

$\mu\text{mol/l}$ at Kayamkulam, 1.00 to 2.50 $\mu\text{mol/l}$ at Neendakara and Paravur, and 1.30 to 3.50 $\mu\text{mol/l}$ at Veli

The nitrite-nitrogen values ranged from 0.02 to 0.30 $\mu\text{mol/l}$ at Cochin, 0.01 to 0.20 $\mu\text{mol/l}$ at Alleppey, 0.06 to 0.10 $\mu\text{mol/l}$ at Kayamkulam, 0.06 to 0.15 $\mu\text{mol/l}$ at Neendakara, 0.08 to 0.30 $\mu\text{mol/l}$ at Paravur and 0.06 to 0.30 $\mu\text{mol/l}$ at Veli

Nitrate-nitrogen ranged from 0.10 to 0.50 $\mu\text{mol/l}$ at Cochin, 0.02 to 0.10 $\mu\text{mol/l}$ at Alleppey, 0.01 to 0.20 $\mu\text{mol/l}$ at Kayamkulam, 0.025 to 0.20 $\mu\text{mol/l}$ at Neendakara, 0.03 to 1.00 $\mu\text{mol/l}$ at Paravur and 0.03 to 0.8 $\mu\text{mol/l}$ at Veli

The values for total nitrogen ranged from 1.00 to 4.00 $\mu\text{mol/l}$ at Cochin, 1.50 to 3.5 $\mu\text{mol/l}$ at Alleppey, 1.00 to 5.50 $\mu\text{mol/l}$ at Kayamkulam, 1.00 to 3.00 $\mu\text{mol/l}$ at Neendakara, 1.30 to 3.00 $\mu\text{mol/l}$ at Paravur and 2.00 to 3.5 $\mu\text{mol/l}$ at Veli

Ammonia-nitrogen values ranged from 0.02 to 1.00 $\mu\text{mol/l}$ at Cochin, 0.02 to 0.10 $\mu\text{mol/l}$ at Alleppey, 0.02 to 0.03 $\mu\text{mol/l}$ at Kayamkulam, 0.25 to 0.50 $\mu\text{mol/l}$ at Neendakara, 0.05 to 0.15 $\mu\text{mol/l}$ at Paravur and 0.05 to 1.00 $\mu\text{mol/l}$ at Veli

The above results shows that high concentrations of dissolved and particulate Cadmium and Mercury were noticed at

Cochin and Veli in water samples. Sediments of Cochin harbour also reported high values for Cadmium and Mercury. The high levels of heavy metals in these stations can be attributed to the anthropogenic sources mainly industrial and domestic effluents. Low dissolved oxygen values reported at Kayamkulam and Paravur, may be due to increased coconut husk retting activity in these areas. Low DO and pH values reported at Veli is due to the acidic effluents discharged by the Travancore Titanium Products. Low nitrite, nitrate, high inorganic phosphate and total phosphorus values are comparable with the values reported by Reddy and Sankaranarayanan. 1967,1970

References

- Gangadhara Reddy C V and Sankaranarayanan V N 1967. Distribution of nutrients in the shelf waters of the Arabian Sea. *Bull. of Nat. Inst. sci. of India*. No. 38, 1968 pp 206-220
- Gangadhara Reddy C V and Sankaranarayanan V N 1970. Total phosphorus content in the waters of the Arabian Sea along the West Coast of India. *Proc. of Ind. Nat. Sci. Aca.* Vol. 36 pp 71-79
- Standard methods for the analysis of water and waste water. 1985. Publ by APHA, AWWA and WPCF

Proceedings of the Sixth Kerala Science Congress, January 1994, Thiruvananthapuram pp 93-94

92-19

IDENTIFICATION AND CHARACTERISATION OF *THIOBACILLI* SPP. FROM CHALIYAR ESTUARY - MALABAR

Raveendran O, Kumaran S and Sankaranarayanan V N

National Institute of Oceanography, Regional Centre, P.B No. 1913, Cochin - 18

Thiobacilli spp. occurring in surface and bottom water and sediment from seven stations in the Chaliyar estuary, for a period of one year, were isolated and cultured. A total of 231 sample of water and sediments were analysed of which 77 gave positive isolation of "typical" *Thiobacilli* and 154 yielded "atypical" strains exhibiting poor growth and oxidative metabolism. In sediments from stations near to the rayon factory, incidence of strains of high oxidative metabolism, ranging between 14.69 and 39.37% were noticed. The species were *Thiobacillus thioparus* and *Thiobacillus concretivorus*.

The *Thiobacilli* which are responsible for the oxidative process of sulphates are of particular importance in the estuarine and coastal marine environments, due to their corrosive property. Published reports on these bacteria include those of Gore and Unnithan (1979) and Gore, Raveendran and Unnithan (1986).

Details of plating, medium, recording of growth and identification were done by the method of Fjerdingstad (1968).

Incidence of *Thiobacilli* in surface water was negative while in bottom water it was recorded in monsoon samples. But from stations near to the rayon factory where the estuary receives land washings and effluents and having low pH (2.3-5.2) these bacteria were recorded during all the seasons. Water samples exhibited poor turbidity in the medium and the incidence was meagre even after incubation for five days. But sediment samples developed high turbidity after four days, resulting in high incidence of *Thiobacilli*. Cultures inoculated with water samples, indicated that the pH drop was not significant, but it was very significant and sudden in sediments. Most of the strains from water exhibited poor oxidative metabolism with thiosulphate oxidation less than 5% and these were grouped as "atypical" strains. Culture from sediment had very high oxidative activity ranging from 14.69 to 39.37% and these were grouped as "typical" strains and identified

as *Thiobacillus thioparus* and *Thiobacillus concretivorus* as per Fjerdingstad (1968).

Most of the colonies were round and pale white. In sediments *Thiobacilli* occurred throughout the period of investigation. Sediments contain organic matter which brings down the pH to acidic making favourable conditions for the growth of this bacteria. Predominance of *Thiobacilli* was noted in stations near to the rayon factory which drains out high amount of effluents into the estuarine system. This study points out that the effluents from

the rayon factory and the land drainage, contribute much to the growth and multiplication of *Thiobacilli* spp. in this ecosystem.

References

1. Fjerdingstad E (1968). Water Research 3:21
 2. Gore P S and Unnithan R V (1979). Indian Jour. Mar. Sci. 6 (1979) 170.
 3. Gore P S, Ravceendran O and Unnithan R V (1986). Fish. Technol. 23, 183-188.
- 