trations were about 2.5 and 1.0 ng ATP per gram dry weight sediment in the upper 2 cm and at 9 cm depth, respectively. This amounts to approximately 1 mg bacterial carbon per m^2 in the upper sediment.

Phytoplankton. Chlorophyll concentrations in the water column were not measurable by our usual methods (less than 0.005 g/liter). The sediment was essentially devoid of chlorophyll, or its degradation products. Extraction of 12 grams of sediment followed by thin-layer chromatography did not reveal any of the usual pigments found in sediments. The water samples and net samples (preserved either in buffered foramlin or Lugol's iodine solution) are currently being examined by microscopy; preliminary inspection shows significant numbers of *Peridinium* sp. (Dinoflagellate) and *Fragilariopsis* sp. (Diatom). These cells appeared to have cell integrity when examined at J–9 and did not stain with Evans Blue, suggesting that the cells were alive.

Zooplankton. All net tows contained between 5-20 amphipods (identical in appearance to those described by Lipps et al., 1979) in addition to an assortment of smaller zooplankton. Preliminary examination of the preserved samples has shown copepod nauplii and adults, radiolarians, and a few polychaete larvae. We do not know if the amphipods are normally found throughout the water column or if they represent individuals which escaped from traps deployed by other investigators.

Results from 1978 field work confirm the existence of a diverse yet sparse, possibly indigenous, flora and fauna under the Ross Ice Shelf. Sample and data analyses, when completed, promise to provide some insights into the mechanism of energy supply to the biota in this remote ecosystem.

The field party consisted of J. Ammerman, L. Campbell, A. F. Carlucci, J. Fuhrman, O. Holm-Hansen, S. Horrigan, and M. Wolfe. We acknowledge the help of the RISP staff and wish to thank S. Jeffrey for help with pigment analyses. This work has been supported by National Science Foundation grant DPP 76–22134.

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Seasonal variability in biological productivity of Scotia Sea and southwest Atlantic

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Texas A&M personnel had a valuable opportunity during the 1978–79 austral research season to participate in two cruises of ARA *Islas Orcadas* in the Scotia Sea and the northern Weddell Sea. Our main objective was to study the seasonal variability of phytoplankton/zooplankton/nutrient chemistry by exploiting a unique chance to compare the similar cruise tracks and station positions of the austral late winter/early spring cruise (cruise 17, from 2 September to 14 October 1978) with the subsequent austral summer cruise (cruise 19, from 22 February to 9 April 1979). Figure 1 shows the cruise tracks, with the 17 biological stations occupied during the winter/spring cruise and the 26 occupied during the summer cruise.

During these two cruises, we adopted a multi-disciplinary approach to the investigation of hydrography, nutrient chemistry, ATP, CHN, particulate organic carbon, suspended solids, microbial studies, standing crop, primary productivity, vertical distribution and composition of phytoplankton, ice algae, chemical fractionation of carbon-14–labeled phytoplankton, particulate lipid and amino acid analysis, and downwelling irradiance.

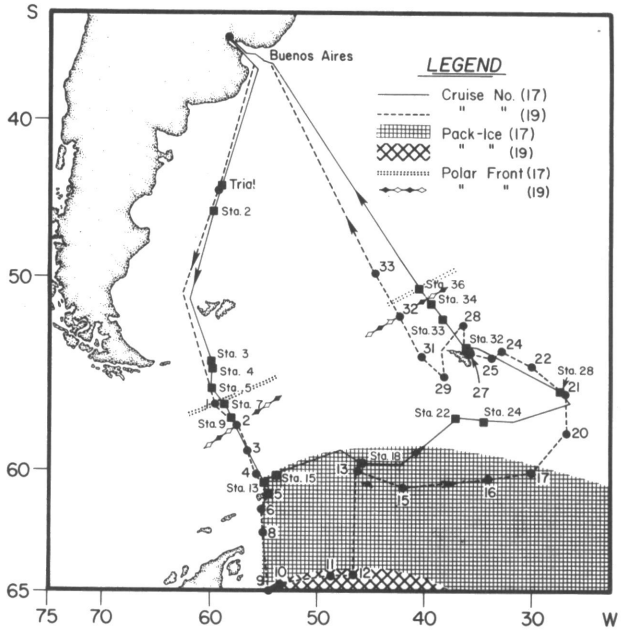

Figure 1. *Islas Orcadas* cruises 17 and 19 in the Scotia Sea and northern Weddell Sea.

During both cruises there were extensive sampling programs on transects across the polar front in the Drake Passage and northwest of South Georgia Island.

During the interim between the two cruises, the polar front shifted toward the south, as did the pack ice edge, which receded approximately 5 degrees of latitude.

During cruise 17, we measured the effects of pack ice at four stations (stations 13, 15, 18, and 19) and extensively sampled the windward side of a large tabular iceberg (32 kilometers long and 40 meters high) near station 22. During cruise 19, we occupied four pack ice stations (stations 9, 10, 11, and 12) for 12 to 18 hours to assess short-term variability.

Chlorophyll and phaeopigment concentrations were determined from discrete water samples taken at depths corresponding to the various light levels (100, 50, 25, 12, 6, 1.0, 0.1, and 0.01 percent) used for primary productivity studies. Eighteen vertical chlorophyll profiles were taken during cruise 17 and thirty-four during cruise 19.

These profiles seem to indicate that there was a decrease in the mean standing crop of phytoplankton from 55.0 ± 62.4 milligrams per square meter during cruise 17, with 31.6 ± 23.8 milligrams per square meter during cruise 19. This seasonal comparison (which excludes data from station 34 of cruise 17) is based on chlorophyll concentrations integrated from the surface to depths corresponding to 1.0 or 0.1 percent light levels. Higher integrated chlorophyll values were found south of the polar front during both cruises. With the use of an in situ submarine fluorometer attached to the salinity-temperature-depth STD cable, simultaneous data on salinity, temperature, nutrients, and chlorophyll concentrations were obtained. The profiles of the vertical distribution of chlorophyll later were used in determining correct placement of the Niskin bottles to insure sampling of the chlorophyll maximum.

A continuous-flow fluorometer (Turner model 10) was used to monitor surface chlorophyll concentrations during cruise 19. The contour surface of chlorophyll concentrations was calibrated with discrete samples taken throughout the cruise (figure 2). Continuous and discrete estimates of standing crop exhibited a significant island-mass effect (Doty and Oguri, 1956; El-Sayed et al., 1979). This aspect of the cruise was performed in cooperation with NASA's program for the development of an algorithm to calculate chlorophyll concentration from reflected irradiance (ocean color) as remotely sensed by the coastal zone color scanner (CZCS) on the NIMBUS–7 satellite (Hovis and Leung, 1977; El-Sayed and Green, 1974; Arvesen, Millard, and Weaver, 1971).

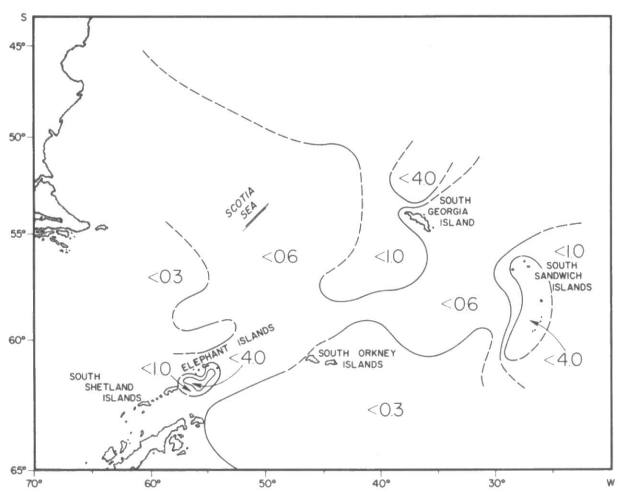

Figure 2. Surface distribution of chlorophyll *a* (in mg-m^3) as measured by continuous in vivo fluorescence and calibrated against in vitro verification values during *Islas Orcadas* cruise 19.

We determined primary production by using the carbon-14 uptake method of Steemann Nielsen (1952). Three in situ and eleven simulated in situ experiments completed during cruise 17 will be compared to eight in situ and twelve simulated in situ experiments completed during cruise 19. The integrated primary production during cruise 17 averaged 258.9 ± 295.7 milligrams of carbon per square meter. Samples from cruise 19 are still being analyzed.

During cruise 17, a pronounced phytoplankton increase was encountered at stations 33 and 34, north of South Georgia Island. At station 34, surface values of 11.6 milligrams per cubic meter of chlorophyll and 183 milligrams of carbon per cubic meter per day phototrophic production were determined. The phytoplankton was dominated by a new *Thalassiosira* sp. (Fryxell, Villareal, and Hoban, 1979).

Chemical identification and characterization of particulate organic matter was investigated during cruises 17 and 19 by Kennicutt, Warner, and El-Sayed (1979).

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