

Antarctica: Mountains, Glaciers, Ice, Ice and More Ice

ROBERT A. WHARTON, JR., GEORGE M. SIMMONS, JR. *and*
BRUCE C. PARKER*

ONE OF THE MORE remote and desolate regions left on this planet is Antarctica. The Antarctic continent, twice the size of Australia, encompasses some five-and-a-half million square miles. As anyone who has visited Antarctica will testify, it is truly an overpowering landscape.

During the past three years we have been fortunate to conduct scientific research concerning the ecological relationships between soils, glaciers, and lakes in the Dry Valleys of South Victoria Land, Antarctica. What follows is a brief discussion of our Antarctic research at Lake Hoare during the 1979-80 austral summer. General aspects of geography, geology, limnology and biology are considered. Climbing endeavors will also be related.

Uniqueness of the Area. The Antarctic land mass was first sighted in the 1820s; however, it was not until 1903 that members of Scott's expedition observed the inland ice. Nearly 98% of the Antarctic continent is covered by an ice sheet some 2000 to 4000 meters thick. It is speculated that if this ice sheet were to melt the oceans would rise 60 meters. The mean elevation of Antarctica is 2000 meters, which makes it the loftiest of continents. Average snowfall is 12 to 15 cm of water per year suggesting a semi-arid climate. Temperatures are generally quite low with the lowest temperature ever recorded on earth, a chilly -88°C , observed at Vostok Station.

The Antarctic Dry Valleys, so named because they are relatively free of snow and ice, are best characterized as cold deserts. However,

* Department of Biology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

numerous alpine glaciers spill from the mountains into the valley floors, oftentimes providing natural dams for lakes located in the valleys. Wildlife in the Dry Valleys is restricted to an occasional bird. Mosses, lichens and algae are the common plant forms. Bacteria, fungi, protozoans, rotifers, and nematodes are also found, particularly in the Dry Valley Lakes.

Scientific Findings. During the 1979-80 austral summer many interesting scientific discoveries were made in our attempt to better understand the Lake Hoare ecosystem (also see *American Alpine News*, Vol. 4, pp. 18-19, Dec. 1979).

Inputs of nutrients into Lake Hoare are derived primarily from glacial meltstreams off the Canada and Sues Glacier. When flowing, these meltstreams contain rather high levels of nutrients, e.g. phosphorus. Up on the glaciers are numerous epiglacial ponds and ice cups. As these ponds and ice cups contain algae and sediment, and drain into the meltstreams, we suspect that they may also contribute nutrients to the lake. Ice cups with algae have also been observed on the North Glacier of Mount Athabasca, Alberta (see *American Alpine News*, Vol. 4, pp. 18-19, Dec. 1978), and in the Thule Area of Greenland.

Except near shore, Lake Hoare is permanently covered by from four to six meters of ice. When walking across the lake-ice surface, algal mat is often encountered. By melting a hole through the ice and employing SCUBA we have also discovered benthic algal mat growing at very low levels of light. Mat material is also found in the moat or littoral regions. Ultimately, our research endeavors are attempting to explain the impact of the algal mat community on Lake Hoare's geochemistry.

Climbing Aspects. Near McMurdo Station, the principle U.S. scientific outpost, are two interesting climbing areas. Probably the most familiar to "Old Antarctic Explorers" is the icefall near the New Zealand (Kiwi) Chalet. Considering the environment in Antarctica, all field personnel train at the snowcraft/survival school offered by the Kiwis. The first day involves some basics and a tramp about the icefall and nearby slopes. Day two is spent climbing on the "Kiwi icewalls," crawling through a narrow 30-meter ice tunnel, and finally building a snow shelter (igloo, trench or pit) in which the night is spent.

Another fine climbing site in the McMurdo area is Castle Rock. This old volcanic plug dome provides snow, ice, and rock of varying degrees of difficulty. Particularly, the "Kiwi Face" and the "Dynamatt Couloir" involve excellent mixed routes. Since the hike from McMurdo to Castle Rock is four miles, the trip can be accomplished in a night after work. With 24 hours of sunlight, incredible views of Mounts Erebus, Terror, and Discovery, the Royal Society Range, and miles and miles of the Transantarctic Mountains are possible.

Across the sound from McMurdo (c. 104 km), at our Lake Hoare field camp are many areas of interest for the alpinist. Located in the rocky, mountainous and relatively snow-free Taylor Valley are possibilities which range from climbing the snout of nearby glaciers to 2000-meter faces. Although a few of the mountains have been scaled, many first ascents remain.

Since science is the primary objective of work in Antarctica, activities such as climbing must relate to this work. Hence, climbing an icefall is justified by the observation of ice cups and collection of the algae within. Mixed routes are scaled in search of isolated populations of snow and ice algae.

PLATE 71

Photo by C. Shorten

**Wharton on Castle Rock, Antarctica.
Mount Erebus smoking in
background.**

