, showing the presence of only *N. mularis* and *Protoeuglena* sp. ($\times 40$).

While dense blooms of phytoplankters are known to occur frequently, the intensity of the present bloom appears to be unprecedented. Their numbers were so great that it was impossible to haul a plankton net beyond a few sec, since the net was getting completely clogged within about 15 s. Therefore, numerical counts were made from surface water samples collected at various points in the Gurgur and Netravathi estuaries and in the inshore waters at stations extending from Someswar in the south to Panambur in the north. A single sample was also obtained from Malpe about 50 km further north. The samples in the sea were taken from the 8–30 m contour lines. The number of *Noctiluca milaris* in these samples varied from $1.6 \times 10^4/\text{m}^3$ to $7.55 \times 10^9/\text{m}^3$. The maximum density was noticed in the 18–20 m depth zone off the bar mouth at Mangalore.

This rare phenomenon has been reported only twice before, by Prasad³ in Palk Bay and by Subramanyan⁴ in the Arabian Sea. Both noticed the association of *Noctiluca milaris* with a green flagellate. Subramanyan⁴ identified this as *Protoeuglena* and described the association of these two organisms as more of a symbiotic nature than of parasitism or saprophytism. The present case appears to be a recurrence of the phenomenon observed about three and a half decades ago, but with greater intensity. The persistent green discoloration of the water aroused the curiosity of fishermen and the public as to its possible effects. While it is known that both these organisms do not secrete any toxins, a possible danger could be from the serious depletion of oxygen, resulting from the death and decay of these dense blooms. Normally the dissolved oxygen level in the region varies from 3 to 5 ml/l, but this went down to 0.2 ml/l after the occurrence of these blooms. However, no large-scale fish mortality was noticed in these areas. This was due to the fact that the fishes largely avoided this oxygen-deficient zone.

The density of the blooms was found to vary over the period. An examination of the hydrobiological data of the region before and after the occurrence of these blooms has not shown any drastic change, particularly with respect to the important nutrients. It is, therefore, difficult to deduce the reason for the mass production of these two organisms. The only difference noticed was that the surface temperature of these waters was about 2.4°C higher as compared to that of the moderately clear waters. A more detailed examination is in progress.

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EFFECT OF NUTRITIONAL STRESS ON CAPSAICIN PRODUCTION IN IMMOBILIZED CELL CULTURES OF *CAPSICUM ANNUUM*

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IMMOBILIZED plant cell cultures are ideally suited for production of some secondary metabolites¹. Nutritional factors required for growth and production of secondary metabolites in plant cells have been known to be different. There are some reports on the development of induction medium for secondary metabolites^{2,3}. In this communication the influence of nutritional stress factors for induction of capsaicin (an alkaloid) in immobilized *Capsicum* cells has been investigated. Capsaicin is used in food formulations as a spice and in pharmacy for preparing tincture, liniments and plaster⁴.

Seeds of *Capsicum annum* var. selection¹, obtained from the Indian Institute of Horticultural Research, Bangalore were germinated aseptically on moistened Whatman No. 1 filter paper in 5 cm petri dishes. Callus was raised from 7-day-old seedlings on Murashige and Skoog's medium⁵ (MS) containing 3% sucrose and 2 mg/l 2, 4-Dichlorophenoxy acetic acid and 0.5 mg/l kinetin. Callus was maintained on the above medium (termed as growth/control medium) by subcultures at a 30 day interval. Cell suspension was raised from callus and maintained on growth medium.

One gram of the cells were immobilized by mixing with 2% (w/v) sodium alginate and extruded⁶ into CaCl₂ solution (1.35 g/150 ml) using sterilized pas-