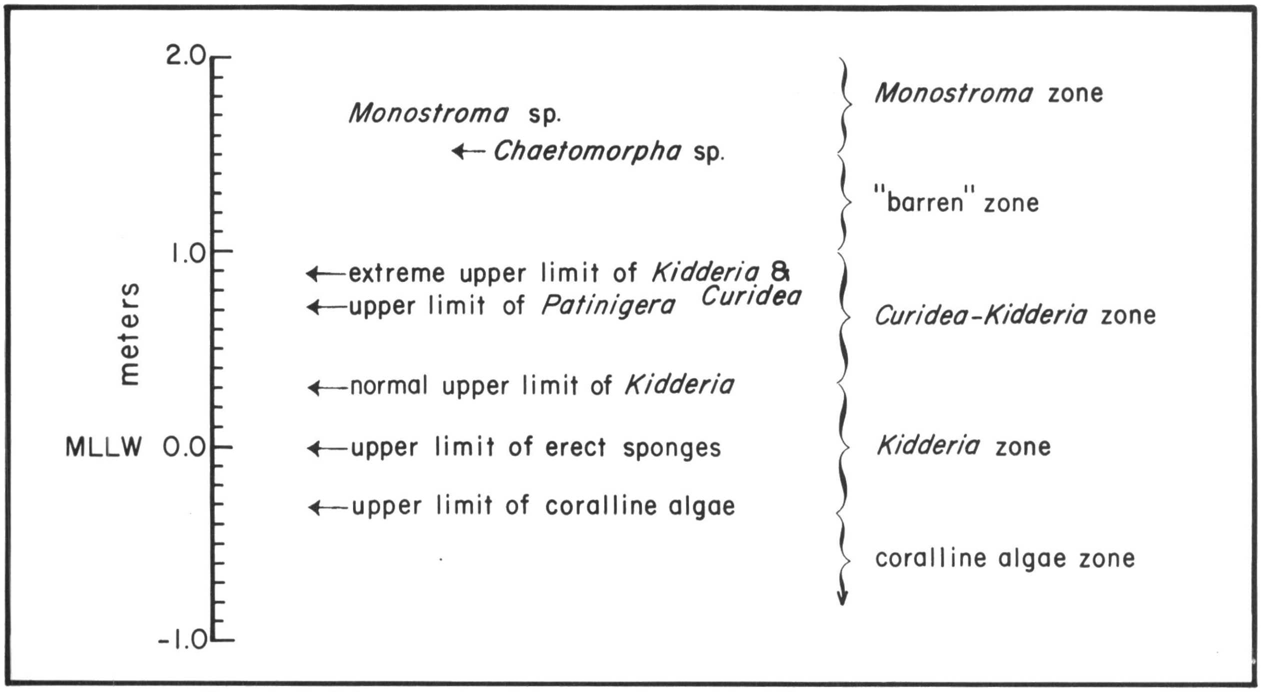


Figure 3. Preliminary zonation of the protected intertidal rubble zone near Palmer Station.

of *Kidderia* (*Kidderia*) *subquadratum* was made by Dr. Patrick Arnaud. Ms. Nancy Valentine did the drafting. To these people and to Dr. Jere H. Lipps, for his help in this project, I extend my thanks.

References

Dayton, P. K., G. A. Robillaird, and A. L. DeVries. 1969. Anchor ice formation in McMurdo Sound, Antarctica, and its biological effects. *Science,* 163: 273-274.

Gruzov, E. N., and A. F. Pushkin. 1970. Bottom communities of the upper sublittoral of Enderby Land and the South Shetlands. In: *Antarctic Ecology* (M. Holdgate, ed.). Academic Press, I: 235-238.

Hedgpeth, J. W. 1969. Preliminary observations of life between tidemarks at Palmer Station, 64°45'S. 64°05'W. *Antarctic Journal of the U.S.,* 6(4): 106-107.

Knox, G. A. 1960. Littoral ecology and biogeography of the southern oceans. *Royal Society of London. Proceedings Series* B, 152: 577-624.

Knox, G. A. 1968. Tides and intertidal zones. *Symposium on Antarctic Oceanography.* Santiago, Chile, 1966. 131-146.

Price, J. H., and R. Redfearn. 1968. The marine ecology of Signy Island, South Orkneys. *Symposium on Antarctic Oceanography.* Santiago, Chile, 1966. 163-164.

Propp, M. V. 1970. The study of bottom fauna at Haswell Island, by scuba diving. In: *Antarctic Ecology* (M. Holdgate, ed.). Academic Press, I: 239-241.

Stout, W. E. and S. V. Shabica. 1970. Marine ecological studies at Palmer Station and vicinity. *Antarctic Journal of the U.S.,* 5(4): 134-135.

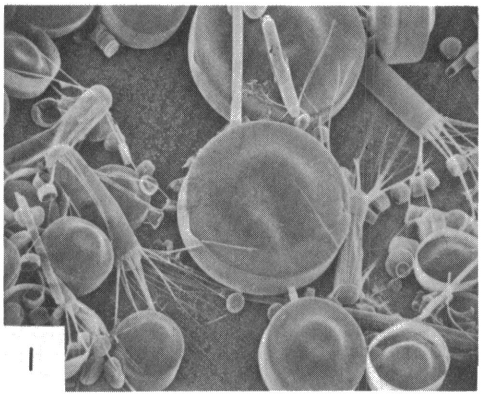
Ecology of antarctic marine diatoms

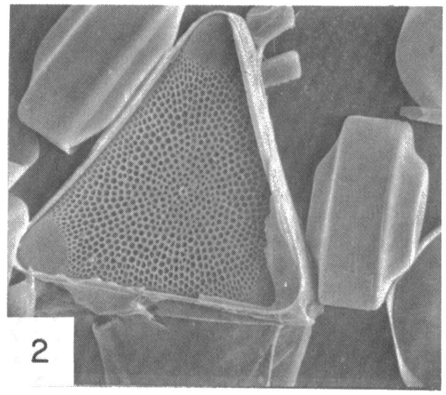
WILLIAM N. KREBS

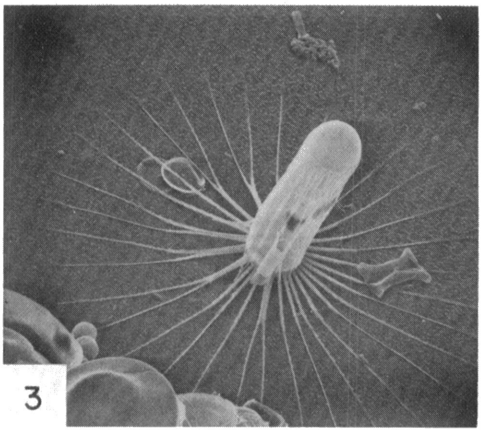
Department of Geology
University of California, Davis

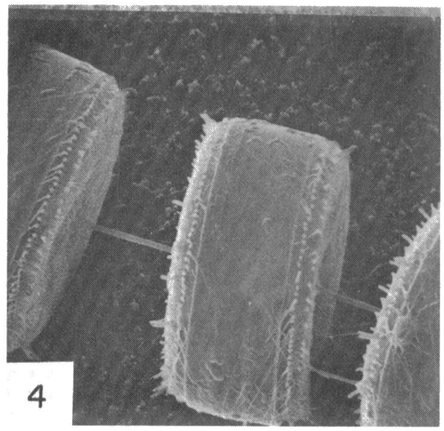
Ecological studies on antarctic near-shore phytoplankton and benthic microalgae were carried out in Arthur Harbor, near Palmer Station, Antarctica, during December 1971 to January 1973. This work was supported by National Science Foundation grant GV-31162, to Jere H. Lipps. It is an essential part of a program designed to study shallow-water benthic foraminiferan ecology and population dynamics in waters off the Antarctic Peninsula (Lipps *et al.,* 1972).

The marine planktonic and benthic microalgae in Arthur Harbor consist almost entirely of diatoms. Thus my work became a study of antarctic marine diatom ecology. It involved quantitative and taxonomic studies of diatom seasonal fluctuations in Arthur Harbor, as well as measurements of important physico-chemical parameters of the seawater. Weekly water samples were secured at 10-foot intervals down to 100 feet and at 135 and 175 feet. A portion of the water was set aside for chemical analysis while the remainder was processed for diatoms. In conjunction with this, tows for zooplankton were









(1) Spring bloom planktonic diatom assemblage, including disc-shaped *Coscinodiscus bouvet*, spiny *Corethron criophilum*, chained *Thalassiosira* sp., and rod-shaped *Rhizosolenia* sp. (enlarged x83). (2) Benthic diatom *Triceratium arcticum* and planktonic diatoms *Coscinodiscus bouvet*, *Thalassiosira* sp., and *Rhizosolenia* sp. (enlarged x185). (3) *Corethron criophilum* perched on a setae (enlarged x157). (4) *Thalassiosira* sp., showing mucus connecting threads (enlarged x1,060).

made when ice conditions permitted. Daily measurements were taken of light intensity and albedo, and of air and water temperatures. Different substrates from Arthur Harbor were sampled throughout the 13 months and processed for diatoms. A series of trays holding microscope slides were suspended in the water column at different depths. Every 2 weeks a slide was removed and the benthic diatoms preserved in their life positions. Thus, by frequent sampling of the plankton and the benthos, a close record was kept of diatom standing crop and of species succession. Frequent seawater chemical analyses may demonstrate the relationship between changes in seawater composition and diatom population. Some aspects of this microalgal study are continuing by the 1973 winter over team at Palmer Station. The result will yield over 2 years of data on antarctic diatom ecology and seawater chemistry.

During my stay at Palmer Station, I monitored four separate phytoplankton blooms. The first was in progress when I arrived on December 1, 1971. It lasted until the end of the month and was composed of species common to Antarctica, e.g., *Corethron criophilum, Cosinodiscus bouvet, Chaetoceros* species and (?) *Podosira* species. The fall bloom occurred in late February to early March and was characterized by a lower diversity than the previous bloom with (?) *Podosira* species predominating. Phytoplankton was negligible during the winter (chorophyll values in June were low, beyond the sensitivity of the spectrophotometer).

Fast ice formed in late July and lasted until early September. Intermittent pack ice filled Arthur Harbor until late November. Sea ice formation proved to be of immense importance for subsequent diatom blooms. Samples of shore, pack, and fast ice yielded both planktonic and benthic diatom floras as well as huge chlorophyll concentrations. At the same time there were low chlorophyll values and cell numbers per volume in the underlying water. With the constant availability of sunlight and lack of herbivores, diatom growth in the sea ice preceded any planktonic or benthic blooms. Melting of the pack ice introduced diatoms into the water column and reduced albedo. A greater amount of sunlight thus was made available for diatom growth. Increased solar radiation and duration during the austral spring caused melting and calving, both of which may contribute to upwelling of nutrients. The addition of penguin guano with the meltwater may be an extremely important nutrient source. Diatom growth in the sea ice probably is responsible for greater absorption of solar radiation, thus hastening disintegration of the ice. Extensive benthic diatom growth in shallow subtidal areas preceded the spring bloom by about 1 month. The spring bloom occurred in mid-November. Although diversity was high, *Rhizosolenia* species and large *Coscinodiscus bouvet* were conspicuous species. The summer bloom lasted 1 month, beginning in mid-December. In species composition it was much like the spring bloom.

Grazing, substrate, turbulence, ice, and availability of sunlight are important factors affecting benthic diatom distribution. As a result, the composition and distribution of benthic diatom floras are quite heterogeneous. Succession slides revealed that growth occurs throughout the year but is far greater during the austral summer. The climax community of all the succession slides was attained quickly and consisted of *Cocconeis* species. Scuba diving last summer revealed a diatom mat covering the bottom of Bonaparte Channel, adjacent to Palmer Station. Its species composition and chlorophyll content are being monitored by the 1973 winter over team.

Reference

Lipps, J. H., T. E. DeLaca, W. N. Krebs, and W. L. Stockton 1972. Shallow water foraminifera studies, Antarctic Peninsula, 1971-1972. *Antarctic Journal of the U.S.*, VII(4): 82-83.

Coordination of the Ross Ice Shelf Project

ROBERT H. RUTFORD

University of Nebraska, Lincoln

The Ross Ice Shelf Project (RISP) management office was established at the University of Nebraska, Lincoln, in June 1972. The charge was to develop an operational plan, identify capital equipment requirements, identify specialized logistic support requirements, and identify and coordinate the interests of scientists from other nations in the project. The management office was assisted in these tasks by the RISP steering group of the Committee on Polar Research.

During the Scientific Committee on Antarctic Research XI meetings in Canberra during August 1972, project coordinators participated in a 1-day session on the Ross Ice Shelf Project, held by the Scientific Committee on Antarctic Research group of specialists on ice shelf drilling projects. Out of this meeting came some specific recommendations that were transmitted to the RISP steering group.

The RISP science plan was developed in draft form during the early fall of 1972, and was presented to the National Science Foundation in October 1972. The purpose of the science plan is to develop in some detail the goals of the RISP and to outline the means to accomplish those goals. The third revision of the project's science plan now is available.

An *ad hoc* committee prepared an environmental impact appraisal for the RISP. This document identifies some of the anticipated environmental effects which may be associated with the project. The draft of this document will undergo revision as the details of the operations on the ice shelf are more clearly defined.

The management office has received 49 proposal outlines and estimated budgets from potential RISP participants. Twelve of these are from outside the U.S., representing seven countries. These proposal summaries include a variety of scientific disciplines and were used to prepare a 3-year estimate of RISP activities.

The drilling operation underwent considerable study and evaluation during the past year. A number of options were analyzed both from operational as well as financial points of view, and specific recommendations were made to the National Science Foundation. Equipment required for the drilling operation will be acquired during the coming year.

The project's field operations are scheduled to begin during the coming austral summer. A geophysical program directed by Dr. Charles Bentley, University of Wisconsin, will work (with light, ski-equipped airplane support) in the eastern part of the Ross Ice Shelf. Dr. Edwin Robinson, Virginia Polytechnic Institute, will supervise a study of the tidal effects on the ice shelf, with the use of gravimeters. A surface glaciology program, working in conjunction with Dr. Bentley, will be led by Dr. Robert Thomas, University of Nebraska, Lincoln; it will include personnel of the University of Copenhagen, who will collect snow cores for oxygen isotope analysis. The U.S. Geological Survey will provide positioning information by using a satellite geoceiver system (directed by Mr. William MacDonald).

Drilling of the first hole(s) through the shelf is scheduled for the 1974-1975 season. A tentative drill site has been selected at 82.5°S., 166°W., on ice about 500 meters thick that is believed to have originated in West Antarctica. The water depth at this site is about 200 meters. Present plans call for coring the ice and bottom sediments. An access hole will be drilled and maintained for work in the water column beneath the ice shelf. Work on the project has been supported by National Science Foundation contract C-726.

Dr. Rutford recently succeeded Dr. James H. Zumberge as coordinator of the Ross Ice Shelf Project management office.