

The spatial distribution of bacterial abundance and production were recorded for the first time throughout the Levantine Basin of the Eastern Mediterranean, as part of the autumn 1991 POEM multinational program. Detailed depth profiles were conducted at 10 stations on an East-West transect along latitude 33° 30' N, and at 5 stations along a NW-SE transect from 35°N, 26° 30' E (near Crete) to 33°N, 28° 30' E.

Bacterial numbers in the upper 200 m ranged between 4×10^4 and 4×10^5 cells ml⁻¹, with an overall mean of 2×10^5 cells ml⁻¹. Bacterial numbers were generally highest at the surface, declined with depth, and were higher along the E-W transect than along the NW-SE transect (Fig. 1). Bacterial volume, determined by image analysis of cells from the upper 100 m, averaged $0.045 \mu\text{m}^3 \pm 0.010 \mu\text{m}^3$ SD for 512 cocci, and $0.106 \mu\text{m}^3 \pm 0.069 \mu\text{m}^3$ SD for rods, spiral and comma-shaped cells.

Bacterial production, measured as the rate of incorporation of ³H-methyl thymidine (TdR) into DNA, ranged from below detection level (<0.02) to 1.28 pmol l⁻¹ h⁻¹, with a single unusually high value of 3.9 pmol TdR l⁻¹ h⁻¹ at 100 m depth. This occurred at the same station (within the Marsa Matrun Gyre) and 10 m above the site of the highest chlorophyll recorded for the basin. The overall mean incorporation rate of the 159 duplicate samples analysed was 0.31 ± 0.38 (SD) pmol l⁻¹ h⁻¹. The rates exhibited greater vertical patchiness than bacterial cell numbers or chlorophyll concentrations. We have confidence in our measured values because of $\pm 10\%$ agreement between duplicate measurements. Peaks in bacterial activity were often, but not always, associated with the deep chlorophyll maximum (DCM). Along the E-W transect bacterial production maxima at 200 m (the deepest depth examined) were found in 6 stations, while surface maxima were found in two. The stations along the NW-SE transect showed additional peaks of bacterial production above or below the DCM, but not at the surface or at 200 m. Unexpectedly high rates were recorded at one out of three stations in which bacterial production was measured also in deep water (0.57 and 0.74 pmol l⁻¹ h⁻¹ at 500 and 1000 m, respectively).

Generation times, calculated assuming 1 mole of thymidine incorporated = 1018 cells, averaged 50 days (range: 0.9-1050 days) and tended to be longer beneath the DCM. The long generation times, together with the low bacterial numbers and thymidine incorporation rates (both of which fall at the lower end of previously published ranges for oligotrophic seas) are in accordance with the ultra-oligotrophic nature of the Levantine Basin.

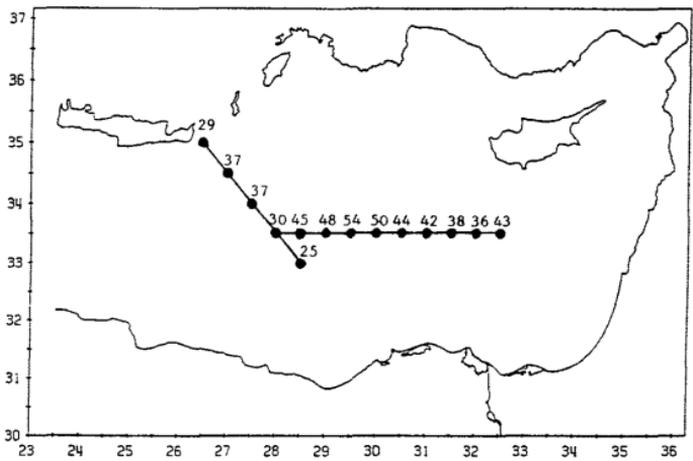


Fig. 1. Station locations (circles) along transects and the distribution of depth-integrated (0-200 m) bacterial numbers ($1012 \text{ cells m}^{-2}$) in the Levantine Basin, Eastern Mediterranean Sea.

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