

MYCOSPORINE-LIKE AMINO ACIDS IN COASTAL AND OPEN OCEAN  
ENVIRONMENTS OFF CENTRAL CALIFORNIA

---

A University Thesis Presented to the Faculty  
of  
California State University, Hayward and  
Moss Landing Marine Laboratories

---

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science in Marine Science

---

By  
Jessica Jill Baltan  
December, 2001

Jill Baltan © 2001

## ABSTRACT

Mycosporine-like amino acids (MAAs) associated with phytoplankton communities in temperate and subtropical environments were studied in the eastern Pacific Ocean. One winter cruise (NAVO 1, February 1997) and two summer cruises (NAVO 10, September 1997 and GRZ, September 1998) were conducted along a transect that originated in Monterey Bay, California. Two cruises extended 280 km offshore (NAVO 1 and NAVO 10) and the other extended 3800 km offshore (GRZ). The relationship between particulate ultraviolet radiation (UVR) absorption and MAA concentrations was examined, and physical and biological data were correlated with the MAAs to assess what factors may determine MAA abundance and distribution. Results showed that in the mixed layer MAAs accounted for 40% of the variability in particulate UV absorption at onshore sites, and approximately 67% of the variability in particulate UV absorption at offshore sites, where detrital particles were lower relative to phytoplankton biomass. The relationship between MAA concentrations and UV absorption deteriorated below the mixed layer, where UV absorbance by detrital material increased. There was a high conservation in MAA content, both in the occurrence of individual MAAs and in their proportions. Mycosporine-glycine, shinorine and porphyra-334 comprised 75% of the total MAA standing crop at 20 of 26 sites. Mycosporine-glycine was consistently the most abundant MAA, constituting at least 50% of the total MAAs at 75% of the sites sampled. MAA concentrations were highest within the mixed layer at all stations and decreased below the limit of detection below the mixed layer. The lowest MAA concentrations were observed during the winter cruise, where reduced irradiance and deepened mixed layers presumably reduced MAA synthesis. At

most sites (19 of 26 stations) MAA distributions revealed vertical concentration gradients through the mixed layer even though chlorophyll was vertically homogenous and temperature was isothermal. Thus, the field data suggest that MAA synthesis and/or degradation rates potentially meet or exceed the vertical mixing rate. The results support the notion that MAAs provide a protective function for phytoplankton in the upper ocean.

MYCOSPORINE-LIKE AMINO ACIDS IN COASTAL AND OPEN OCEAN  
ENVIRONMENTS OFF CENTRAL CALIFORNIA

By

Jessica Jill Baltan