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In this issue...

Pseudodontorns, related to modern-day cormorants and pelicans, were large seabirds whose remains have been found in marine deposits in Great Britain, Europe, both coasts of North America, Japan, Africa, New Zealand, and the Seymour Island area of Antarctica. Equipped with a powerful bill, which had bony projections along its edge, and long, thin wing bones, the pseudodontorn was believed to be a marine glider during the Eocene period. Fossil remains from what is probably the legbone of a pseudodontorn (literally, "false-toothed" bird) found near Mount Discovery during the 1995–1996 research season by University of Nebraska researchers now link the bird to East Antarctica. In "First fossil bird from East Antarctica," researchers Jeffrey D. Stilwell, Craig M. Jones, Richard H. Levy, and David M. Harwood describe the find and its significance. This sketch, drawn by Pauline Tandon, shows what the pseudodontorn probably looked like in flight.

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The *Antarctic Journal* invites contributions from members of the antarctic science, logistics, and policy communities who want to communicate their work and ideas to an audience of specialists and scientifically literate nonspecialists. The *Antarctic Journal* is not peer reviewed. It provides reports on U.S. activities in Antarctica and related activities elsewhere and on trends in the U.S. Antarctic Program. The author guidelines explain the requirements for articles submitted for publication.

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U.S. Antarctic Program news

Highlights from the first part of the field season

THREE U.S. stations, four major field camps, and two research vessels support U.S. science activities in Antarctica during the 1997–1998 field season. Weather took its toll at the opening of the season, but careful rescheduling by station and project managers brought the year's programs back on track.

Palmer Station, the smallest U.S. station, is equipped with laboratories that complement those available to marine biologists and oceanographers aboard the research ships *Nathaniel B. Palmer* and *Laurence M. Gould* and that enable joint shipboard-station research on the marine ecosystem. Instrumentation at the station provides critical satellite imaging support for cruises in the Antarctic Peninsula region and in the Weddell Sea. Palmer's location next to the Antarctic Peninsula is significant due to the maritime climate and proximity to large concentrations of birds, mammals, sea life, and terrestrial plants. *Photo by Joyce Jatko, Office of Polar Programs, National Science Foundation, November 1997.*

Palmer Station. When the *Nathaniel B. Palmer* brought the first of the summer crew to Palmer Station on Anvers Island at the end of September, it had to plow through solid ice all the way into the bay. In mid-November, the M/V *World Discoverer*, filling in for the delayed *Laurence M. Gould*, brought cargo and more of the summer crew, raising station population to 45. Two other tour ships and a National Oceanic and Atmospheric Administration charter vessel will bring the balance of the personnel and limited additional cargo. Because of the delayed delivery of the *Gould*, Palmer Station will not send out any cargo until February 1998.

Science research teams' stays at Palmer Station range from 4 weeks to 4 months. While at Palmer, researchers use the on-site laboratories as well as venturing into the land and water areas around the station. This season, as for the past decade, several research teams at Palmer Station are monitoring the springtime depletion of ozone and studying how the concomitant increase in ultraviolet-B radiation affects organisms in the area. For the past several years, scientists have become

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attentive to the effect that tourism and human presence may have on local birdlife, and this year, Palmer is once again host to a team examining that issue.

McMurdo Station is the site of the Crary Science and Engineering Center, a state-of-the-art research facility that supports a wide range of research projects. Shown here in a 1997–1998 austral summer photo by Ed Anderson of Antarctic Support Associates, McMurdo Station is built on one of Antarctica's few pieces of ice-free solid ground, making permanent structures possible. The station is critical as a staging facility for logistics support to field camps in the continent's interior and to Amundsen–Scott South Pole Station.

McMurdo Station. The largest of the three U.S. stations, McMurdo on Hut Point Peninsula, Ross Island, reached its full summertime population of 1,200 by early November. The station opened on 30 September when the first cargo flight arrived, and the first passengers arrived by air the following day. Storms pummeled the station in mid-November, disrupting flight schedules and field camp openings. The move from the sea-ice runway to Williams Field was completed on 6 December, a week earlier than planned because of deteriorating sea ice.

The *Nathaniel B. Palmer* arrived on 16 December, breaking through the ice edge as far as possible. Personnel and cargo were transported from the *Palmer* to the station by helicopter.

Because of its location on an ice sheet 3 kilometers thick at Earth's axis of rotation, its cold, dry atmosphere, and its remoteness from centers of human population, Amundsen–Scott South Pole Station has unique and important advantages for conducting world-leading science in earth seismology, astronomy, astrophysics, and atmospheric chemistry. Seen here in February 1997, South Pole Station is accessible by air for only 3-1/2 months during the austral summer.

Amundsen–Scott South Pole Station. The summer crew began arriving by LC-130 Hercules airplane on 8 November—12 days late because of low temperatures at South Pole and bad weather across the continent—to relieve a winter crew that had been isolated since February. Science and support personnel began arriving at the station on 12 November for the summer research season, which had been planned for 16 weeks but shortened to 14 by the delayed opening. To make up for time lost, the National Science Foundation (NSF) decided to raise the preseason-

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planning population cap of 183 and bring in extra science and support personnel to help throughout the season.

The busy summer schedule includes the following:

- Antarctic Support Associates, support contractor for NSF, will complete the VIPER telescope project for the Center for Astrophysical Research in Antarctica (CARA). VIPER is a larger and more powerful replacement for CARA's PYTHON telescope.
- The Polar Ice Coring Office (PICO) will drill three more holes for the Antarctic Muon and Neutrino Detector Array (AMANDA). The holes planned for this season will be wider and deeper than the previous AMANDA holes.
- In January, NSF will host a dedication ceremony for the new Atmospheric Research Observatory (ARO), which replaces the old Clean Air Facility. The ARO will house the National Oceanic and Atmospheric Administration's climate monitoring laboratory, a lidar experiment, and experiments that will monitor aerosols and ultraviolet light.
- Work will begin on remodeling and upgrading the station. Compressed snow has been blasted away from the existing garage arch. The arch will be removed, and working in round-the-clock shifts, ASA's construction crew will build a new garage arch before the end of the season.
- The summer camp will be moved in hopes of keeping it from being buried by drifts during the winter. ASA will also construct three new Jamesway huts, providing accommodations for 27 additional people.

Field camps. Early in the field season, researchers worked at the first drill hole site of the Cape Roberts Project, successfully retrieving one core, but bad weather forced them to close the camp early on 25 October 1997. The Cape Roberts Project is an international effort to learn about the climate history of Antarctica by studying sediment cores from the ocean floor.

In late October, Siple Dome camp staff and a construction crew were put into the field to open that camp. Four Jamesway huts that had been left up over the winter had held up well. By mid-November, the science teams, including a group from the Polar Ice Coring Office, began setting up the large drill and a small drilling project away from the main camp.

In early November, the Taylor Valley camp in the McMurdo Dry Valleys and the Lake Hoare camp were opened. The team sent to open the Taylor Valley site were marooned for almost a week by bad weather.

The *Nathaniel B. Palmer* leaves Winter Quarters Bay and McMurdo Station on its way to sea to conduct science investigations in the Ross Sea region. *Photo by David Beverstock, U.S. Antarctic Program.*

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Research ships. On its way to Palmer Station, the *Nathaniel B. Palmer* stopped at King George Island to set up the Copacabana camp, an observation hut staffed by three scientists who will study three different species of penguins for the next 5 months. After arriving at Palmer on 30 September, the *Palmer* returned to Lyttelton, New Zealand, to prepare, along with the *Roger Revelle*, for the Joint Global Ocean Flux Study (JGOFS). Once the equipment was set up and tested for the 16-university study, 34 scientists set sail on the *Revelle* for the first cruise. The *Revelle* will concentrate its JGOFS efforts on the Polar Front Zone, and the *Palmer* will work farther to the south.

During the JGOFS cruise, the *Palmer* had the opportunity to make use of data from the newly operational SeaWiFS. (See the story in the December 1997 online issue of *Antarctic Journal*.) Slight changes in the ocean's color indicated a phytoplankton bloom, so the *Palmer* adjusted its cruise track to enable the JGOFS team onboard to study the phenomenon.

The *Laurence M. Gould*, the new NSF research ship, spent 36 hours in the Gulf of Mexico for science trials on 5 and 6 December. All science equipment aboard ship was tested, and the science suite functioned well. Following the completion of trials and resolution of administrative details, the *Gould* will go from Louisiana to Punta Arenas, Chile, to replace the *Abel-J*, a chartered ship that has been transporting scientists, staff, and cargo between Punta Arenas and Palmer Station.

Sky diving accident at South Pole claims three lives

Three members of a private expedition were killed on 6 December when their parachutes failed to open during what was billed as the first private skydiving attempt made in Antarctica. The three men who died were part of a group of six skydivers brought to the continent by Adventure Network International, a private company that has been flying tourists to Antarctica since 1988. The three men killed were said to have logged hundreds of jumps each and were described by an Adventure Network International spokesman as very experienced jumpers. The cause of the accident remains unknown.

Two Americans, Steve Mulholland, 36, of Seattle and Ray Miller, Jr., 43, of Tiffin, Ohio, were among the dead. The third man killed was Hans Rusack, 49, an Austrian. An American and two Norwegians survived the accident. All six men jumped from a Twin Otter plane flying about 2.5 kilometers (8,500 feet) above the ice surface. A physician and an emergency team from Amundsen–Scott South Pole Station found and retrieved the bodies after a short search.

Mulholland, who had worked as a carpenter at South Pole Station, was a former employee of Antarctic Support Associates (ASA), support contractor for the National Science Foundation. “Steve is one of those people that will be remembered here in our shop for many years because of who he was. He was definitely one of a kind,” said Jay Burnside, Science Construction Coordinator for ASA.

Antarctica is managed under the Antarctic Treaty, which allows peaceful activities, and private companies are free to organize expeditions there. According to

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U.S. government policy, the National Science Foundation, which manages U.S. activities in Antarctica, does not support private expeditions to Antarctica nor does it prevent such activities. Nevertheless, in times of crisis, such as the recent skydiving tragedy or the fatal 1993 accident in which a member of a Norwegian expedition fell into a crevasse (see *Antarctic Journal*, 29(2), 11–12), groups and individuals turn to government research activities for help, simply because no other organization is available. Rescues endanger program personnel and cut into valuable research time and resources, including flight hours. “From the point of view of the antarctic program, [private expeditions] have the potential to hugely impact what we do,” comments Steve Dunbar, a search-and-rescue expert. Dunbar pointed out that station resources are typically being used to maximum capacity to accomplish the year's science program and that research is bound to suffer when those resources must be diverted to go to the aid of a private expedition in trouble.

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Is there life on Mars? The controversy over ALH84001 continues

Science notebook—News from Antarctica and beyond

Asteroid impact in the Bellingshausen Sea

Just over 2 million years ago, claim the authors of an article in the 27 November 1997 issue of *Nature*, an asteroid splashed to Earth off the coast of West Antarctica, creating a blast the size of a 10-megaton bomb and firing a column of water 5 kilometers into the air. The impact site was first discovered in the 1960s when the research vessel *Eltanin* recovered cores that bore the characteristic signature of asteroids: iridium. Iridium, a metal element, is rare in the Earth's crust but common in certain types of asteroids and meteorites. The asteroid was subsequently named for the ship.

In 1995, Rainer Gersonde from the Alfred-Wegener-Institute for Polar and Marine Research in Bremerhaven, Germany, and his colleagues, working aboard the FS *Polarstern*, returned to the impact site to explore it. The *Nature* article contains their findings and speculations about the event. By analyzing the geologic record, they determined that the asteroid must have been at least 1 kilometer in diameter and was perhaps as large as 4 kilometers. Its size places the Eltanin asteroid at the threshold believed to have global consequences.

Gersonde and his multinational team believe that when the Eltanin asteroid crashed to Earth, it created devastating tsunamis that swamped the coasts of South America and Antarctica. Sediment blasted from the ocean bottom by the impact probably spread up to 4,000 kilometers away. Dust, vapor, and salts most likely were carried aloft around the world, and the debris and hot vapor emitted from the blast could well have damaged the Earth's ozone layer. Climate change is probable, but the authors say that whether it persisted or lasted only a few years is unknown. No evidence has been found that the climate change caused the extinction of any species.

Of the 140 known impact sites on Earth, the Eltanin asteroid site, at 4,000 meters depth, is the only one in the deep ocean. Researchers hope that what they learn from studying this impact site will help them locate other deep-ocean impact sites. Logic dictates that because the Earth's surface is 70 percent water, impact sites should be more numerous on the ocean floor than on land.

For a brief description of the *Nature* article, see the 4 December *Nature* science update, "Earth: Ocean splashdown."

Is there life on Mars? The controversy over ALH84001 continues

"It is a completely normal part of science," writes geologist Ralph P. Harvey, of Case Western Reserve University, on the Antarctic Search for Meteorites (ANSMET) Web site, "for researchers to 'try on' various theories and interpretations, and at this stage [in the ongoing study of ALH84001] utterly natural that groups might hold to contradictory interpretations. Normally, the public doesn't see science at this stage."

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Scientists agree on one thing: because trapped gases within the potato-sized rock match the composition of gases in the atmosphere of Mars, the meteorite, which was found in the Allan Hills region of Antarctica in 1984, did originate on the surface of Mars. But within the Mars rock, researchers have found carbonate globules, and it is the origin of the carbonates that has led to a parting of the ways.

Some researchers studying the rock believe that the carbonates formed as a result of biotic processes and contend that within the globules there are tiny vestiges of ancient microbial life, which they call "nanobacteria." National Aeronautics and Space Administration geologists Everett K. Gibson, Jr., David S. McKay, and their team make their case for this interpretation in the December 1997 issue of *Scientific American*.

Others—including Ralph Harvey and his fellow researcher H.Y. McSween, Jr., of the University of Tennessee–Knoxville writing in the 4 July 1996 issue of *Nature*—believe that the carbonates formed right from the host volcanic rock itself during reactions taking place because of physical changes—heating, cooling, being pressurized, or subjected to fluid—to the rock. J. William Schopf, Professor of Paleobiology, Department of Earth and Space Sciences, University of California, Los Angeles, agrees. The nanobacteria the NASA team saw within the carbonate of the rock were all too symmetrical and orderly, in his opinion, to be biological organisms—had a few been flattened or had some been clumped together Schopf might have been more convinced that they are, in fact, the microscopic organisms that Gibson and McKay and their team claim they are.

"Both our study," writes Harvey on the ANSMET Web site, "and that of the McKay group are only small parts of the tremendous amount we still have to learn about ALH84001." Gibson concurs that much yet is to be learned. He is hopeful that when NASA conducts its sample-return mission to Mars in 2005, the Martian rocks brought back will provide scientists with the kind of data they need to determine conclusively whether life came into being on Mars and, in turn, to begin to unlock the mystery of the prevalence of life in the Universe.

The debate between the two groups also is played out in the December issue of *Nature* (see the 18 December *Nature* science update), where each side was given 1,000 words to state its case.

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Children's author visits the South Pole

Amundsen–Scott South Pole Station hosted during December children's science writer Janice VanCleave as she and Randy Landsberg, the education coordinator for the University of Chicago–based Center for Astrophysical Research in Antarctic (CARA), led children on an educational adventure. Middle school students from different geographic locations suggested simple science experiments for VanCleave and Landsberg to perform at the South Pole; the students performed the same experiments in their schools. For example, an experiment might seek to answer the question, "Does water boil at the same temperature everywhere?"

Both the student groups and VanCleave and Landsberg posted the results of the experiments on an interactive Web site at http://www.southpole.com. Students can ask questions and get answers at the site. They were able to continue submitting ideas for experiments throughout the antarctic summer research season. The goal of the project is to stimulate interest in science and in Antarctica. Students and teachers can e-mail VanCleave and Landsberg at *icy@astro.uchicago.edu*.

VanCleave, who has written three dozen children's books and is a former Phi Delta teacher of the year, will use the experience to write another book in her "Science for Fun" series. She also holds "Fun With Science" workshops at libraries, schools, museums, and bookstores throughout the country.

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The Protocol on Environmental Protection enters into force

On 14 January 1998, the Protocol on Environmental Protection to the Antarctic Treaty, entered into force. The Protocol was signed in 1991 at Madrid, Spain. For it to be a legally binding agreement, each signing party had to ratify it in accordance with its own constitutional processes. That action was completed on 15 December when Japan, the last party to do so, deposited its instrument of ratification with the U.S. Department of State. (The United States is the Antarctic Treaty's designated depository government.) Entry into force takes place 30 days after the last Party ratifies.

The Protocol builds on the Antarctic Treaty to provide a comprehensive system to protect the antarctic environment and its associated and dependent ecosystems. It designates Antarctica as a natural reserve, devoted to peace and science. The Protocol also establishes a new committee, the Committee for Environmental Protection (CEP). This committee is charged with providing advice and recommendations to the Treaty parties in connection with implementation of the Protocol. Adoption of the rules of procedure for the CEP will be a primary focus of the next Antarctic Treaty Consultative Meeting to be held in Tromsø, Norway, in early June of this year.

Among the provisions of the Protocol is a ban on all activities related to mineral resources except for scientific research. The Protocol also commits parties to environmental impact assessment procedures for planned activities, both governmental and private. It enhances the protective measures accorded to fauna and flora and imposes strict limitations on the disposal of wastes and discharge of pollutants, both land based and ship board. Changes to the terms used for designating protected areas are included in one of the annexes to the Protocol, though adoption of those changes must be made separately by the Treaty parties.

The United States, through regulations that were issued under the Antarctic Conservation Act, has been complying with most of the Protocol even prior to its entry into force. The United States completed its ratification with passage of the Antarctic Science, Tourism and Conservation Act of 1996, signed into law on 2 October 1996. Among the regulatory changes that have been made since then are specific requirements for environmental impact assessments for nongovernmental expeditions sponsored by U.S.-based companies and requirements for ships traveling to Antarctica to have plans that will provide for prompt and effective response to oil spill emergencies. Additional pending changes to the U.S. regulations are in the protected area system. Areas currently designated as either Specially Protected Areas (SPAs) or Sites of Special Scientific Interest (SSSIs) will be designated as Antarctic Specially Protected Areas (ASPAs) and renamed and renumbered. The permit system for entry into such areas will remain unchanged.

The full text of the Protocol and its related annexes can be read at New Zealand's "Gateway to Antarctica" World Wide Web site.

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First fossil bird from East Antarctica

Jeffrey D. Stilwell, Department of Geology, University of Nebraska, Lincoln, Nebraska 68588-0340

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REMAINS of a large fossil bird (Aves) of Middle Eocene age were discovered by University of Nebraska–Lincoln geologists during the 1995–1996 austral season. This is the first record of a fossil bird from East Antarctica. The fossil was collected in glacial moraine deposits flanking the upper northwestern side of Mount Discovery in McMurdo Sound (figure 1). New data gleaned from the bone will help bridge a major gap in our scant knowledge of Paleogene vertebrates of Antarctica. The recovery of Aves remains (often fragile and hard to preserve) indicates the potential presence of other vertebrate remains in the McMurdo Sound erratics.

The only information hitherto available on Eocene antarctic Aves has been those of penguins (Spheniscidae), rather common in the extensive, highly fossiliferous deposits of the La Meseta Formation of Seymour Island on the northeastern tip of Antarctic Peninsula, and other fossil birds recorded from Seymour Island since 1980 including those of the Pelagornithidae, Diomedeidae, Phororhacidae?, and

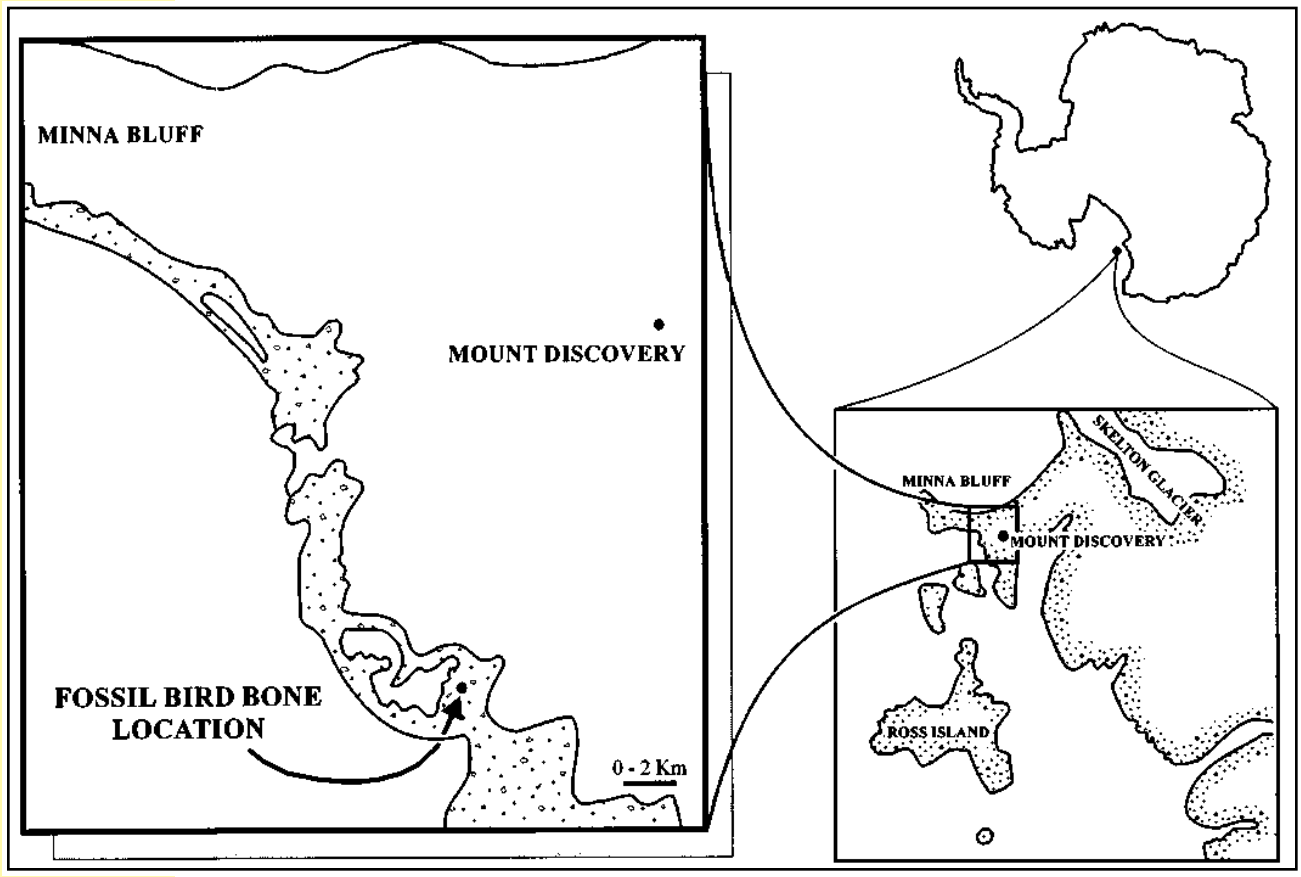

Figure 1. Location map of fossil pseudodontorn bird locality, Mount Discovery, McMurdo Sound, East Antarctica. (Km denotes kilometer.)

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a probable ratite (see Seymour Island papers and comments on fossil birds by Wiman 1905; Marples 1953; Simpson 1971; Tonni 1980; Tonni and Tambussi 1985; Case, Woodburne, and Chaney 1987; Tambussi and Tonni 1988; Fordyce and Jones 1990; Myrcha, Tatur, and del Valle 1990; Stilwell and Zinsmeister 1992; Tambussi et al. 1994).

Also known from Seymour Island is a loonlike bird (Chatterjee 1989), which is of latest Cretaceous age, was collected from the Lopez de Bertodano Formation, and is possibly referable to the fossil loon *Neogaeornis wetzeli* (Aves: Gaviidae) (Olson 1992). The remains of a latest Cretaceous shorebird (Anseriformes: Presbyornithidae) were discovered recently in the Lopez de Bertodano Formation of Vega Island, Antarctic Peninsula (Noriega 1995). The Seymour and Vega islands fossils represent the oldest fossil birds from Antarctica. The only other record of fossil birds from Antarctica, albeit indirect evidence, is of bird tracks of Tertiary age from Fildes Peninsula of King George Island, South Shetland Islands (Covacevich and Rich 1982).

The erratic containing the bird bone from Mount Discovery is a fossiliferous, medium-grained sandstone interpreted to have been deposited in a shallow marine environment. The bone, a probable humeral shaft (figure 2), is abraded

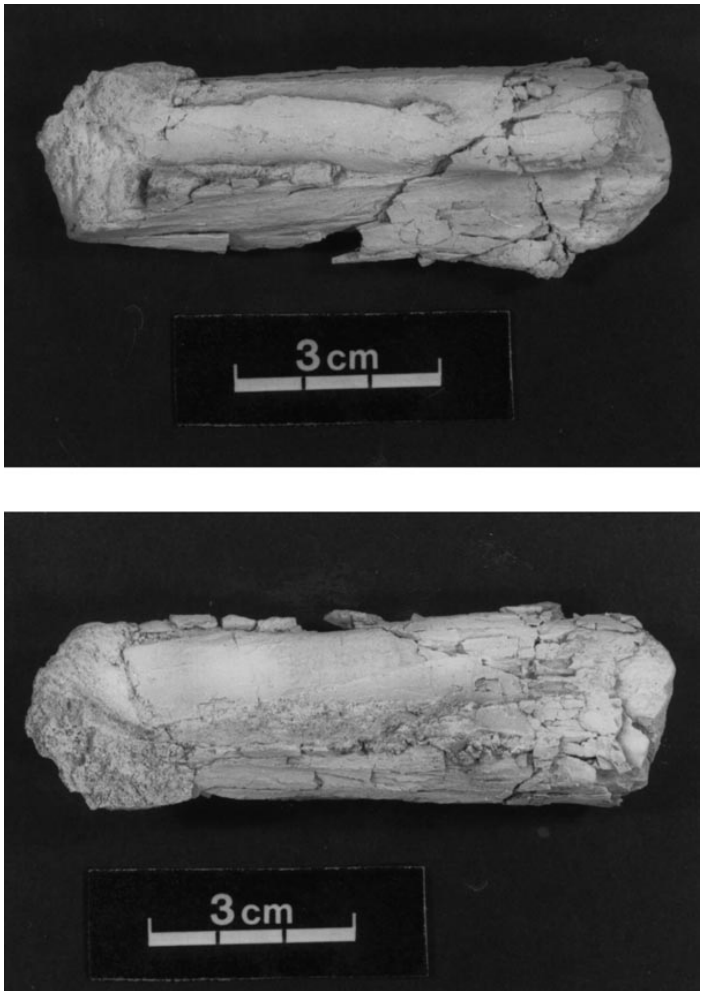

Figure 2. Two views of the humeral shaft bone of Middle Eocene pseudodontorn bird from Erratic E303, Mount Discovery; length of bone is approximately 95 mm.

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and moderately crushed, suggesting that it was exposed on the seafloor for some time before burial. Whether the bone was crushed during a predator attack or by postmortem taphonomic processes is uncertain, because only a fragment of the bone is preserved. The fragment is approximately 95 millimeters (mm) long with a maximum diameter of 33 mm. The bone is straight and hollow and has thin walls (2–3 mm) relative to its size. The proximal? end is exposed on the surface of the erratic and has an inflated, approximately triangular cross-section. A wide, shallow groove runs along one face of the bone; it is deepest at the proximal? end. The remainder of the bone is badly crushed and abraded, and it lacks any other positively identifiable features. The size of the bone indicates that the bird, when alive, was quite large. The hollow nature of the bone precludes placement of the bone in Spheniscidae. The thin walls, large size, and straightness of the fragment indicate it is probably a humeral shaft fragment from a longbone of a large volant (flying) bird, the most likely candidate being a pseudodontorn ("false-toothed" bird) belonging to the Pelecaniformes: Odontopterygia: Pelagornithidae.

The pseudodontorns (*sensu* Olson 1985) (*see* figure 3) are a highly specialized group of extinct seabirds, related to cormorants, gannets, boobies, pelicans, tropic birds, and frigatebirds (Pelecaniformes). They are characterized by their large size; robust bill, which had numerous toothlike bony projections devel-

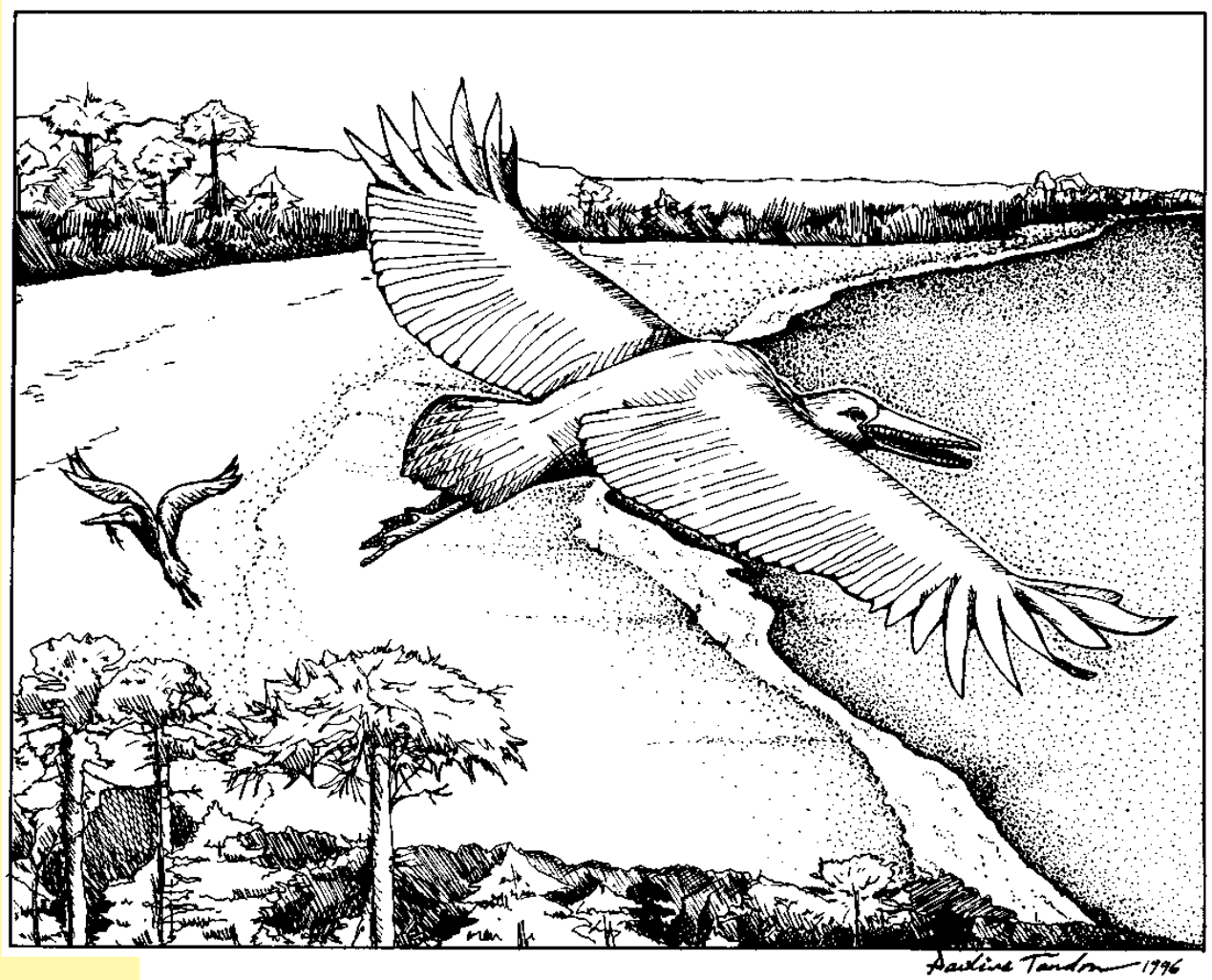

Figure 3. Reconstruction of a pseudodontorn bird in the Middle Eocene east antarctic coastal environment. Note araucarian and southern beech tree (*Nothofagus*) forest, based on fossil leaf and wood material associated with the bone and similar erratics.

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oped along its edge; elongate, thin wing bones; and humeral head morphology that reduced mobility in the shoulder joint. Olson (1985) suggested that the pseudodontorns were similar to extant albatrosses in that they were predominantly pelagic? or marine gliders.

Pseudodontorns have a fossil record ranging from Early Eocene to Pliocene. They are known from marine deposits in Great Britain, Europe, North America (Atlantic and Pacific coasts), Japan, Africa, New Zealand, and Antarctica. The pseudodontorn record from Antarctica is derived from the Middle Eocene to ?lowermost Oligocene sediments of the La Meseta Formation on Seymour Island, Antarctic Peninsula (Tonni 1980; Tonni and Tambussi 1985; Stilwell and Zinsmeister 1992; and personal observation in 1994, R. Ewan Fordyce collection of University of Otago Geology Department, New Zealand). Unfortunately, the Seymour Island material, comparable to the Mount Discovery specimen, is fragmentary and is not identifiable at genus- and species-level. Nevertheless, the antarctic records of these fossil birds are among the oldest known, representing the near base of the radiation of the group.

The age of the bird bone is based on associated mollusks, decapods, and microfossils (dinoflagellates). A moderately well-preserved turritellid gastropod specimen associated with the bone, identified as probably conspecific with *Colposigma euthenia* Stilwell and Zinsmeister of Seymour and Cockburn islands, indicates an Eocene age. On Seymour Island, *Colposigma euthenia* ranges from unit I to unit VI in the La Meseta Formation, indicating a late Early to mid-Late? Eocene age. A probable fragment of the venerid bivalve *Eurhomalea* sp. also supports an Eocene age, as does a small fragment of the decapod *Callichirus*? *symmetrica* (Feldmann and Zinsmeister), which was dated recently as late Early to Middle Eocene age (Stilwell et al. in press). Other macrofossils that are present with the bones but are not age diagnostic include plant fragments and other unidentifiable fossil fragments. Dinoflagellate taxa associated with the bone include *Deflandrea antarctica* Wilson, *Senagalinium? asymmetricum* (Wilson), *Spinidinium macmurdoense* (Wilson), *Vozzhennikovia apertura* (Wilson), *Enneadocysta partridgei* Stover and Williams, *Lejeunecysta hyalina* (Gerlach), and *Hystrichosphaeridium truswelliae* Wrenn and Hart. The antarctic age constraints for these dinoflagellate taxa are currently under study by Richard H. Levy but suggest a Middle to Late Eocene age for the bird bone. The pseudodontorn material from the La Meseta Formation of Seymour Island was collected from the middle units of the formation, indicating a Middle Eocene age (Askin personal communication), thus strengthening the probability that the Mount Discovery specimen is coeval.

This find of a probable pseudodontorn at Mount Discovery is significant not only because these birds were a widespread, important component of the Eocene high-latitude avifauna but also because the find indicates an apparent link between east and west antarctic faunal elements.

We wish to thank the personnel of McMurdo Station, Ross Island, including the VXE-6 Squadron, for supporting our research in Antarctica. John Kaser, University of Nebraska–Lincoln, discovered the erratic containing the bird bone, and we thank him for finding it in a sea of erratics in the Mount Discovery

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moraine. Steve Bohaty, University of Nebraska–Lincoln, assisted in the field, and we thank him for his enthusiasm for collecting fossils. This research was supported by the Alumni of the Department of Geology, University of Nebraska–Lincoln, and National Science Foundation grants OPP 93-17901 and OPP 91-58075 to Harwood.

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