

Heterotrophic Bacteria of Nearshore Waters of the Bay of Bengal & the Arabian Sea*

R PALANIAPPAN & K KRISHNAMURTHY

Centre of Advanced Study in Marine Biology, Parangipettai 608 502

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Water and sediment samples from the Arabian Sea (Cochin area: lat. $9^{\circ}58'N$; long $76^{\circ}16'E$) showed higher viable bacterial counts when compared to the Bay of Bengal (lat. $11^{\circ}29'N$; long. $79^{\circ}46'E$) samples. *Bacillus*, *Micrococcus*, *Corynebacterium*, *Pseudomonas*, *Vibrio*, *Aeromonas*, *Alcaligenes*, *Flavobacterium*-*Cytophaga* group, Enterobacteriaceae members and luminescent *Vibrios* were isolated from samples of both the seas.

Heterotrophic bacteria present in the water and sediment of marine and brackishwater environments play an important role in the decomposition of organic matter and in the regeneration of minerals¹⁻⁴. The present study deals with heterotrophic bacterial density and the composition of various bacterial genera encountered in the nearshore waters of the Bay of Bengal and the Arabian Sea.

Surface water samples from the Cochin area (lat. $9^{\circ}58'N$; long. $76^{\circ}16'E$) in the Arabian Sea and from 5 stations in the Bay of Bengal (neritic region, Vellar estuary mouth, Vellar river-opposite the CAS in Marine Biology, backwater and Pitchavaram mangroves; lat. $11^{\circ}29'N$; long. $79^{\circ}46'E$) were collected during Feb. 1983 using sterile plastic bottles⁵. Water samples were brought to the laboratory immediately for bacteriological analysis. Sediment samples were collected using small dredger and the surface portion of the sediment was aseptically transferred to sterile plastic bottles.

All the samples were serially diluted (10 fold) using 99 ml and 9 ml of sterile 50% seawater (100% seawater salinity, 33.6×10^{-3}) and 1 ml of aliquots were pipetted out into sterile petridishes and Zobell's 2216⁶ medium was poured, mixed thoroughly and allowed to settle. Duplicate plates were incubated aerobically at room temperature ($28^{\circ} \pm 2^{\circ}C$). The total viable bacterial colonies were counted using Lapiz electronic bacterial colony counter. Average bacterial counts of the duplicate samples were determined for each sample.

Morphologically dissimilar colonies, selected randomly from Zobell's agar plates, were subcultured to check the purity after noting their morphology and pigmentation. The pure cultures were again

subcultured in nutrient agar slants and stored at $4^{\circ}C$ to maintain their viability. Various bacterial genera present were identified⁶⁻⁸.

Heterotrophic bacterial population was higher both in water and sediment samples in the Arabian Sea when compared to the Bay of Bengal (Table 1). This may be due to upwelling and higher primary productivity in the study area⁹. In the Bay of Bengal neretic samples showed the highest bacterial counts. The association of the heterotrophic bacteria with biodeterioration processes of senescent mangrove leaves and vegetation might be the reason for higher bacterial numbers in the Pitchavaram mangrove sediment samples (Table 1).

From the Arabian Sea samples, 88 morphologically different types of bacterial strains were identified (Fig.1). Dominance of gram positive bacteria (70.83%) over gram negative types in the sediment samples was noticed, while in the water samples occurrence of gram positive and gram negative types was almost evenly matched. The genus *Bacillus* (gram positive) was dominant both in water and sediment samples. Among gram negative types *Vibrio* and *Pseudomonas* were dominant flora in the sediment samples.

From the Bay of Bengal samples, 387 bacterial isolates were identified up to generic level from the

Table 1—Total Viable Bacterial Counts in Sediment and Water Samples

	Sediment 10 ⁶ /CFU	Water 10 ⁴ /CFU
Bay of Bengal		
Neritic region (5 fm line)	208.46	302.21
Vellar estuary mouth	92.56	61.54
Opposite Biological Station	81.68	59.61
Backwater	40.24	60.28
Mangrove (Pitchavaram)	358.61	120.77
Arabian Sea (5 fm line)	365.48	428.46

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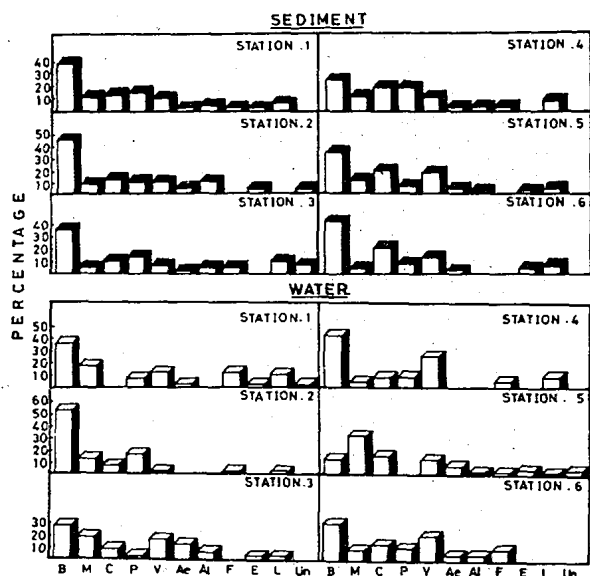


Fig. 1—Percentage composition of various genera isolated from sediment and water samples (B=*Bacillus*, M=*Micrococcus*, C = *Corynebacterium*, P = *Pseudomonas*, V = *Vibrio*, Ae = *Aeromonas*, Al = *Alcaligenes*, F = *Flavobacterium-Cytophaga* group, E = *Enterobacteriaceae*, L = *Luminescent vibrios* and Un = Unidentified. Bay of Bengal: st 1, neritic region, st 2, Vellar estuary mouth; st 3, opposite biological station; st 4, backwater; st 5, mangrove and Arabian Sea sample, st 6)

sediment and water samples (Fig. 1). It would appear that the gram positive types are dominant both in

water and sediment samples. This could be a seasonal phenomenon, noteworthy for February (postmonsoon season). The genus *Bacillus* was the major microflora in water and sediment samples except in mangrove region where the genus *Micrococcus* was dominant in the water samples.

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