

Antarctica Lives— Paradise not only for Microbe Researchers



Antarctica – the highest, driest, windiest place on Earth – is roughly the size of the USA and Mexico together. It is a land continent with 98% of its surface covered by ice, some of it two miles or 7.5 km thick. The average temperature in the short, cold summers is -8°C , in the long, icy winters -35°C .

Given these climatic conditions it is hardly surprising that the enormous area around the South Pole is not settled – with the exception of the research stations established by various countries in the world. And there is plenty of “research material” here. Microbes survive under the harshest conditions; the sea is teeming with phytoplankton, zooplankton, marine invertebrates, fish, seals, penguins and whales; ice sheet movements and the hole in the ozone layer are also the subject of scientific research.

Biologists, Physicists, Geologists and Palaeontologists

McMurdo Station Antarctica is located almost due south of New Zealand at $77^{\circ}51' \text{S}$, $166^{\circ}38' \text{E}$, one of the three largest terrestrial stations in the United States Antarctic Programme (USAP). The Albert P. Crary Science and Engineering Center that is part of the McMurdo Station is an “Antarctic workstation” for physicists and biologists equipped with state-of-the-art technology.

Using Leica laboratory and fluorescence microscopes, the biologists study microorganisms such as the cyanobacteria that survive in the snow or in perennially frozen salt lakes at the South Pole. The aim of the research is to find out how they do this. However, in a first stage they have succeeded in clearly identifying the cyanobacteria by proving the presence of chlorophyll and phycobiliproteins.

The physicists are concerned with the mechanisms that avoid freezing in Antarctic fish. They have found

Anti-Freeze Glycoproteins (AFGP) circulating in the blood of these fish, who live in water where temperatures can reach -1.8°C ; this acts as a natural “anti-freeze” by removing ice crystals from within these fish. Fluorescent DNA probes are used to find the locations of the genes responsible for the AFGPs circulating in the blood of the fish.

The fossils of diatoms, single-celled or filamentous algae whose cell walls consist of pectin and silica, are the field of palaeontologists. Using these fossils, the basis of the food web in Antarctica, environmental change can be proven using microscopes.

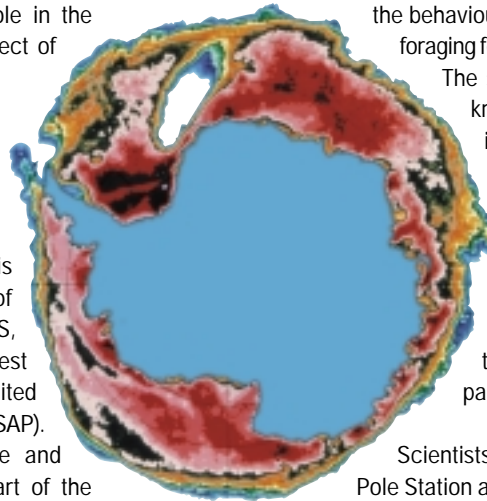
Leica stereomicroscopes are used in remote camps in the dry valleys of the McMurdo territory. The study of fossils, rock samples and volcanic ash will provide information on the developments that shaped Antarctica.

Penguins and “Sun-Dogs” as Subjects of Research

The stomach contents of Adelie penguins in the McMurdo Sound region of Antarctic are also of scientific interest; after all, they provide evidence about the behaviour of these marine birds when foraging for food and rearing their chicks.

The stomach contents – primarily krill, but also small fish – are identified with the aid of a Leica M5 stereomicroscope.

All microscopic images are documented with a Leica photomicroscope system or captured by digital camera. It is certain that the survival of the chicks is dependent on the parents’ ability to catch prey.



Scientists at the Amundsen Scott South Pole Station are after a completely different phenomenon, called “sun-dogs”. These haloes are white or colored sources of light visible around the sun or moon that are caused by refraction of light on ice crystals. These ice crystals are studied under microscopes in order to identify their structures and to find out how the crystals bend the light and thus generate the characteristic haloes in the Antarctic sky.

Even if it is thought that it went into the “Deep Freeze” around 15 to 30 million years ago – Antarctica lives and will continue to be researched.

Wayne Howard
McMurdo Station Antarctica



Leica MS5 Stereomicroscope