Palmer LTER: Temporal variability of transparent exopolymer particles in Arthur Harbor during the 1994–1995 growth season

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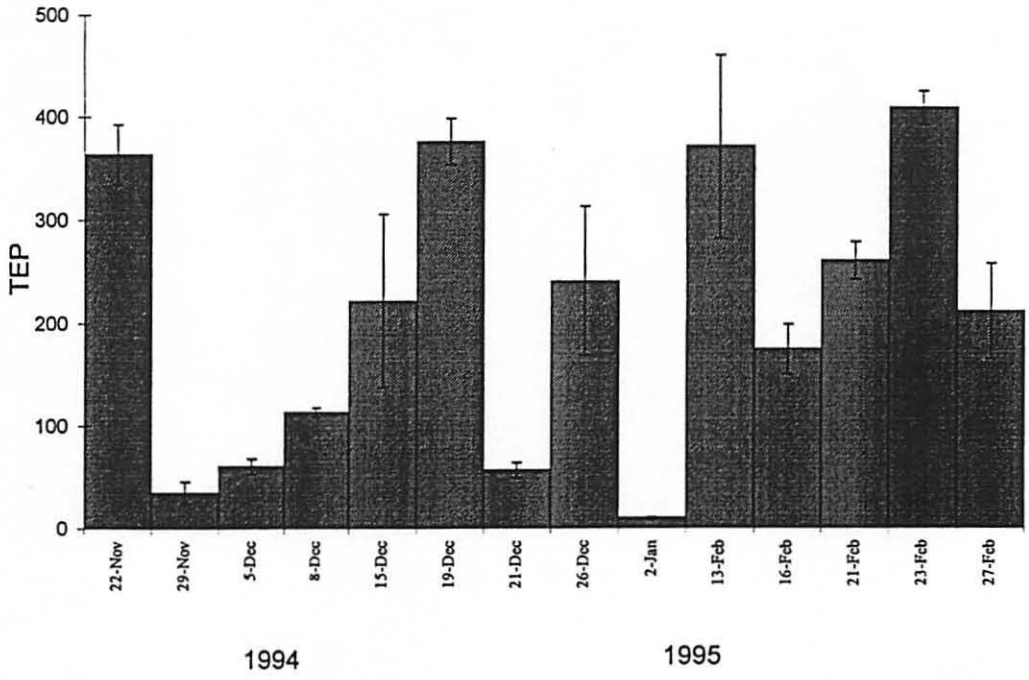
Polysaccharide-specific staining techniques have recently revealed a class of large, discrete, transparent particles formed from dissolved extracellular polysaccharides exuded by phytoplankton and bacteria in the ocean (Alldredge, Passow, and Logan 1993). These gel-like transparent exopolymer particles (TEP) appear on filters as films, webs, and strings up to hundreds of micrometers in size and occur at concentrations up to thousands per milliliter in sea water (Alldredge et al. 1993). TEP are especially significant as surface habitats for bacteria (Passow and Alldredge 1994) and for the aggregation and sedimentation of diatom blooms (Passow, Alldredge, and Logan 1994). TEP appear to be present everywhere and have been found in all waters investigated so far (Norwegian Sea, North Atlantic gyre off Bermuda, off California; Passow and Alldredge 1995). Here we present preliminary data on the occurrence of TEP in antarctic waters.

We measured the concentration of TEP in the surface layer [2–6 meters (m)] during the southern summer (between 22 November 1994 and 27 February 1995) off Bonaparte Point, Anvers Island, Antarctica (station B: 64°46.4'S 64°04.4'W). Samples from the depth of 50 percent photosynthetically available radiation were collected using a 5-liter Go-flo bottle from a Zodiac boat. Samples were brought to the shore-based laboratory and processed within 1 hour of collection (Vernet, Koslowski, and Ruel, *Antarctic Journal*, in this issue).

TEP was measured colorimetrically according to Passow and Alldredge (1995). Three replicate samples of 100 milliliters (mL) each were filtered onto 0.4-micrometer (µm) membrane filters and stained for 2 seconds with an alcian blue solution. Filters were kept frozen at –80°C and analyzed in California within less than 5 months. Filters were incubated for 2–3 hours in 80 percent sulfuric acid before the solution was measured colorimetrically at 787 nanometers in a spectrophotometer. Blanks were subtracted, and the measurements were calibrated with gum xanthan.

During the observation period, measured values at station B varied between a minimum of 15 micrograms per liter (µg L^{-1}) gum xanthan equivalent (2 January 1995) and maximum values above 500 µg L^{-1} gum xanthan equivalent (22 November, 19 December, 13 February, 23 February; figure). These values span the range of values observed in the coastal areas off California. Off coastal California, highest values of 400–500 µg L^{-1} gum xanthan equivalent have been observed during diatom blooms, and low values were measured below 50 m during summer and at all depths during winter (Passow and Alldredge 1995).

Concentrations of TEP off California are correlated to chlorophyll-*a* concentrations (Passow and Alldredge 1995). Such a relationship between TEP and chlorophyll-*a* was not observed for the samples from station B, Antarctica. Concentrations of TEP were higher during the two bloom



Temporal variation of the concentration of TEP expressed as micrograms per liter xanthan equivalent at the depth corresponding to 55 percent of the incident irradiance.

periods, however, in mid-December and the second half of February. The absence of a direct correlation between TEP and chlorophyll-*a* at station B may be explained by the fact that the phytoplankton was frequently dominated by non-diatom species at station B. Diatoms appear to generate TEP more abundantly than other organisms (unpublished data, Passow). The bloom in mid-December was dominated by cryptomonads, whereas diatoms appeared to dominate phytoplankton at the end of February (Kozlowski, Lamerdin, and Vernet, *Antarctic Journal*, in this issue).

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