U.S. Antarctic Research Program, 1975-1976

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Ecology of nearshore foraminifera, Arthur Harbor and vicinity (Antarctic Peninsula)

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Little is known of the nearshore foraminiferal fauna of Antarctica. The harshness of the environment and the pack-ice barriers have usually prevented research vessels from reaching nearshore areas (Echols and Kennett, 1973). Foraminiferal distribution and ecology in Antarctica has thus been based chiefly on sediment samples from waters deeper than 200 meters.

This study's purpose was to determine the species composition, the density, and the distribution of living, benthic shallow-water antarctic foraminifera in the vicinity of Arthur Harbor, Anvers Island (64°46'S. 64°04'W.). The field work was carried out from Palmer Station on Anvers Island between December 1973 and March 1975 with cooperation from personnel at the station. This project is part of a multidisciplinary investigation of foraminiferal ecology along the Antarctic Peninsula under the direction of J.H. Lipps (National Science Foundation grants GV-31162 and DPP 74-12139).

Scuba diving and underwater photography were used to observe subtidal communities and to document the relationship between the foraminiferal assemblages and the type of habitat. A more accurate description of the benthic environment is obtained by sampling with the aid of scuba diving (Everson and White, 1969). By this means a diver may select the sampling site and regulate the size of the sample (Hulings and Gray, 1971).

A total of 119 bottom samples were examined from 35 locations (figure). Cliff residue samples comprised of benthic invertebrates and detritus were scraped from the rocks and placed into a diver's collecting bag lined with a fine-meshed sac. Patches of cliff sediment and mud samples from soft-bottom substrates were collected with a plastic flour scoop and were stored during the dive in sand sample bags.

Analysis of these samples revealed that the foraminiferal community on the rocky cliffs encrusted with invertebrates is more diverse and abundant than both the foraminiferal community in the mud and the communities associated with algae or the sediment beneath the algae. The conspicuous difference between the two substrates, cliff and mud, is the presence of a dense growth of macroalgae and the abundance of invertebrates, especially sponges, on the vertical rock cliffs and their absence from muddy substrates. A total of 81 species of foraminifera were identified from the cliffs of the Arthur Harbor area.

Foraminifera found abundantly with tunicates included *Cibicides refulgens*, *Rosalina globularis*, *Tolypammina vagans*, and *Turritellella shoneana*. Common and abundant species found living in association with sponges included *Astrononion stelligera*, *Cassidulinoides*

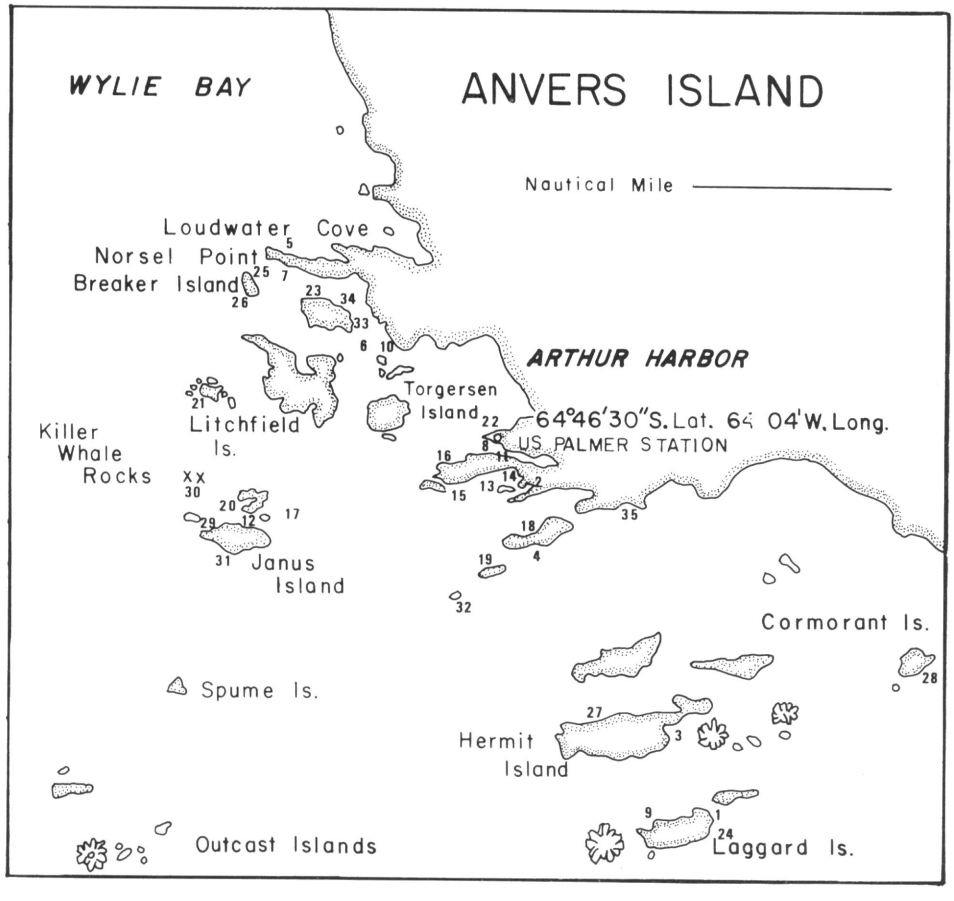
parkerianus, Cibicides refulgens, Cribrostomoides jeffreysii, Globocassidulina crassa, Pullenia subcarinata, Pyrgo elongata, Reophax dentaliniformis, Rosalina globularis, Tolypammina vagans, Trochammina malovensis, T. ochracea, and *Turritellella shoneana.*

Specimens of *Tolypammina vagans* found abundantly or commonly in cliff residue samples are rarer in cliff sediment and are absent in the mud. This agglutinated foraminifer and *Cibicides refulgens, Crithionina hispida,* and *Rosalina globularis* were found encrusted on sponges, bryozoans, hydrozoans, tunicates, various shells, algae, and pebbles. A need for a firm substrate on which to adhere probably explains their absence in soft-bottom substrates and their conspicuous presence in the coarser cliff sediment and the rich cliff biota.

Floating ice has an impact on the cliff biota. This ice may scour subtidal areas down to approximately 15 meters (DeLaca and Lipps 1976). Common and abundant foraminifera present in cliff residue samples from this zone included *Globocassidulina crassa, Patellina corrugata, Pyrgo elongata, Quinqueloculina seminulum, Rosalina globularis, Tolypammina vagans, Trochammina malovensis, T. ochracea,* and *Turritellella shoneana.* However, *Cibicides refulgens, Glabratella* sp., *Hemisphaerammina depressa, Pyrgo elongata, Rosalina globularis, Trochammina malovensis,* and *T. ochracea* were dominant in the cliff sediment.

Shallow-water areas (2 to 4 meters) protected from the scouring action of the ice contained several species of foraminifera. Common and abundant species included *Cribrostomoides jeffreysii, Fissurina diaphana, Pseudoparrella exigua, Quinqueloculina seminulum, Rosalina globularis, Textularia wiesneri, Tolypammina vagans, Trochammina ochracea,* and *Turritellella shoneana.*

Stockton (1973) investigated the distribution of mud-dwelling foraminifera in Arthur Harbor based upon examination of 49 mud grabs. A total of 23 species were identified, with at least five benthic species (*Globocassidulina crassa, Hippocrepinella hirudinea, Psammosphaera fusca, Reophax dentaliniformis,* and *Trochammina malovensis*) found either commonly or abundantly. Some forms that Stockton considered as rare, *Cassidulinoides parkerianus, Pro-*



Location map of dive sites.

teonina tubulata (= *Saccammina sphaerica*), *Pyrgo williamsoni*, *Trochammina intermedia* (= *T. ochracea*), *Uvigerina angulosa* (= *Trifarina angulosa*), and *Webbinella hemisphaerica* (= *Hemisphaerammina bradyi*), were collected in large quantities from the cliff habitat. The variation in the foraminiferal abundances between cliffs and mud may be attributed to their displacement from a favorable into an unfavorable habitat.

Many foraminifera found off the Antarctic Peninsula have been encountered by workers who have studied foraminifera off South America. Lena (1966) noticed that the littoral foraminiferal fauna off the tip of South America is Subantarctic in nature but biogeographically belongs to the Argentinean province. Such studies must be noted because of the relatively close proximity of South America to the Antarctic Peninsula. Since the Early Tertiary the Scotia Arc has served as a connection between these two continents (Adie, 1963) and as a migration route for benthic organisms (Dell, 1972). Out of 69 species encountered by Lena, 15 occurred in the Arthur Harbor area. These included *Cassidulina* (= *Globocassidulina*) *crassa*, *Cassidulinoides parkerianus*, *Cornuspira* (= *Cyclogyra*) *involvens*, *Epistominella* (= *Pseudoparrella*) *exigua*, *Fissurina earlandi*, *F. laevigata*, *Hemisphaerammina bradyi*, *Hippocrepinella alba*, *Nodosaria calomorpha*, *Ovammina* sp., *Patellina corrugata*, *Pullenia subcarinata*, *Quinqueloculina seminulum*, *Saccammina decorata*, and *Spiroplectammina biformis*.

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Intertidal region and molluscan fauna of Seymour Island, Antarctic Peninsula

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During the 1974-1975 austral summer a joint geological field party from Instituto Antártico Argentino and Ohio State University spent 5 weeks studying the Late Cretaceous to Early Tertiary stratigraphy and paleontology of the north end of Seymour Island (Elliot *et al.*, 1975). Much time was spent examining outcrops exposed along the sea cliffs. During low tides I observed and collected molluscs from the intertidal region. This brief note describes the intertidal zone and its molluscan fauna along the north coasts of Seymour Island.

Seymour Island is southeast of the north end of the Antarctic Peninsula (figure 1). Ice conditions are unpredictable because of the island's location on the edge of the Weddell Sea. During the 1974-1975 spring and summer the prevailing southeast winds drove the sea ice northward along the east coast of the Peninsula. Most of the ice passes along the east coast of Seymour Island with lesser amounts of pack ice passing to the west through Admiralty Sound. Shallow depths