

ANTARCTIC



Bulletin Vol 15. No. 2, 1997

21st ANTARCTIC TREATY CONSULTATIVE MEETING



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2	Sun	28 Dec 97	Sydney	8.00am	8.30pm
3*	Wed	31 Dec 97	Melbourne	5.00pm	4.30am
4	Sun	04 Jan 98	Sydney	8.00am	8.30pm
6	Sun	18 Jan 98	Sydney	8.00am	8.30pm
7	Sun	25 Jan 98	Melbourne	8.30am	8.00pm
8	Sun	01 Feb 98	Sydney	8.00am	8.30pm
9	Sun	08 Feb 98	Sydney	8.00am	8.30pm
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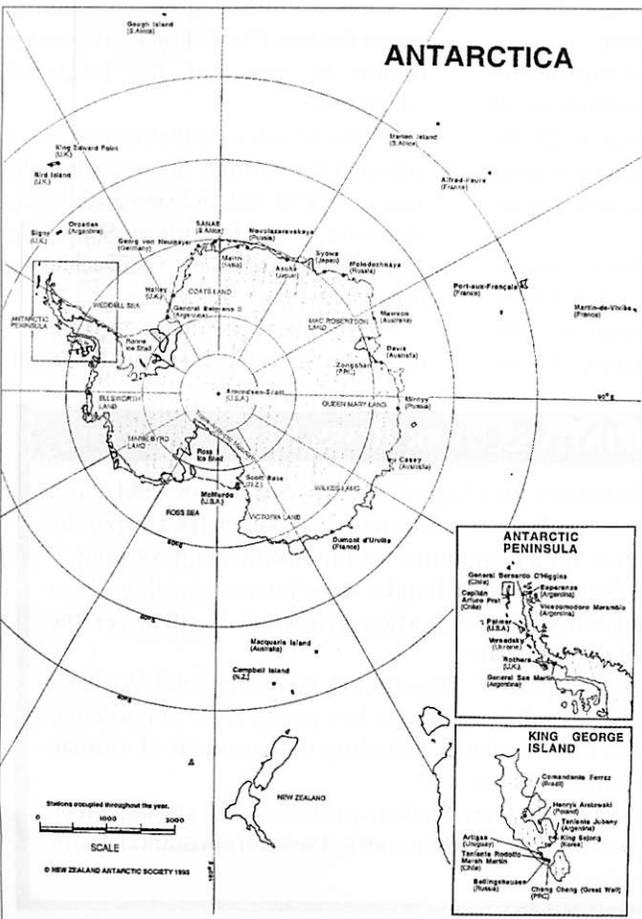


Cover: The 21st Antarctic Treaty Consultative Meeting. Christchurch Convention Centre. Photo courtesy of The Press.

Volume 15, No. 2, Issue No.161, 1997

ANTARCTIC is published quarterly by the New Zealand Antarctic Society Inc., ISSN 0003-5327.

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FORTHCOMING EVENTS

27 October — 7 November 1997
XVI CCAMLR Meeting. Hobart, Australia.

April 1998
Antarctic Futures Workshop. Christchurch, New Zealand.
(Run by Antarctica New Zealand — current & future patterns of tourist & science-related business).

TREATY NATIONS CONFRONT MAJOR ISSUES

With the remoteness of Antarctica under challenge as never before, the 21st Antarctic Treaty Consultative Meeting at Christchurch, New Zealand, has put some major issues squarely before member nations.

Tourism is now a significant human activity on the ice and, apart from fishing, is the principal commercial enterprise in the Antarctic Treaty area, says New Zealand's Ministry of Foreign Affairs & Trade. Around 9000 tourists visited Antarctica in 1995-96, double the number of five years earlier.

The early winter meeting by representatives of 26 nations that undertake scientific programmes in the continental area has increased public awareness of Antarctica and flagged a wider range of issues. These include environment and tourism issues, fishing controls, management of specially protected areas and monuments, global climate change and spread of plant and animal diseases.

"Unresolved sovereignty claims and jurisdictional matters have crowded agendas and stifled debate in the past" says New Zealand's associate Minister of Foreign Affairs, Simon Upton, urging faster consideration of key issues by Treaty nations. Antarctica is a special place," says Upton. "Many people would like to visit this vast, icy, continent which is the coldest, driest, and highest place in the world."

Increasingly, many people are now able to do so, he notes. But as more people visit the continent the risks of environmental damage also increase. Concerned at the growth in visits, New Zealand has released guidelines for visitors to the Ross Sea Dependency, an area receiving some 800 visitors annually.

The Treaty consultations took place against the backdrop of an outbreak of illegal fishing in the vast Southern Ocean. This modern-day equivalent of a "gold rush" threatens the inter-generational survival of the Patagonian toothfish, one of Antarctica's oldest fish. This deep water species is a massive specimen, sometimes up to 2 metres long and up to 65 pounds in weight, and is regarded by elements of the global fishing industry as a rich target.

Not surprising when, the Patagonian toothfish fetches a top price of between US\$5000-\$7000 a tonne from markets in East Asia, and the USA.

Several nations have accepted regulation on fishing and have signed the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). Sources say that not all feel obliged to honour the convention. Pirate fleets allegedly operate outside the convention with near impunity.

The 1996 CCAMLR meeting set the total allowable catch for toothfish in all parts of the Southern Ocean at 23,000 tonnes but estimates of illegal harvesting suggest that the figure is nearly four times higher.

The need to protect Antarctica's environment is not an issue; when Treaty nations met at Madrid, Spain, in 1991 they agreed on the Antarctic Treaty



Scott Base . . . an integral part of New Zealand's Ross Dependency presence.

Protocol on Environmental Protection which allows freedom of scientific research whilst protecting the environment. The problem is that the protocol is unreal until ratified by all Treaty states, a process that is now stretching into 1998.

To improve the prospects of eventual success, the Christchurch meeting spent considerable time agreeing on the protocol procedures and in drawing up rules to ensure the protocol's implementation doesn't bog down.

Some 260 officials from 43 countries met at the new Christchurch Convention Centre to map out the future of Antarctica.

Of the 17 non-consultative parties, 13 attended the meeting. Shortly before the start of ATCM XXI, Bulgaria advised the Antarctic Treaty Depository State (the United States) of its interest in achieving consultative party status.

Treaty members determined that a condition of such status would be ratifi-

NEW ZEALAND PURSUES POLICY INITIATIVES OVER ROSS SEA

New Zealand launched three special policy initiatives at the Treaty meeting:

- a proposal for a Ross Sea region as a large-scale Antarctic Specially Managed Area.
- a proposal for a Ross Sea Region State of the Environment Report targeted to the year 2000.
- an invitation for Ministers from Antarctic Treaty consultative parties to visit Scott Base in early 1999 to mark the 40th anniversary of the Antarctic Treaty.

The initiatives for a large-scale Ross Sea region ASMA and for a Ross Sea Region environment report helped drive the momentum for a Committee for Environmental Protection.

New Zealand will undertake some intersessional work on the framework for a reporting project that will cover the whole of the Antarctic.

The Treaty parties' Transitional Environmental Working Group made "solid progress in key policy areas of particular interest to New Zealand, including management of tourism and operations on the ice."

"Real advances were made in protected area management, where New Zealand had forwarded several substantial plans for approval."

cation of the Protocol on Environmental Protection to the Antarctic Treaty. Bulgaria has an active involvement in scientific research in Antarctica and indicated a willingness to sign the Protocol. The question of Bulgaria's status will be considered at ATCM XXII in Norway.

Some parties expressed the hope that Bulgaria might consider joining the CCAMLR Commission, particularly if Bulgarian vessels were involved in harvesting of Antarctic marine resources.

The 21st Treaty Consultative Meeting spent the first week on detail work, particularly in the environmental area, before considering the major policy issues.

The meeting was in four parts:

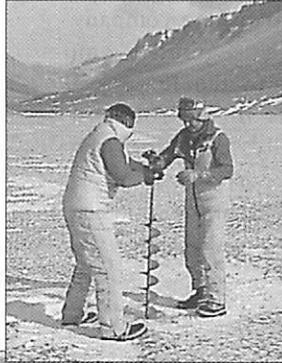
- The Liability Group, which is working on drafting an annex to the Environmental Protocol to the Antarctic Treaty. It asked questions about who should be held liable for damage to the Antarctic environment through human activities. This group was chaired by Professor Ruediger Wolfrum of Germany.
- The Transitional Working Group, chaired by Dr Ola Orheim of Norway, looked in detail at environmental matters. This group is laying the groundwork for the proposed Committee for Environmental Protection which will oversee the management of the Antarctic. The machinery to set up this committee was put in place by the 1991 Madrid Protocol but it will not start operating until all 26 Antarctic Treaty consultative partners ratify the Protocol.
- Two working groups in policy, chaired by Dr Francois Hanekom of South Africa, and science, chaired by Dr Roberto Puceiro of Uruguay.

The host nation, New Zealand, has significant interest in Antarctic matters. Since gaining responsibility for the Ross Dependency, New Zealand has kept up a significant scientific effort on the continent. The Ross Dependency has given New Zealand an acute awareness of the ice-cap, especially in Christchurch which is regarded as the "gateway" to the continent.

The Treaty meeting showcased New Zealand's strong interests in Antarctica

and Christchurch's Antarctic business base, the New Zealand Antarctic Institute ("Antarctica New Zealand"), the International Centre for Antarctica Information and Research, the Antarctic Heritage Trust, the Christchurch Visitor Centre and the Antarctic Society.

"There is an awareness of something to be protected to be enjoyed in the future," says Stuart Prior, head of the Antarctic policy unit of the Ministry of Foreign Affairs and Trade, Wellington.



"The dependency is an extraordinary part of the continent. It is the principal access point by air, the climate is in Antarctic terms 'almost Mediterranean',



New Zealand has maintained a significant scientific effort on the continent.

it has a physical attraction with its flora and fauna and marine wildlife, a history of whaling and sealing and is the location of Scott Base."

"The Ross Dependency is a marker for the rest of Antarctic. Not to beat a nationalistic drum but New Zealand is committed to an Antarctic presence because what happens in the Ross Dependency is of vital importance to New Zealand."

Importantly, too, New Zealand does not feel it has given up the Ross Dependency by signing the Antarctic Treaty. New Zealand's claim to the Ross Dependency continues with or without the Treaty.

"There is nothing incompatible with our support of the Treaty and having a strong national interest," says Prior. New Zealand believes strong positive

values can be helpful in setting standards and the Treaty provides a good framework within which governments can work together. This has led to working alliances between New Zealand and the United States and with Italy in particular.

Public interest in the continent is rising as tourism to Antarctica expands. Prior says New Zealand sees tourism as a "perfectly legal activity . . . it helps to have people aware of responsible tourism."

The New Zealand view is that the meeting of the Transitional Environmental Working Group (TEWG) was the principal policy success of ATCM XXI. "It operated, for the first time, as a professional scientific body and its success was an encouraging omen . . ."

There was disappointment, however, that more progress was not made towards establishment of the Committee for Environmental Protection (CEP). The CEP could not be set up at Christchurch because Russia and Japan had not yet ratified the Madrid Protocol.

Russia completed formalities during the Christchurch meeting and Japan is confident that it will complete its processes by the northern summer. It thus seems that setting up the CEP is imminent and the committee is expected to meet for the first time at ATCM XXII in Norway, 25 May-5 June 1998.

Discussions on liability made good progress and there will be an intersessional meeting in Cape Town in November. A written report will emerge at the next Treaty meeting in Norway.

No progress was made on the concept of a permanent Treaty secretariat. Argentina worked extremely hard to try and maintain a united Latin American front in support of Buenos Aires as a location. Brazil stated its support for Argentina's hopes. A Tasmania state government delegation visited the ATCM to lobby for Hobart as the secretariat seat.

There is a possibility that South Africa may join Australia as a potential bidder for the secretariat site. There seemed, however, no sense of urgency on the issue among Treaty parties because the Treaty system has so far functioned without a secretariat.

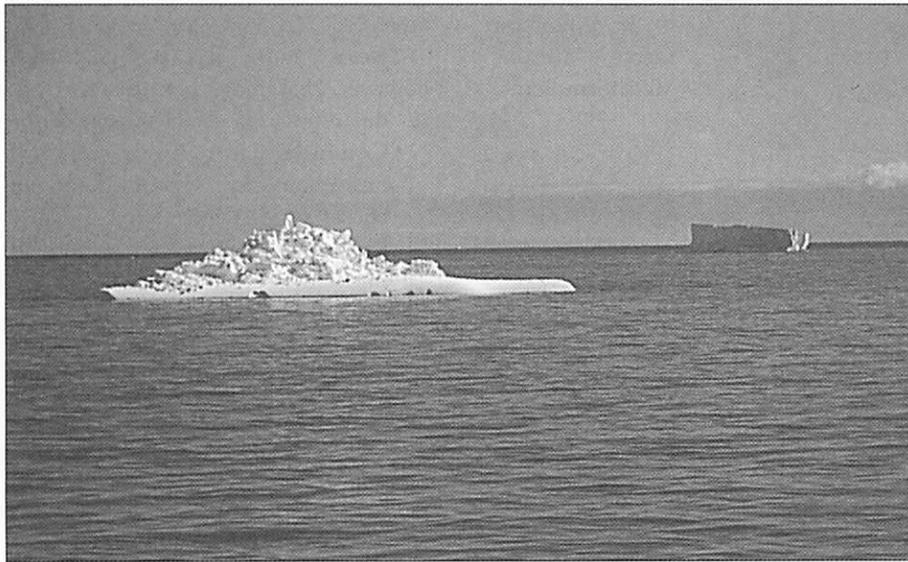
By Warren Head

TOOTHFISH PLUNDER THREATENS SOUTHERN OCEANS

Antarctica's rich oceans are under challenge as never before and the Antarctic Treaty nations have been alerted to large-scale unregulated fishing for the deep-water toothfish.

Reports of riches being reaped by more than 70 illegal trawlers plundering the southern oceans have captured international media attention and have caused mounting unease by governments.

The Patagonian toothfish, *Dissostichus eleginoides*, resides at depths anywhere from 100 metres to 1.5kms and can live as far down as 3kms. They grow up to 2 metres in length.



The pristine southern oceans are under attack from illegal fishing.

Previously a commercial target only on the Chilean coastline where the fishing is limited to regulated inshore longlining, the toothfish has become in keen demand because it commands up to US\$7,000 per tonne.

French news agency reports say the fishing was only recently revealed when US sources declassified satellite photography in the region. France is understood to have arrested a number of illegal fishing boats operating in its exclusive economic zone around Kerguelen Island.

The illegal fishing is dubbed "hoovering" by the fishing industry and totally disregards the principles of sustainable management.

Dr Don Robertson, a marine scientist with the National Institute of Water and Atmospheric Research, says no one knows how many toothfish there are in the southern ocean, reports the New Zealand Herald. The newspaper adds

that the fish had been found in "quite heavy concentrations around the Australian Antarctic territories of Macquarie, Heard and McDonald Islands, around South Georgia in the southern Atlantic and in the French territories around Crozier Island, and in limited numbers at the southern end of New Zealand's exclusive economic zone.

The New Zealand fishing company Sealord has been granted an exploratory permit in the Ross Sea. Many other vessels in the southern oceans are illegally poaching the resource.

"There is no doubt that the southern

oceans around Antarctica are a magnet for fish and they are among the world's richest oceans," says Stuart Prior, head of the Antarctic Policy Unit of New Zealand's Ministry of Foreign Affairs and Trade. "The challenges to this resource are only just beginning and we need to ask what are we doing today to protect Antarctica."

He says that the illegal fishing of toothfish in waters managed by the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) was a major sub-theme of the recent Antarctic Treaty meeting in Christchurch.

"At our initiative very useful discussions were held in the margins about this major problem. While some delegations (notably Germany and Japan) fussed about the propriety of discussing CCAMLR matters in Christchurch, we received very strong support from South Africa, Australia, France,

Norway and the United Kingdom — the countries most affected by the problem — for our efforts to generate worthwhile discussions on this alarming threat to the eco-system management method adopted by the Antarctic Treaty System as a whole."

"Our belief that this fishing is a major challenge to the credibility and workability of CCAMLR was shared by most parties."

Prior says CCAMLR worked very well whilst no-one fished resources in the convention zone. "But now it may prove to be a Maginot line, outflanked by flags of convenience."

Information passed between delegates yielded an idea of the scale of the problem: 40-60 vessels blatantly conducting "pirate" activities which may cause major damage to fish-stocks.

"The management of the human presence in Antarctica and of human interaction with its immensely valuable eco-systems poses a huge and continuing challenge," says Simon Upton, New Zealand Associate Minister of Foreign Affairs & Trade. "The major challenge to CCAMLR is a timely warning of the danger that such interaction can pose."

"In the case of fishing there are things we can do. We must share information. This will help us to put the spotlight on those who are breaching the CCAMLR regime."

"There are effective ways of doing this: the use of satellites, tracking fish transshipments, and monitoring major fish markets are all proven means."

"We must encourage new parties to join, to reduce the risk of new flags of convenience and to put pressure on at ports where catches are landed. Among the ideas I hope will be looked at are a register of vessels who fish in compliance with the Convention and end-user certificates for the toothfish caught in accordance with CCAMLR regulations."

"Illegal and unregulated fishing may be the tip of the exploitation iceberg," added Upton.

As an offshoot of discussions on the toothfish problem, a dialogue has begun on the management of the sub-Antarctic islands between New Zealand, Norway, France, the UK, Australia, South Africa, Chile and Argentina.

TOURISM

PRESSURE INCREASING ON INTEGRITY OF ECO-SYSTEMS

Tourism in the Antarctic continues to expand, according to data released to the Antarctic Treaty consultative meeting in Christchurch.

"Tourism and other uses of Antarctica are burgeoning as the activities of governments cease to be the sole, or even principal, means of human access to the continent," said Simon Upton, New Zealand's Associate Minister of Foreign Affairs and Trade, opening the consultative meeting.

Upton said the Treaty nations should consider how to develop the system of environmental impact assessment to make it more useful and ensure effective response action should environmental disruption or disaster happen.

"But an environmental impact assessment alone will not clearly be enough," he said, urging a clear focus at the wider political level on the values of Antarctica. This requires

broader view of the issues facing the continent and its seas. "I assume that none of us want it to become a great 'theme park' where all sorts of different activities are promoted and encouraged?"

The Minister attributed some ingenuity to tour operators in providing experiences and opportunities for their clients. "It is our view that such activities must be conducted in a way that is compatible with the over-riding integrity of Antarctic eco-systems."

New Zealand has sought to develop practical approaches to implementation of the Treaty protocol, by bringing in guidelines and procedures for managing visitors to the Ross Sea region.

The New Zealand delegation at the Treaty meeting began work on a framework for a Ross Sea region State of the Environment Report and started discussions with its partners in the Ross Sea on a comprehensive Antarctic specially managed area.

Papers presented at the Treaty meeting included those from the tourism sector, particularly the International Association of Antarctica Tour Operators (IAATO).

IAATO is dedicated to appropriate, safe and environmentally sound

private-sector travel to the Antarctic and its members operate within the parameters of the Antarctic Treaty.

Founded by seven private tour operators in 1991 the association has grown significantly to include 23 members and associate members in Australia, Canada, Chile, Germany, Japan, the Netherlands, New Zealand, the UK and the United States.

The number of shipborne travellers to Antarctica on commercially organised expeditions in 1996-97 austral summer (7322) was about 30% less than in the previous year (9212) primarily because the single largest cruise vessel currently active in the Antarctic (Marco Polo) did not operate in 1996-97.

Land-based tourism (91) and overflights (3448) continued at approximately the same levels as 1995-96.

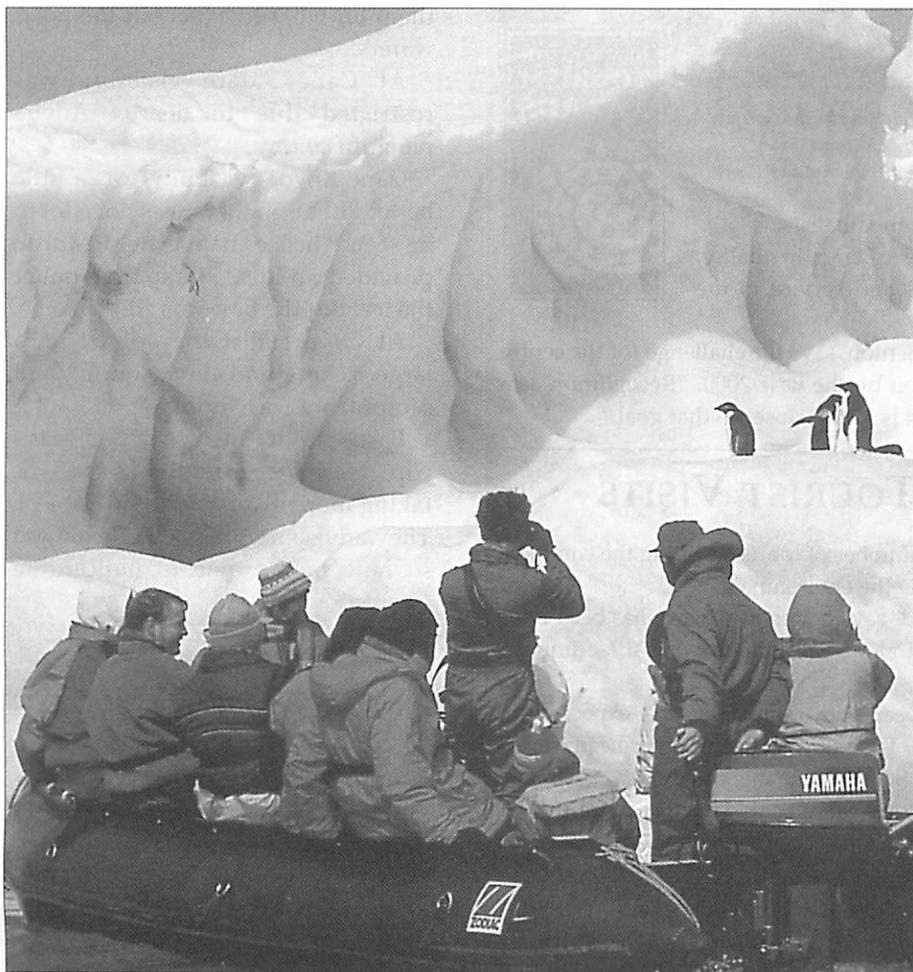
All 13 tour vessels operating in the ice during 1996-97 austral summer were operated by IAATO members.

The members of IAATO are actively involved in formal and informal liaison with national Antarctic programmes as well as scientific and environmental organisation.

Following concerns expressed at ATCM XX, IAATO members have continued to safeguard introduction of alien species to the ice. Recognising that tourists are a highly mobile population in the region, visiting a number of sites within a short time, increased measures have been introduced to safer operations.



Simon Upton



Tourist numbers to Antarctica dropped by about 30% in the 1996/97 Austral summer.

Boot-washing stations are now standard on all tour vessels, where all visitors are required to clean their boots before and after each landing, to eliminate soil or weeds from footwear as a result of visits ashore and to avoid accidental transfer of non-native organisms to the Antarctic or within sites within the Treaty area.

As a further step to avoid introduction of non-native species, tour vessels do not discharge water in Antarctica taken on north of the Antarctic convergence.

IAATO also manages its site visits so that no more than 100 people are ashore at any one site at any one time.

Expedition leaders are co-ordinating their final tour schedules to avoid having two ships in the same place at the same time.

They are also examining how landing sites are selected as a mitigating factor in potential environmental impacts of brief visits ashore by tourists. Such criteria for selecting and managing site visits include frequency of past visitation, presence of flying birds (especially nesting giant petrels), vegetation cover, and ongoing science being conducted at the site.

While each tour operator conducts its own training programmes and

hires according to its own standards, IAATO is collecting information on the qualifications and experience of the field staff employed by its members.

According to IAATO by-laws, members are required to hire staff that as a whole have at least 75% previous Antarctica experience. The 175 staff members employed during the 1996-97 season by IAATO members had, on average, seven years of Antarctic experience, ranging from one to 35!

To further its educational mission, IAATO has a Website operating, it is <http://www@iatto.com> that went online in July 1997.

VISITOR CENTRE RECOGNISED AGAIN

The Visitor Centre, International Antarctic Centre, is a finalist in the New Zealand Tourism Awards Visitor Attraction Centre for the second time in five years.

The centre won the award in 1992 and competed against three other visitor attractions.

The Tourism Board says the judging process for the awards is "extremely rigorous," with seven judges from the tourism industry spending two days considering all entries before announcing the finalists.

"The awards are judged in terms of overall excellence in quality, service, customer focus, marketing operations and service to the environment."

The general manager of the centre, Richard Benton, says the challenge for the centre is to become Australasia's best visitor attraction by the year 2000. "Recognition as a finalist in the tourism awards for our attraction is a step closer to that goal."



Above: Visitor Centre, International Antarctic Centre . . . finalist for second time.
Right: The New Zealand Tourism Awards logo.



DIVERS DISCOVER 'UNREAL' WORLD

They didn't quite have to break the ice to get in, but for four divers and three snorkellers on a Heritage Expedition South to Antarctica (Jan 28th — Feb 18th 1997) found some of the best diving around icebergs.

They had come well prepared, and dive master Cam Aird had briefed them on what to expect in the polar waters.

At Cape Adare visibility was restricted due to nearby Adelie penguin colony.

Cape Royd's visibility was a little better although there was not a lot to be seen. The ice channel at McMurdo provided an ideal site to dive under the ice. But the best was still to come.

At Cape Hallet they dived on a large iceberg and the colouring and sculpturing was "unreal."

Based on the success of this year's trip, Heritage Expeditions will be taking more divers south in 1998/99. They advise numbers will be limited so now is the time to indicate an interest.



Preparing for a polar plunge.

CALL TO RESTRICT TOURIST VISITS

A leading Antarctic scientist wants to limit the number of tourists visiting the continent until studies show what effect they are having on the environment.

New Zealand geo-chemist Dr Doug Sheppard says not enough work has been done on setting up systems monitoring impacts, "let alone research on what these impacts might be."

Nearly 10,000 tourists went to Antarctica last year, with a similar number expected this year. Five years ago the number was only 3000. They pay up to \$5000 per head for the trip, with most tourists coming from the United States, Germany, Britain and Australia.

Dr Sheppard said the problem was you can see where people have been on the ice. "There's no vegetation to cover where they've been. The eco-system down there does not recover quickly and footprints last for decades."

He said New Zealand was in a difficult position because it did not have the resources to manage controls over tourists.

However Antarctica New Zealand spokesperson Tim Higham says he believed tour groups were being successfully managed with no significant impact on the environment.

NEWS

BRITISH PREDICT MODEST RISE IN ANTARCTIC TEMPERATURES

The British Antarctic Survey has put forward its view on global warming.

In a position statement the Survey says most climate models indicate relatively modest temperature rises around Antarctica over the next 50 years and that over this period, increased snowfall should more than compensate for increased melting of ice. This will partially offset the rise in sea levels resulting from thermal expansion of the oceans and melting of icecaps and glaciers elsewhere in the world.

Few Antarctic stations have weather records extending beyond 40 years and temperature records in the region are characterised by a very high level of inter-annual variability. They say warming trends are very small over much of Antarctica and there has even been some cooling in recent years at the South Pole.

One area where detectable climate does seem to be occurring is the central and southern parts of the west coast of the Antarctic Peninsula.

They report that climate changes from the region extend beyond 50 years, and over this period, annual mean temperatures have risen by about 2°C — a far larger rise than elsewhere in the southern hemisphere.

They conclude, however, that climate model predictions do indicate an enhanced response to global warming in some parts of the polar regions, but the Antarctic Peninsula is not one of these.

"While we cannot definitively state the cause of the warming of the Peninsular at present, the available evidence indicates it is more likely to be a local phenomenon caused by the complex interactions of atmosphere, ocean and ice in this region, than a response to global warming."

Meanwhile American and Danish scientists have reported that the ice cap north of Greenland seems to be getting thinner. They made their claims after studying radar images from a European satellite.

Their measurements found that glaciers are carrying about 20% more ice into the sea than is being replaced by snow deposited in the island's interior, reducing the ice cap an inch a year.

Previous estimates of the rate at which the ice flows into the sea depended mainly on measurement of the size of icebergs breaking off the ends of glaciers. That method could not account for melting from the bottoms of glaciers where they can sometimes extend up to 100km under water before breaking off.

Using the satellite measurements scientists found that for every cubic foot of ice that wound up in icebergs, 3.5 cubic feet of ice had melted from the bottoms of the advancing floating glaciers before they formed any bergs.

THE ICE'S 'WASTE POLICEMAN'

The signing of the protocol on environmental protection to the Antarctic Treaty has led to an awareness of the potential impact of activities on the continent, says Emma Waterhouse, the environmental manager of Antarctic New Zealand.

Known as the "waste policeman" at the New Zealand and American bases, Waterhouse says appropriate management of environmental issues has become an integral part of New Zealand's programme. This was being supported by a review of the programme's compliance with the environmental protocol, a document that has

RESTORED BASE POPULAR



Port Lockroy . . . busy year.

The first season of manning the restored base of Port Lockroy has been a busy one.

Some 65 ships, 16 yachts and 4250 tourists visited the site. Feedback from visitors was universally favourable, and merchandise also sold well.

Port Lockroy is the first living museum on the Antarctic Peninsula.

banned mining for 50 years and provided guidelines and rules for any Antarctic undertaking such as research or tourism.

Waterhouse's job includes everything from writing waste-management handbooks for staff and visitors at Scott Base to providing environmental impact advice to a panel reviewing all New Zealand proposals for Antarctic activities.

She sees New Zealand taking a broader stewardship role in the future, especially taking a proactive rather than a reactive approach to environmental issues and in a wider area than just around Scott Base.

U.S. CIVILIAN WORKER DIES

An American civilian worker at McMurdo Station died two days before he was due to be flown to Christchurch for treatment.

Charles Gallagher, 50, a US Navy retiree who was in charge of recreational activities at McMurdo, died of heart failure after suffering from pneumonia, dehydration and fluid build-up around his heart.

He was the 48th American to have died in Antarctica since 1955.

The US Air Force had been preparing for a risky winter airlift, involving a nine-hour flight from Christchurch, and after his death made the flight to retrieve Mr Gallagher's body.

CONSERVATION AWARD TO TVNZ NATURAL HISTORY UNIT

The TVNZ Natural History Unit has been awarded the New Zealand Antarctic Society's Conservation Trophy.

It is the 18th recipient of the award which is presented annually to an individual or group that has contributed significantly to conservation in the region.

The award was presented by the society's president, Dr Margaret Bradshaw, before a public lecture at Otago Museum by Dr Bob Headland of the Scott Polar Research Institute.

Dr Bradshaw said raising public awareness about the beauty, fragility and vulnerability of Antarctic was an important first step, and the TVNZ Natural History Unit had fulfilled that.



Dr Margaret Bradshaw presents Michael Stedman with the New Zealand Antarctic Society's conservation trophy.

The trophy was awarded for eight documentaries about various aspects of Antarctica. The programmes were made for the Wild South series and gained international acclaim.

The documentaries were: *The Emperors of Antarctica*, the life cycle

of the Emperor penguin; *Solid Water, Liquid Rock*, from ice caves to the volcanic crater of Mt Erebus; *The Longest Night*, the effects of winter on a small community at Scott Base; *Ice Bird*, the life cycle of the Adelie penguin; *Ozone — Cancer of the Sky*, the importance of the ozone layer and the effect of its 'ozone holes' on the world; *Ice Bound*, 100 years of man's exploration in Antarctica; *Legacy of Lust*, the damage caused by whaling on South Georgia; *Antarctica*, the life that abounds in the sea under the ice.

The managing director of the unit, Michael Stedman, said he saw the films as an important step in the conservation of Antarctica because he believed "it is hard to destroy what you understand."

HIGHER TOXIN LEVELS IN SEABIRDS

Antarctic seabirds are accumulating dangerously high levels of toxic organic chemicals in their bodies, a Dutch study has found.

Nico van den Brink, of the Institute for Forestry and Nature Research in the Netherlands, has found that the pollutants are produced by industrial plants thousands of kilometres away

from the ice. His study focused on hexachlorobenzene (HCB) which is released into the air from industrial incinerators and factories. HCB can interfere with birds' ability to transport oxygen around their bodies.

Levels of HCB in preen oil samples from five species — the Adelie penguin, the southern fulmar, the snow petrel, the Antarctic petrel and the pintado petrel — were hundreds of times higher than the levels found in oil from common terns living in Holland.

Van den Brink believes chemicals such as HCB accumulate in cold regions through a phenomenon known as the "cold condenser" effect. Pollutants released in warmer climates remain as vapour and rise to the upper atmosphere, but when they reach the poles they condense and fall to earth.

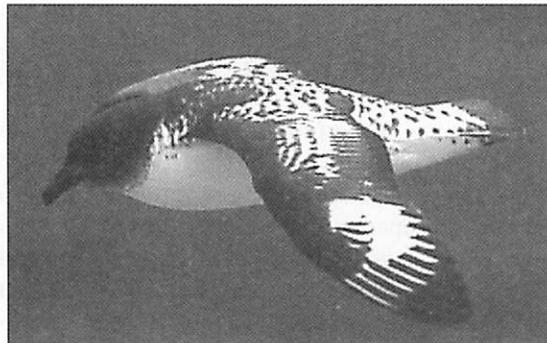
DISCOVERY HUT CLEAN UP CONTINUES

Work has continued on cleaning up Discovery Hut.

Recently the fuel pump house, fuel tank, all electrical lines and poles, fuel lines and stanchions were removed from Hut Point.

The white anchor chain and pipes were also removed.

Two large concrete barriers have been placed in the road about 50 metres from the Hut, to block vehicles from driving up to it.



The Pintado petrel . . . high levels of pollutants.

HERITAGE TRAIL LAUNCHED

An Antarctic Heritage Trail has been officially launched in Christchurch highlighting the city's connection with the continent.

The trail links eight historic sites within three Antarctic-linked precincts, including the port of Lyttelton from where Captain Robert Falcon Scott set out on his expeditions south and Christchurch Airport, from where the US Antarctic programme, Operation Deep Freeze, has operated since 1955.

Other sites are the Memorial to the Dead in Christchurch Cathedral, the Scott Statue in Worcester Boulevard, the Canterbury Museum, Lyttelton Museum and Quail Island.

The Christchurch City Council, the Antarctic Heritage Trust and Trust Bank Canterbury have produced a brochure on the heritage trail.

Meanwhile the Trust has also celebrated its 10th anniversary which coincided with the inaugural New Zealand lecture by Bob Headland, entitled "Heroic Ambitions — Harsh Realities."

WINFLY OPERATIONS MARK START OF 1997-1998

ANTARCTIC SEASON

The US Antarctic Program launched its 42nd season on the ice on 20 August 1997, with the winter fly-in to McMurdo Base, called WINFLY.

As last year, the U.S. Air Force's Air Mobility Command (AMC) is flying the missions. AMC will deliver support personnel and supplies to McMurdo to ready the base for the 1997-98 austral summer season, and generally

prepare McMurdo and New Zealand's Scott Base for the October surge of scientists and support workers.

WINFLY has scheduled four flights. Each flight will use a single C-141 Starlifter from the U.S. 7th Airlift Squadron, based out of McChord Air Force Base in Washington State.

The Air Force jet will make the trips to save money and time.

A C-141 can traverse the 2,117-mile distance from Christchurch to McMurdo in five-and-a-half hours, as opposed to the Navy's LC-130 Hercules, which takes eight hours to travel the same distance.

The first, third and fourth flights were to carry mixed passengers and cargo, while the second only cargo. More than 45,000lbs of cargo and 220 persons were to be sent south.

This is the U.S. Navy's last season in Antarctica, as it will transfer its responsibilities to the New York State Air National Guard and civilian contractors in March.

U.S. Naval Support Force Antarctica provides logistical support to the U.S. Antarctica Program, which is operated by the National Science Foundation's Office of Polar Programs.



This year's Winfly operations were to be undertaken by the faster C-141 jet.

MINKE WHALE KILLING PROBED

A Massey University team has been asked by the government to prove to the International Whaling Commission that the Japanese technique of using electric lancing to kill minke whales in Antarctic water is inhumane.

Four years of study by physicist Dr Geoffrey Barnes and veterinary pathologist Per Madie has shown that electric lancing, as used by the Japanese, is ineffective as a secondary method of killing whales and is likely to cause further pain and suffering to an already wounded animal.

The lances use the standard ship electrical supply of 220 volts and a current of about five amps. The lances are aimed at the body, not the head. The scientists say insufficient current reaches the brain so it is unlikely that the whale is adequately stunned.

"If enough current affects the heart, the whale has a heart attack. In due course this stops blood from getting to the brain which dies, but in the meantime, the whale suffers excruciating pain."

Japan kills up to 440 minke whales a year.

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ENHANCED TECHNOLOGY FOR ATMOSPHERIC ANALYSIS GIVES NEW DATA ON OZONE HOLE

The Antarctic ozone hole, resulting from a rapid loss of ozone each spring-time, remains a striking example of how easily mankind can change the atmosphere.

The unusual photochemical and dynamic conditions which lead to this loss; a combination of sunlight, cold temperatures, the polar vortex, and anthropogenic chemicals, provide a unique opportunity to study the processes that control the amount of ozone. Knowledge gained in its study can be applied to the task of predicting how such processes affect ozone in other parts of the world as well as their direct impacts in the Antarctic and southern hemisphere.

At Arrival Heights the lowest amount of ozone measured in 1996 was 141 Dobson units (DU) on 30 September, which is comparable to the minimum in previous years (130 DU on 4/10/1995). The 1996 measurements were marked by a greater variability: ozone measurements of 188 and 320 DU in September and 220 and 310 DU in November were made on consecutive days. This was due to greater motion of

the polar vortex, meaning that for some of the time air from outside the vortex, less depleted in ozone, lay above Arrival Heights.

Measurements of trace gases that interact with ozone, active and benign forms of chlorine and odd-nitrogen, were made at Arrival Heights and Scott Base. Simultaneous measurements of related gases can be used to test models of the chemistry of ozone depletion and predictions of how that chemistry changes as chlorine levels respond to controls on source gases under the Montreal Protocol. They will also be used in the validation of the new ILAS instrument launched on the ADEOS satellite to measure trace gases.

The ability to measure trace gases at Arrival Heights has been enhanced by the replacement of the existing infrared instrument by one with a much higher resolution and wavelength range, in collaboration with the University of Denver. The spectra it records contain information on several important gases in the atmosphere.

One new measurement in particular is of importance. Chlorine monoxide,

ClO, is arguably the most important indicator of the chemistry which causes the Antarctic ozone hole. It has been measured intermittently in the Antarctic since 1986. The dedicated ground-based microwave receiver installed at Scott Base in February 1996, in collaboration with the State University of New York, will provide year round measurements of ClO. Its first year of operation was highly successful, showing surprising levels of ClO in the upper stratosphere.

Retrievals of bromine monoxide, BrO, from ultraviolet measurements have been successful. Bromine compounds come from both natural and anthropogenic sources, and their role in ozone depletion is of concern, especially as chlorine levels are likely to reduce. The BrO measurements show episodes of short term enhancements that are correlated with tropospheric activity and so will provide insights into lower atmospheric chemistry.

*by Dr Stephen W. Wood
(National Institute of Water and
Atmospheric Research Ltd*

LETTER FROM McMURDO

COMMERCE COMES TO McMURDO

Urbanisation has come to McMurdo in the form of a Wells Fargo Bank ATM, giving members of the McMurdo community unlimited access to their money from their bank accounts at home.

One night after working I stopped by the ATM. I have had this card for 14 years and never used it so I wanted to be alone just in case I had the wrong number, but 30 seconds after inserting the card and punching in the numbers, cash was flowing into my hand.

The ATM was installed as part of the transition of functions from the military to the civilian contractor. In addition to providing an added convenience to the community, the ATM reduces the contractor's staffing requirement for cashing travellers and personal checks.

by Madison Hall

CHILLY DIP FOR DECKHAND

The annual fuel resupply tanker, the MV Samuel M. Cobb, steamed into Winter Quarters Bay escorted by the Coast Guard icebreaker Polar Sea. The tanker is filled with 22,000,000 litres of fuel, 1.5kg, so there was a lot of weight to be tied up at the Ice Pier. As the ship was maneuvering into the pier, a deckhand threw a line to one of the line handlers on the pier.

Using the smaller line they pulled a much larger rope, called a hawser, as big as a man's forearm, which reels off a large spool on a winch and serves as a break to slow the ship. The line handlers place the hawser over a bollard on the pier and the deckhand takes up the slack using the winch. However the deckhand did not pay out the hawser fast enough and the slack was quickly taken up until the hawser began vibrating so hard that I could see it whipping.

Suddenly the hawser snapped, and under tremendous tension, the recoil from the large rope hit the deckhand, knocking him down and out through the hawser opening in the side of the ship. As he fell through the hawser opening he bounced off the anchor chain and tumbled down into the freezing water.

After he bobbed to the surface, he quickly swam the short distance to the pier and was helped on to the ice pier by the line handlers.

The deckhand was taken to the medical department for examination and later released. He received multiple scratches to his face and numerous bumps and bruises but had no other major injuries. He was very lucky.

*by Madison Hall, US McMurdo Base,
Antarctica*

NATIONAL PROGRAMMES



NEW ZEALAND

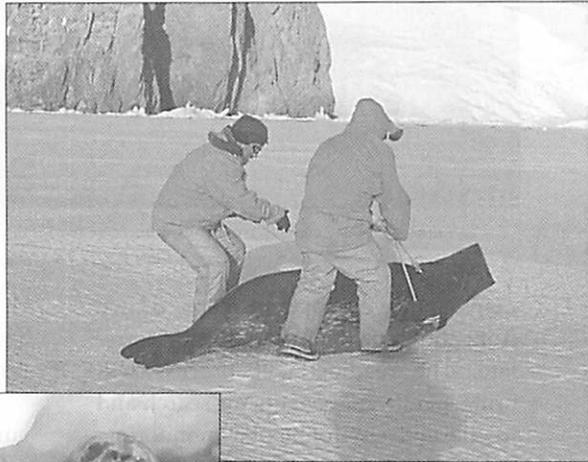
VETS EXPLORE PHYSIOLOGY OF LACTATING WEDDELL SEALS

An animal and veterinary science group from Lincoln University, comprising Dr Graham Barrell, Peter Isherwood, Regina Eisert and Glen Judson late last year carried out studies with Weddell seals to investigate how these and other large mammals regulate massive changes in live weight and, simultaneously, maintain lactation while fasting.

This research team operated from a field camp at Turks Head, Ross Island, where there is a breeding colony of Weddell seals, consisting mostly of lactating seals and their pups and some non-lactating females.

Part of the study involved measurement of the energy expended by the mothers during the suckling period.

The team investigated different techniques for achieving this. These included weighing the seals, measuring body size (length and girth), measuring total body water as an index of fatness, and measuring milk production over a 10-day interval.



Change in body composition (as a function of body water space), weight and size was also determined in pups to estimate how much of the maternal energy expenditure was

retained by the pup. Because this was a preliminary trial to troubleshoot the different techniques involved, only two non-lactating seals and two mother-pup pairs were studied.

To investigate energy metabolism, three mother seals were given an intra-

venous infusion of glucose and small blood samples were collected over the following few hours. These samples were analysed for plasma glucose and insulin concentrations to monitor how quickly these animals take up glucose from the blood into body tissues.

Another question was whether the lactating mothers actually do fast. This question may be resolved by testing blood samples for the presence of a chemical, trimethylamine-N-oxide (TMAO), derived from fish in the diet. To determine the pharmacokinetics of TMAO, two seals which had not been diving for many hours were given an oral dose of TMAO and blood samples were collected to monitor the change in TMAO concentrations with time.

Although the team had 15 days in the field, severe winds prevented all work for seven days. In spite of this, analysis of the data obtained will answer some questions about metabolic regulation in these animals. The team was also able to test and optimise the techniques needed for the main study in 1997/98.

STUDY SEEKS SOLUTIONS TO ANTARCTIC OIL SPILLS

Significant numbers of hydrocarbon degraders exist in subsurface soils at Scott Base and Marble Point.

Preliminary investigations by Jackie Aislabie, Megan Balks and Julia Foght confirm that hydrocarbons contaminate subsurface soils.

The team from Antarctic New Zealand spent time at Scott Base investigating the use of bioremediation for cleaning up oil-contaminated soil in Antarctica.

Oil spills occur in the Antarctic when fuel oils such as JP8 jet fuel and MoGas are moved or stored. Hydrocarbons, both n-alkanes and aromatic compounds, have been detected in surface soils around Scott Base.

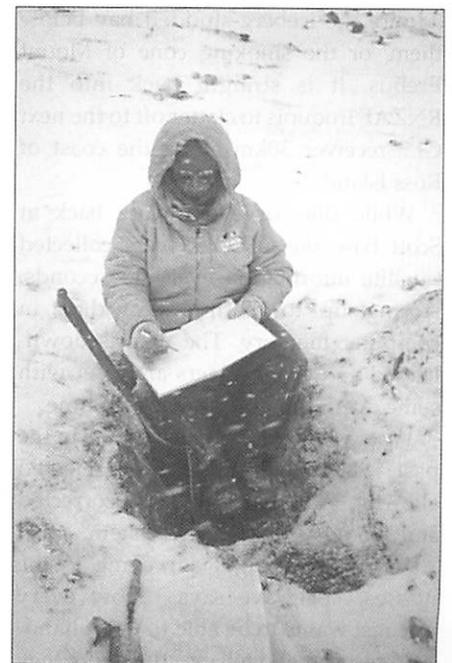
In such areas hydrocarbon-degrading microbes could be used to clean up the oil spills and previous investigations have shown that oil-contaminated surface soil samples were enriched with

culturable heterotrophic bacteria and hydrocarbon degraders. Bacteria able to degrade the hydrocarbons contained in JP8 jet fuel were isolated.

This year the study was extended to include oil-contaminated soil from Marble Point and Vanda Station on the mainland.

Oil deposited on soil, particularly light fuel oils, does not remain in surface soils but migrates down the soil and travels along the ice-cemented surface of the permafrost where present.

This season the study team collected soil samples from the subsurface. All samples are being analysed for hydrocarbon-degrading microbes, culturable heterotrophs, total petroleum hydrocarbons and a range of parameters known to limit biodegradative activity, including water content, pH, electrical conductivity, and concentrations of nutrients (N and P).



Megan Balks collecting soil data in the snow at Marble Point.

RE-MAPPING THE ROSS

By Tim Higham

Maps of Antarctica's Ross Dependency are in for an overhaul, bringing them in line with modern technologies.

Antarctic surveying has always had an element of the heroic: Sir Edmund Hillary's men were the first to dog sled over the ice shelf and glaciers of the Trans-Antarctic Mountains after Scott Base opened in 1957, setting up fixed points and triangulating from sun and stars.

Even eight years ago, Vince Belgrave from Wellington camped on mountain tops — one of eight surveyors split into pairs — using theodolites and lasers to fix coordinates between parties.

"We were totally reliant on fine weather to make readings," he says. "Now we just put out our GPS receivers and sit back at Scott Base." (Field camps are also used with a small generator for charging batteries and powering computers).

GPS (Global Positioning System) involved computer calculation of geographical position based on triangulation from orbiting satellites and is accurate to 100 metres. Processing data from two or more receivers can fix positions to within one centimetre.

Belgrave and his two colleagues, Lawrie Cairns from Palmerston North and Wellingtonian Jerry Simonsen, duck below the rotating blades of a helicopter and disassemble a white, metre-wide dish attached by wires to a plastic-cased datalogger. They have no time to admire the iceberg-studded bay below them, or the smoking cone of Mount Erebus. It is straight back into the RNZAF Iroquois to clatter off to the next GPS receiver 30km along the coast of Ross Island.

While the surveyors were back at Scott Base the GPS receivers collected satellite information every 15 seconds, storing up to 57 hours of data in computer memory. The data is downloaded and the receivers are reset with some overlapping territory each time.

Where surveys have been done in the past, several points are selected allowing all old datum to be corrected and brought into the new system.

"GPS has brought surveying to the masses," Belgrave says. "Now every scientist wants to be able to use a hand-held receiver and tell exactly where they are." At the moment the GPS co-ordinates do not match the topographic



Terralink surveyor Lawrie Cairns, from Palmerston North, removes a GPS receiver while a RNZAF helicopter waits at Cape Royds. (Photo by Tim Higham).

maps and even adjacent maps, drawn from different data sets, do not correlate. The readjustment process will bring significant benefits for search and rescue and environmental monitoring. A scientist lost in a blizzard with a GPS beacon would be an easy target for a search team. Even without a beacon the search team can comb an area systematically, rather than blind.

Scientists studying lake levels in the Dry Valleys as indicators of climate

change will soon be able to measure against sea level, rather than an historical reference point.

New Zealand's commitment to surveying and charting has been rethought recently with restructuring of what was the Department of Survey and Land Information into Land Information New Zealand (LINZ) and Terralink, and the creation of Antarctica New Zealand to manage New Zealand's interests on the frozen continent.

DNA STUDIES REVEAL EVOLUTIONARY PROCESSES

Serially preserved ancient DNA deposits have been discovered at a number of Adélie penguin colonies on Ross Island, Antarctica.

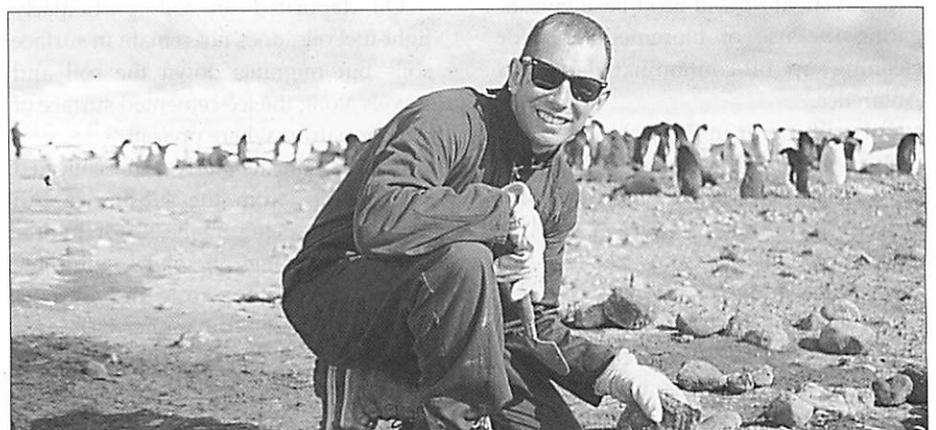
A research programme conducted by David Lambert and Peter Ritchie is taking samples from stratified deposits of sub-fossil bones of Adélie penguins to trace for the first time the evolution of several genes.

The Antarctic environment is an ideal one for the preservation of DNA. Using modern DNA technology, samples from both extant and extinct penguin populations will be studied.

Specifically, the research will directly examine evolutionary changes in

microsatellite and mitochondrial genes over a substantial time frame. These data will provide fundamental knowledge about the genetic processes of evolution.

During the 1996/97 season subfossil material at Cape Bird was excavated, and in certain places there were five distinct layers of preserved bones. These samples were returned to New Zealand in a frozen state, where ancient DNA is extracted under sterile laboratory conditions. DNA has also been collected from the contemporary populations which will reveal much about their current patterns of contact and their genetic structure.



Peter Ritchie — tracing evolution.

COMMUTING CUTS INTO PENGUIN DIETS

A team of researchers from Landcare Research in collaboration with an American science team, has continued a programme investigating population size and colony distribution of Adélie penguins. The team studied the importance of the key resources of nesting space and food, and the way they are allocated by behavioural traits (site fidelity and movement between colonies).

Automated weighbridges, which collect data on foraging effort (feeding trip duration and food load size), of Adélie penguins rearing chicks, were installed at the three Adélie penguin colonies (Capes Royds, Bird and Crozier) on Ross Island. Analysis of foraging effort data showed that parents at Capes Royds and Bird averaged 4.11kg upon arrival to feed their chicks and averaged 3.80-3.82kg after doing so. In contrast, parents arriving at Crozier weighed only 3.80kg before feeding chicks and 3.67kg after. This means that the meals fed to chicks at Royds and Bird were 57% heavier than the meals fed at Crozier.

Using radio telemetry and satellite imagery the team analysed Adélie penguin foraging behaviour at sea. Adélie penguins apparently do not forage in open water but seek areas of pack ice in which to forage. Cape Crozier birds had to travel as much as 72km to reach pack ice. Birds from Capes Royds and Bird had significantly shorter distances to travel (10.5km and 19km respectively). Trip duration was directly related to distance to the nearest pack ice.

At Capes Bird and Royds, Adélie penguins brought back larger food loads when they stayed away longer. Trip length, however, rarely exceeded 24hrs. At Cape Crozier, where trips were longer than 24hrs, parents brought back less food on long trips than they did on short trips, indicating that more of the foraging effort was devoted to self maintenance. This, along with the fact that parents at Cape Crozier actually



Adélie Penguin

lost body mass as the season progressed, indicated that birds at Cape Crozier were not foraging optimally.

Analysis of diet samples, collected weekly from parents as they returned from the sea to feed their chicks, showed that the main prey items were krill and fish. At Cape Royds fish was the most abundant prey for most of the collection period, although, in the last week krill was dominant.

The opposite was true at Capes Bird and Crozier. Krill dominated in the samples collected at the start of chick

rearing but fish became increasingly important as time passed.

Chicks at Cape Crozier grew much slower and reached lower body mass than chicks at Capes Bird and Royds. Reproductive success at Crozier was lower as well.

The diet at both Capes Bird and Crozier was similar, which meant that a difference in food quality could not explain the differences. This suggested, that in 1996/97, the distance to the pack ice was the factor constraining reproductive effort.

LOOKING FOR LICHENS AT HIGH ALTITUDE



Sledging towards La Gorce Mountains over the ice of Robinson Glacier.

Visible life is a rare occurrence at the highest southern latitudes, a team led by a University of Canterbury biologist has found.

Dr. Paul Broady led a team of four to perform biological and geological studies at La Gorce Mountains (147 deg W, 86 deg 35 min S) and nearby Nunataks for 18 days during January 1997. These are almost the furthest south areas of exposed rock and moraine and lie about 800km south of Scott Base. A variety of sites was visited during about 250km of sledge travel from two base camps.

The team investigated the extent and diversity of plant and microbial life and collected rock samples for age analysis and geochemical studies. The latter studies will help understanding of the break-up of the ancient Gondwanaland continent.

Also in the team was biologist Rick Weinstein (University of Cambridge). Geological collections were made by Trevor Ireland (Australian National University). Eric Saxby was Field

Leader and ensured the success of the logistical side of the expedition.

Lichens were observed on only one rock outcrop. However, on ice-cored moraine there were hundreds of ice-covered ponds. Several of these were sampled by coring through about 30cm of overlying ice to sample the water and sediments below. Thin mats of algae occur in at least some, and probably most, of the ponds. There were also algae outside the ponds associated with the soils.

A previously undescribed community of green algae was discovered under the thin layer of gravelly moraine covering the ice at one location. Other soil algae have appeared in cultures. In total, about 13 different algae were found during microscopic examination of the hundreds of samples and cultures established from these.

Laboratory work is continuing in New Zealand, United Kingdom and Australia and the results will be prepared for publication in 1998.

DRY VALLEY SURVEY COMPLETED

A new survey of the McMurdo Sound/Dry Valleys area of Antarctica has been completed.

The work was undertaken by Terralink NZ Ltd for Land Information New Zealand (LINZ) between November 28, 1966 and January 13, 1997.

The project team used Global Positioning System (GPS) receivers in an area covering Ross Island, Dry Valleys from Mt Marston in the north to Lake Miers in the south and west as far as Mt Crean and Mt Dewitt, including White and Black Islands and Brown Peninsula.



Checking one of the GPS receivers used in the study.

The team reported excellent initial results with considerably more data obtained than was originally expected. This was partly due to the co-operation between Terralink and the USGS/Ohio State University project being undertaken at a similar time.

Eight Trimble 4000 SSI GPS receivers with sufficient memory to log about 50 hours of data before requiring downloading were used. 'Pelican' type cases were modified by drilling a hole in one end to allow the power and antenna cables to enter and the receivers were housed inside when deployed in the field.

Helicopters were used to access survey stations with 68.1 hours of helicopter time used to complete the project.

All main observation sessions were run overnight with three to eight receivers deployed at a time.

With the inclusion of data from the USGS/OSU project many extra GPS baselines were observed which strengthened the project network and added to new development intentions.



UNITED STATES

ENVIRONMENTS ON OTHER PLANETS AND EARTH ONE AND THE SAME?

What do boiling hot fissures in the Earth's crust, the insides of airplane fuel tanks, vast expanses of ice in Antarctica and the parched sounds of deserts have in common with other planets?

Scientists taking part in a new National Science Foundation (NSF) funding initiative, Life in Extreme Environments (LExEn), hope soon to find out.

Total funding of \$6 million is being provided to explore the relationships between organisms and the environments in which they exist.

Extreme environments on Earth and their associated life forms known to science include:

- sandstone rocks and cryptoendolithic organisms (lichens and cyanobacteria) living in winter temperatures of -45°C ;
- seafloor hydrothermal vents and bacterial mats;
- ice-fields with viable yeasts found 2500m deep and 200,000 years old.

The co-ordinator of the NSF programme, Mike Purdy, says those

environments might be analogous to the harsh conditions that now exist, or have existed, on Earth and other planets.

"The study of microbial life forms and the extreme environments they inhabit can provide new insights into how these organisms adapted to diverse environments and shed light on the limits within which life can exist."

It has been established that estimates of Earth's biomass beneath the surface exceed that of the biomass on its surface and that fewer than 3500 distinct bacteria have been identified on Earth when estimates indicate there may be a million more types alive on the planet. Those already discovered exist at extremes of the pH scale, in high salt environments and at subfreezing temperatures. Oxygen is poisonous to some of them.

The LExEn research is expected to lead the discovery of a diverse group of microorganisms, the lifestyle and biologies of which may only now be guessed at.

EVOLUTION OF FISH ANTIFREEZE GENE SHEDS LIGHT ON CLIMATE HISTORY

New research shows that fish in the Antarctic and Arctic Oceans independently evolved nearly identical antifreeze glycoproteins.

Studies have pinpointed the parent of the Antarctic antifreeze gene — a digestive enzyme called trypsinogen. Researchers suggest the gene arose five to 14 million years ago, providing a new line of evidence to confirm when the Southern Ocean froze.

The research shows that the gene for antifreeze glycoprotein (AFGP) found in the Antarctic family of notothenoid fishes, evolved in a unique way, arising from "whole cloth" trypsinogen, an enzyme produced by the pancreas.

New genes are usually created through recycling of existing protein genes.

The AGPF gene differs very little from its parent — only 4% to 7% in the inherited gene segments, so in evolu-

tionary terms its molecular clock is quite recent. Applying the known rate at which DNA evolves in salmon mitochondria, the researchers have pegged the gene's origin at five to 14 million years ago, close in time to the freezing of the Antarctic Ocean.

Arthur DeVries, of the University of Illinois, who first discovered the first antifreeze gene in Antarctic fish 30 years ago, says the new molecular evidence shows that the two polar fishes, the arctic cod and the Antarctic notothenoid, developed their antifreeze genes separately.

By sequencing and analysing the Arctic AFGP gene the researchers have shown that it does not resemble the gene for trypsinogen.

The similar AFGPs in two unrelated fishes exemplify convergent evolution — the development of a similar protein from different parents under similar environmental pressure.

INCREASED ULTRAVIOLET LIGHT HARMS ANTARCTIC ALGAE

Scientists have discovered that algae in Antarctica's Weddell Sea are extremely sensitive to increased ultraviolet radiation from the sun, especially ultraviolet-B (UV-B) let in by the ozone hole.

The discovery was made on a recent cruise aboard the National Science Foundation's research icebreaker, the *Nathaniel B Palmer*.

Studies by Patrick Neale, biologist at the Smithsonian Institute's environmental research centre, show that UV-B exposure caused a greater reduction in photosynthesis in Weddell Sea algae than in algae from Chesapeake Bay and other marine waters. Algae are the base of the aquatic food chain.

Why the Weddell Sea algae are more susceptible to UV-B is not clear but Neale's data show that UV-B have increased over Antarctica because of the seasonal depletion of the protective ozone layer there. Neale will head follow-up studies in both Antarctica and Arctic oceans this year and next.



ITALY

Italy's 13th Antarctic programme, which runs from October to February 1998, will concentrate on existing international engagements and oceanographic activities.

The oceanographic programme will be carried out in two legs; setting up a daytime accommodation camp for the Epica programme at Dome C, and planning for the establishment of the Concordia Base, which is an Italian and French collaboration.

Also on the programme are start-up activities for the Cape Roberts Project, including the first coring which was postponed in 1996 because of adverse ice conditions and the implementation of the ITASE (International Trans-Antarctic Scientific Expedition) traverse (1100km long) from Terra Nova Bay to Dome C.

Further tests in Italy of the instrumentation on board the stratospheric M-55 Geophysika aircraft for the APE (Airborne Polar Experiment), aimed at the study of the ozone hole, will also be undertaken.



UNITED KINGDOM

SCIENTISTS PREDICT SPACE WEATHER STORM

The first successful prediction of a major space weather storm was made earlier this year.

On 6 January researchers observed a magnetic cloud, produced by a major disturbance on the Sun, heading towards Earth. It resulted in a significant magnetic storm on 10 January. The failure of the Telstar 401 broadcast spacecraft occurred early on 11 January cutting television coverage to millions of Americans.

British Antarctic Survey experiments at Halley Research Station show the storm hit the south polar region early on the morning of 10 January causing disruption to operational communications with field parties and affecting air operations for much of the rest of the day.

Scientists involved in the International Solar Terrestrial Physics Programme (ISTP) had gathered for a workshop meeting. The group uses about 20 research spacecraft, a wide range of ground-based research facilities and computer simulations to study solar storms and their effects on Earth. They watched with excitement as successive research spacecraft and ground-based systems detected the disturbance (known as coronal mass ejection) making its way to Earth and

finally giving rise to dramatic auroral displays over the Arctic and Antarctic.

"It was a very exciting moment," said Dr John Dudeney, head of the Upper Atmospheric Research at the British Antarctic Survey. "For the first time we were able to see the birth of a space storm and have sufficient instruments in the right places to follow its

effects all the way from the explosion on the sun to the final dumping of gigawatts of energy into the Antarctic atmosphere.

"The unprecedented global coverage we have achieved pushes us a huge step towards providing reliable and practical space weather predictions," he said.



AUSTRALIA

FIFTIETH ANNIVERSARY OF ANARE

This year the Australian National Antarctic Research Expeditions (ANARE) celebrates its 50th anniversary.

The black sandy shore of Atlas Cove on Australia's remote Southern Ocean outpost of Heard Island was the site of the first landing on 26 December 1947. A motley group of Australians gathered among the grass tussocks around a rock cairn in which someone had placed a pole carrying the Australian flag.

So began ANARE, the brainchild of Antarctic pioneer, Douglas Mawson, who established the organisation under the leadership of Phillip Law, the first Antarctic Division director.

ANARE now has its own purpose-built headquarters in Tasmania, four major Antarctic and sub-Antarctic bases, its own Australian-built icebreaking research ship and an array of scientific programmes.

A comprehensive history of the modern Australian Antarctic Programme has been compiled for the jubilee. *The Silence Calling*, by Tim Bowden is more than 600 pages long and is fully illustrated throughout.

A number of other events are being held throughout the year to commemorate the anniversary.

NEW ZEALAND ANTARCTIC SOCIETY

SOCIETY CELEBRATES 40TH ANNIVERSARY OF SCOTT BASE

In April the New Zealand Antarctic Society celebrated the 40th anniversary of the opening of New Zealand's Scott Base with a series of events.

SCOTT BASE REUNION DINNER

One of the designers of the original Scott Base was a special guest at a dinner marking its 40th anniversary.

Eighty-year-old Frank Ponder joined more than 200 guests at the Ngaio Marsh function centre for the reunion on Saturday 19 April. He told the gathering of the almost impossible job of designing, constructing and shipping the base to Antarctica in kit-set form without knowing where the final site would be or what foundations would be like.

Bob Thomson, former superintendent of Antarctic Division, outlined how the old base had first been modified and enlarged as the New Zealand facility grew. Finally a seven staged programme was initiated with the framework of one stage being built the same season as the previous one was completed.

The dinner had a pronounced Antarctic flavour with a commemorative Scott Base menu that included "tide crack surprise with sledging biscuit," "skua legs in wine," "roast haunch of husky", "airdrop failure salad" and "hangar happiness".

Right — Sunny smiles and Antarctic ties at the 40th Reunion Dinner. Left to right: Harry Burson (Hut caretaker), Randal Heke (Foreman, original Scott Base), Bob Norman, RDRC Chairman.



Above — Stalwarts of the 1950s.

Left to right: sitting — Dick Barwick, John Findlay, Frank Ponder, John Claydon, Randal Heke, Bill Johns; standing — Bob White, Euan Young, Graeme Claridge, Robert Bucknell, Baden Norris.



BOOK REVIEW

SCOTT BASE — ANTARCTICA:

A HISTORY OF NEW ZEALAND'S SOUTHERN-MOST STATION, 1957-1997

by David Harrowfield

A booklet covering the history of Scott Base over the past 40 years has been published by the NZ Antarctic Society to mark the anniversary.

The 48-page book, with 33 illustrations, was written by Antarctic historian David Harrowfield and is retailing at \$10 to society members. The book was

sponsored by a Lottery Trust Board writer-in-aid grant (environment & heritage committee) and Antarctica New Zealand, and was officially launched at Canterbury Museum by Gillian Wratt, chief executive of Antarctica New Zealand, immediately after the opening of the society's photographic exhibition.

The book is the only complete history

of the base to have been published, and Harrowfield has dedicated it "to all who have passed through Scott Base".

At the back is a useful list of important dates for happenings at Scott Base, and plans of the original base in 1957 and the base as it is today.

Malcolm Laird, Deirdre Sheppard and Margaret Bradshaw reviewed the initial text.

SOUTHERN ENDEAVOUR: NEW ZEALAND — THE TRANS-ANTARCTIC EXHIBITION & INTERNATIONAL GEOPHYSICAL YEAR 1956 - 58

The Antarctic Society's photographic exhibition contains 130 colour and black and white images, most of them never seen in public before. The pictures illustrate New Zealand's involvement in the Trans-Antarctic Expedition and International Geophysical Year.

The exhibition was officially opened at Canterbury Museum by Wing Commander John Claydon of the TAE New Zealand Antarctic Flight to mark the 40th Anniversary of the opening of Scott Base. At the opening Mr. Claydon read an extract from his diary for 19 April, 1957, the day he flew with Ed Hillary to the Polar Plateau.

About 70 people attended, some of whom were involved in the TAE, including Wing Commander Bill Cranfield (pilot, New Zealand Antarctic Flight) and his wife Helen, Jeanne Ayres (wife of the late Harry Ayres), Frank Ponder (Scott Base designer), Randal Heke (foreman Scott Base construction team), Bill Johns (crewman on the Endeavour), John Findlay (medical officer) and Dick Barwick (scientist).



Panel 7, South to Antarctica.

The exhibition was compiled and arranged by Margaret Bradshaw with assistance from Harry Burson, Baden Norris, David Harrowfield, Matthew Lombard and John Bradshaw.

The exhibition comprises 14 panels arranged chronologically.

After six weeks at the Canterbury Museum, the exhibition was housed at the University of Canterbury library. Once travel sponsorship has been arranged, the exhibition will travel to museums and libraries throughout New Zealand.

TRIBUTE

GEOFFREY WILL MARKHAM, 1907 — 1997

Geoffrey (Geoff) Markham, who was New Zealand's founding administrator for government funded scientific research programmes in Antarctica, died earlier this year. He was 89.

The son of English parents, he arrived in Auckland in 1921 as a 13-year-old schoolboy. After completing his secondary education at Auckland Grammar, Geoff began a career in the New Zealand Civil Service as a survey cadet with the Department of Lands and Survey.

The department enabled him to attend Auckland University, from where he graduated with a bachelor's degree in geology and physics in 1930. His work as draughtsman with Lands and Survey continued until 1940. As an army officer on home service his scientific knowledge was brought to the attention Ernest (later Sir Ernest) Marsden, Secretary of the Department of Scientific and Industrial Research (DSIR).



Geoffrey Markham

Geoff was seconded to DSIR in Wellington for the duration of the war to work under Ernest Marsden's direction in research, development and installation of the network of coastal defence gunnery around New Zealand and in the South Pacific.

From 1945 he worked as a senior and then principal scientific officer to successive secretaries and directors-general of DSIR on a range of scientific administrative issues, particularly in geophysical and meteorological fields.

In the early 1950s Geoff led the first planning efforts in DSIR to establish a scientific research capability on the ice, and with others was responsible for seeing the construction of Scott Base completed in early 1957.

In the same year he led the planning work from Wellington for the New Zealand research activities for the International Geophysical Year, and the Trans-Antarctic Expedition of Sir Vivian Fuchs and Sir Edmond Hillary.

Geoff was appointed superintendent of the Antarctic Division of DSIR upon its establishment in 1959. He developed and managed the organisation of New Zealand Antarctic research programmes by both summer parties and wintering-over parties at Scott Base, and made trips to the ice. A highlight of his work was in 1962 to guide the visit to the South Pole of the then Governor-General, Sir Bernard Ferguson.

He retired from the Antarctic Division in 1965, and took up an appointment almost immediately as the first executive officer of the Royal Society of New Zealand in which he continued his interests and association with science in Antarctica.

After his final retirement in 1974 he and his wife moved to Whangaparaoa and led a happy retirement until his death this year.

He is survived by his wife Elma (Sue) and their daughter and three sons.

HISTORICAL

THE RIDDLE OF THE ANTARCTIC PENINSULA

by David E Yelverton FRGS.

The Story of the Belgian Antarctic Expedition 1897-99: Part III

The fate that awaited the Belgian explorers was beyond their imagining. Through two epidemics their will to survive would come near to extinction in a world of ice stretching to every horizon.

Three days after Lecointe thrust the *Belgica* into the leads that beckoned De Gerlache and his men southward, they were stuck fast in 71°20S 85°30W. They had got further south than James Cook had in 1774, and were about 400kms farther east.

From late May, as the ship was carried this way and that in the ice, the scene was lit dimly at midday as the northern horizon glowed, varied occasionally by a day of bright moonlight, until the growing return of daylight in mid-July. But their long imprisonment, destined to last far into the summer, was to show that the darkness and the weather were not their main enemies.

Nor would the pack be the menace many feared. Only once, the morning after Midwinter's Day, did its pressure make them prepare to abandon ship. Far more silently, the threat to their survival gradually appeared.

As in the Arctic, whenever men had been denied fresh food for more than about two months, the dreaded scurvy made its appearance, but in this case complicated by acute anaemia and circulation ailments in many of the party. The little band of men on the beleaguered ship faced that ordeal twice before their escape. It first struck after two and a half months locked in the ice, but initially the symptoms were not the usual ones. De Gerlache developed constant headaches, and two weeks later Danco suffered from serious heart trouble. His condition rapidly worsened and by 5 June he was dead.

That didn't really suggest diet deficiency because De Gerlache had taken Danco on knowing he had a history of chest weakness. But Cook was already worried on 20 May about the general decline in health, and by early July Lecointe had developed the classic symptoms of the disease: swollen gums and stiff joints. A few days later Cook insisted that Lecointe, who was now sinking fast, should force himself to eat penguin steaks. It was almost too late.(5)

The fresh beef appeared to have run out late in March, more than three months previously. In the meantime they had lived largely on a Norwegian version of tinned pemmican recommended by Nansen — "made of minced cats" Amundsen told them according to Lecointe. (6) If Amundsen wasn't joking, it hardly sounds like the pemmican taken on the Fram expedition. It was called kjoedbollers and kjoedpolsers (meat balls and sausages). The Belgians also had fiskebollers, similar but made from fish, and some tinned Australian rabbit, which does sound like the "Australian pemmican" Nansen had used.(7)

De Gerlache had found it all quite palatable when freshly prepared in Norway. Now it all tasted repulsive, the tinned rabbit being worst of all. The experience of tinned food going bad aboard *Discovery* four years later suggests that this also may have happened in the *Belgica*.

The little-varied diet was endured, despite the fact that on

26 March they had set about hunting seals and penguins in an energetic campaign which Lecointe described as "days of carnage". Five weeks later, faced with growing discontent among the crew over the diet, Lecointe confronted De Gerlache, pointing out that he had never been told how much fresh meat they had amassed, and demanding to know why it was not on the menu. To his amazement, the commandant's explosive response was that of course there was plenty, but what would the press say later when it got out that they had eaten seals!!

After a long argument, De Gerlache produced a list of varied menus the next day. The trouble was that Michotte had been unable to make the meat palatable, and no one could bring themselves to eat the seal or penguin dishes he prepared.(8) Of the two, the penguin was evidently the less nauseating.

While Lecointe, who had been unconscious for some hours at his worst, made his dramatic recovery in the second half of July, Michotte at last found out how to remove the oily taste from the seal meat. It was too late to prevent Johansen joining the ranks of stiff-limbed sufferers while, disturbingly, another sailor became hysterical.

Even then De Gerlache, Mélaerts and two others refused to eat seal meat. Amundsen and Cook recovered well like Lecointe, and joined others in hunting seal daily, which Lecointe (9) implies most of them ate in large quantities, though Cook says Lecointe only ate penguin from then on.(g)

Despite that all the deck crew, except the teenager Koren, were afflicted with acute anaemia by mid-September and De Gerlache started having headaches again. Although fresh meat was almost their staple diet that month, the table being "liberally supplied with fresh steaks" he, Mélaerts and Michotte all developed the usual scurvy symptoms. Finally Lecointe, who claimed he continued eating seal, developed the symptoms in November and became too weak to carry on the magnetic observations.

He had recovered by the end of the month after eating as much extra seal and penguin as he could manage, but De Gerlache continued to worsen, and on 4 December he and Lecointe drew up a document appointing Mélaerts and Somers to succeed them if they should die, it having been agreed with the Brussels geographical society, their principal sponsors, that command should remain in Belgian hands. With some justification, Lecointe must have feared the scourge would return despite a diet of fresh meat.

Happily it did not, for by mid-January 1899 all but two men were fit enough to join in operations to cut the ship out, including the unhappy bosun who had developed persecution mania at the height of the first epidemic, and became permanently deranged in December on return from a ski-trek to an iceberg nine miles from the ship — the longest journey made from the ship. (10)

Not surprisingly during their long ordeal, little beyond valiant scientific observations had been accomplished. Back in May, before the first symptoms appeared, Cook had tried out his idea for a sail-driven sledge, but its centre of gravity was too high and it constantly overturned even with him riding on it and Lecointe steering. He tried in vain to modify

it. Then came De Gerlache's headaches and Danco's death and on the last day of June, little knowing that Lecointe would be at death's door and he himself seriously ill within three weeks, the commandant had proposed Lecointe lead a 15-day sledge journey to the south when daylight returned, taking Amundsen and Cook with him. Arctowski had obtained soundings of 420 metres through the ice where they were trapped and he believed (correctly as today's maps show) that meant land was not far to the south.

The trio's health being restored, they had set off on 30 July to make the first ever sledge journey on Antarctic ice, using a small tent designed by Cook. The next day they were fog-bound and built themselves an igloo in which they spent the second night. The third day they advanced by moonlight, stopping every 20 metres to take a compass reading. After spending the night in the tent with the ice breaking around them, a mirage made them think the ship was in open water and they started back, fearing De Gerlache couldn't see them. However, he had seen them and sent sailors out to meet them. They abandoned all their gear and hurried in, deciding that De Gerlache's plan was far too risky.

Lecointe had found the experimental tent too cramped by half. Cook later modified it, but the Belgian, while finding no major fault, still thought it too small. Curiously Amundsen, a taller man than Lecointe, made no complaint about it. It only weighed 12lbs, but it was anything but streamlined should the wind shift to the entry side after it was pitched. They never slept in it again, for the ice remained resolutely solid around the ship until Christmas, by which time all possibility of reaching the Ross Sea had disappeared.

By the middle of January, after being thwarted in an attempt to blast a way out to one piece of open water, they located a long belt of ice a metre thick leading in little over a mile to another open pool where they began to cut triangular pieces out of it from the water's edge inwards towards the ship. After four weeks the ship was free and they made 20 km progress northwards only to have the ice close around them once more. While the men aboard the *Belgica* woke the next day, Borchgrevink's party aboard the *Southern Cross* on the other side of Antarctica first sighted Cape Adare after a long struggle to get through the pack.

When Borchgrevink and his shore party were installed in their hut early in March, the *Belgica* was being carried WSW again and the survivors were wondering once more if they would ever emerge into the Ross Sea as De Gerlache and Lecointe had believed, when they had taken the fateful decision to push into the ice a year before.

Fortunately after six more days they were free. Two weeks later they dropped anchor in Punta Arenas on 28 March 1899, evoking widespread consternation, for they had long since been given up for lost.

The ship needed to be overhauled before she sailed for home, but there was not enough money left for that. So the two scientists and their assistant were sent back by steamer with part of the collections to start work classifying them and to study the physical records. Cook was released and, after further study of the aboriginal Indians, returned to the States. The unfortunate bosun, once ashore, could not be persuaded to reboard the ship. Amundsen, who had handed De Gerlache a formal written resignation when he learned that Mélaerts, and not he, would be promoted if either De Gerlache or Lecointe died, escorted him back to Norway. (h)

The remaining stock of the detested tinned food was sold and enabled the repair bills to be paid. De Gerlache then took the ship round to Santa Cruz, and put Lecointe ashore with a party to make magnetic observations on a month's journey into the mountains. Johansen and Koren were in the party, which had to return after Johansen was taken gravely ill. Johansen was left at Santa Cruz. Lecointe himself got back too late, and, as arranged, took himself back to Belgium, while De Gerlache and Mélaerts, who could not afford to buy coal, left Buenos Aires on 4 August with the engineers, Michotte and just four deck hands (I) to sail labouriously across the Atlantic.

Forced near to the Newfoundland banks by contrary winds, it took them more than 21 months to reach Boulogne, where they were joined by Lecointe and the scientists. Sailing into Antwerp on 7 November 1899 the first men ever to brave a true Antarctic winter received an ecstatic welcome.

They had established the first year-round scientific record south of the Antarctic Circle, interrupted only briefly at the height of the second scurvy crisis. But the price of their achievement had been very high, and for the men planning expeditions in London and Berlin their story served as a double warning. Neither the British nor the Germans would opt for the route they had followed.

Almost a year later, as Scott read Cook's book in the train from Copenhagen to Berlin, the lesson of their terrifying experience was taken to heart despite the fact that nowhere does Cook actually use the word scurvy. A further year later saw the *Discovery* at anchor opposite the whalers' huts on Macquarie Island and there Scott first put the lesson into practice. As he wrote in his report (No.3) mailed from Christchurch:

"The opportunity was taken of serving out the flesh of the penguins for food. I had anticipated considerable prejudice on the part of the men to this form of diet which it will so often be essential to *enforce* [author's italics] and was agreeably surprised to find that they were by no means averse to it. Many pronounced it excellent, and all seemed to appreciate the necessity of cultivating a taste for it. I found no prejudice more difficult to conquer than my own."

In Stockholm, when Otto Nordenskjöld heard the Belgians' story he believed that De Gerlache had found the real Bismarck Strait, the key to the riddle as he and others saw it. And from that moment on the Swedish Antarctic Expedition he was campaigning for numbered among its goals the discovery of an eastern entry on the western shore of the Weddell Sea.

To reach it Nordenskjöld would head south, to the east of Hughes Bay, for De Gerlache had not been able to establish that it was anything other than the channel Larsen believed to separate Trinity Land from d'Urville's Louis Philippe Land.

Notes

(g) (Cook: *Through the First Antarctic Night* p333). Writing over 25 years later (*My Life as an Explorer* p27) Amundsen also claimed that De Gerlache "forbade any of the ship's company to indulge in" eating seal or penguin. When the commandant and Lecointe were bedridden Amundsen took command and "put everyone on seal." Even De Gerlache ate his share and "all improved greatly within a week."

(h) The letter quoted by Huntford (*The Last Place on Earth* p73) reveals he also took it as a personal insult.

(I) Van Mirlo, Dufour, Knudsen and Koren.

Source refs:

(5) Cook: pp331 &3; (6) *ibid* p219; (7) Nansen *Farthest North* I/p478; (8) Lecointe p255; (9) *ibid* p282; (10) *ibid* p385

40 YEARS AGO

SCOTT BASE — THE FIRST 'WINTERING OVER'

Part III of a three-part series
by Margaret Bradshaw.

The winter of 1957 was an important time for the scientists on base, especially for observations of the aurora, which Trevor Hatherton had made himself personally responsible for.

On clear days, Hatherton found himself extremely busy, for there were only two days between mid-May and mid-August when auroral displays did not appear.



Meal time at Scott Base in 1957.

When most people were snug in their beds, Hatherton was usually standing with his head out of an open hatch in the lab roof, recording the display with theodolite and an AllSky Camera with numb fingers. One of Vern Gerard's responsibilities was to measure the Earth's magnetic field at Scott Base. Automatic recordings were made by instruments in huts some distance from the base, but the records had to be changed regularly. Regardless of whether it was blowing a full storm or was an icy cold clear 'night', Gerard had to venture out twice a day to change the records. Peter Macdonald was making a survey of McMurdo Ice Shelf ice movement using oil drums mounted on snow cairns as markers.

He kept daily records of movement rates, as well as the buckling of the shelf against Pram Point where it produced the pressure

ridges. MacDonald had also installed a tide gauge the previous summer, part of the apparatus lying on the sea bed in seven metres of water under five metres of sea ice.

Like the other scientists, Macdonald showed great dedication in preventing the recording apparatus from icing up over the winter.

Neil Sandford's main task was to measure the ionosphere using aerials mounted on two 27m high masts well away from the science laboratory where the ionoson de-recording equipment was housed. When one of the winter blizzards ravaged and entangled the aerials and its stays, Sandford had the unenviable job of climbing the mast in complete darkness and in the freezing cold to sort the problem out.

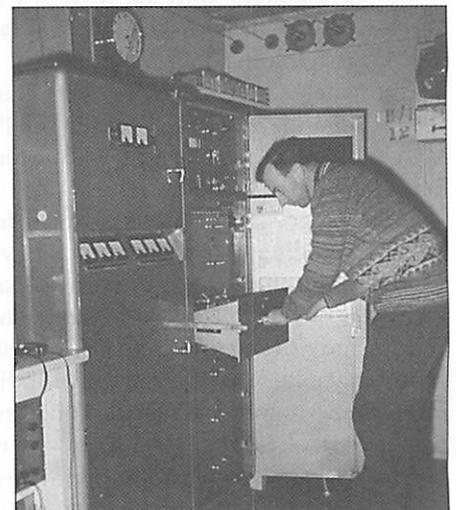
Herbert Orr concentrated on the seismological equipment but was also responsible for accurate timekeeping, vital for most of the atmospheric and geophysical recorders.

Within the base, geologists Guyon Warren and Bernie Gunn spent many hours on the messy task of slicing up rock they had collected the previous summer on small diamond-coated saws, then grinding them to translucency so that their component minerals could be identified under a microscope. They also completed a geological map of the lower Skelton area that had been drawn up for them by the surveyors.

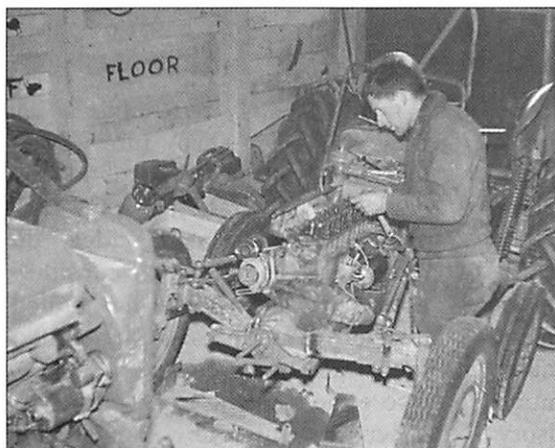
But the winter was cold. Ron Balham's meteorological readings show that the lowest temperature was -40°C , and maximum wind velocity 80 knots. Surprisingly, Pram Point proved to be a colder place than McMurdo Station just over the hill, where the lowest

temperature was only -30°C . Blizzards, which occurred on 34 of the 153 days of winter, caused several problems. Dogs chains became effectively shortened from 2 metres to 60cms as the dogs moved up to keep on top of the snow. Sometimes it took up to 12 hours to dig the line out and respan the dogs at the new level. Sledges, caches of seal meat, and both aircraft became buried and needed digging out. After one storm, only the propeller tip of the Auster was still visible. Snow drifted so high against the base that the inhabitants could walk up onto the roofs with ease.

The end of winter was approaching, but about a month before the return of the sun, a US helicopter crashed after a moonlit flight, with five Americans injured and one killed. George Marsh hurried round to McMurdo to help there for several days. On 17 August, the team at Scott Base could see the sun lighting up the top of Mt Rucker in the Royal Society Range across McMurdo Sound. Two days later, John Claydon and Bob Miller flew high over McMurdo Sound, and were the first to see the sun's return low on the horizon. The long polar night was over, and the New Zealanders began to gear them-



Trevor Hatherton checks the ionoson de-recording equipment.



Jim Banks working in the garage in March 1957.

selves up for a busy summer season.

Communication with McMurdo was improved when Peter Mulgrew and an American technician laid a telephone line between the two bases in early September. From 9 September, the number of people at Scott Base steadily diminished as successive sledging parties left the base on short expeditions to toughen up both dogs and men. By the middle of the month only eight residents remained of the 23 who had wintered over.

George Marsh and Guyon

Warren had taken one dog team to Cape Royds, then across to the west side of McMurdo Sound. They later met up with Bob Miller and Roy Carlyon who had driven two dog teams via a more southerly route past the Blue Glacier. Together, the four men had one last try getting from Butter point onto the Ferrar Glacier, then, being unsuccessful, turned north to Cape Bernacchi and Gneiss

Point. After sitting out a violent two-day blizzard, they returned to base with about 275 km under their belt, achieved in under two weeks.

Meanwhile, Richard Brooke and Bernie Gunn were exploring up the Blue Glacier with one dog team, surveying as they went, and Ed Hillary, Jim Bates, Murray Ellis, Peter Mulgrew and Herbie Orr were testing the tractors following winter modifications. They replenished the depot at Butter Point and established another one further north at Gneiss Point. A bonus was the discovery of several supply boxes left by Scott's party in 1901-

04. The tractors completed 260 km in eight days with no mechanical failures.

The last party to leave the base was Harry Ayres, Murray Douglas, Ron Balham and Neil Sandford in mid-September for Cape Crozier. The weather was not good, and it took them 10 days to reach the Emperor penguin rookery, where they reported a population of around 1000, including newly hatched chicks. The return journey took only three days.

Apart from a trip to Cape Royds and Cape Evans at the beginning of October by Miller, Carlyon, Gunn and Macdonald with two dog teams, work now focused on the main summer journeys in the north and the south, including depot laying onto the Polar Plateau.



Spring trial and tractor train.

AMUNDSEN SHIP GIFTED TO CANTERBURY MUSEUM

The Canterbury Museum has been gifted a model of Norwegian explorer Roald Amundsen's ship *Fram* — the culmination of 10 year's work by museum curator, Baden Morris.

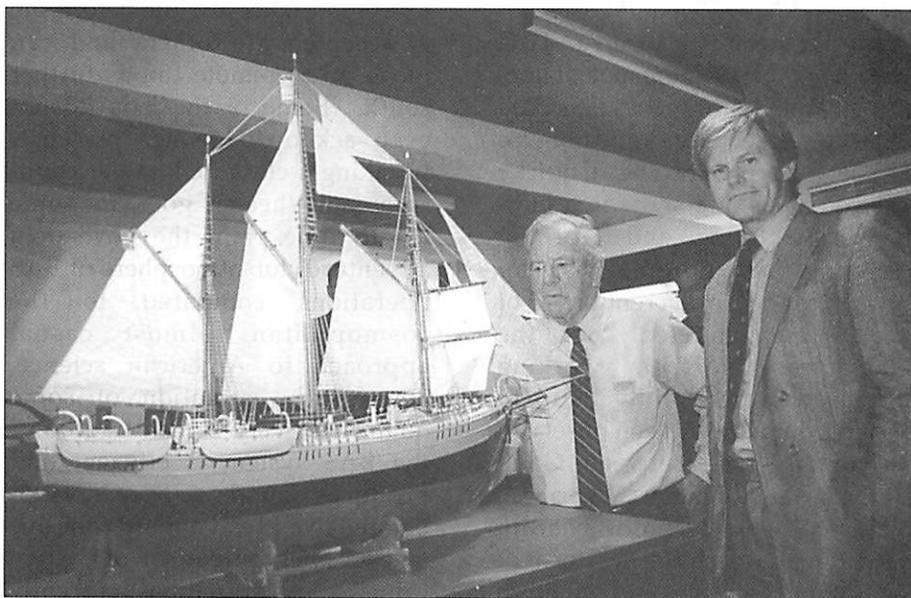
The metre-long model, made in Norway, was presented to the museum by Norway's ambassador to New Zealand Jon Bech.

Baden Morris was helped in his quest to secure the ship by Anne-Christine Jacobsen, a grand neice of Amundsen. She secured finance from the Sigval Berisen Foundation of Oslo, and model maker Johan Jensen of Englesvik Norway agreed to produce the model.

The model with a full press of canvas is of *Fram* as a steam auxiliary schooner, rigged as the ship was for her first two Arctic journeys. Amundsen altered the ship

for his expedition, replacing the steam propulsion with diesel and rerigging her with a slightly different configuration of sails.

The model of *Fram* is now housed and displayed in the Sir Robertson Stewart hall of Antarctic Discovery.



Baden Morris (left) and Norway's ambassador to New Zealand Jon Bech cast an approving eye over the model of *Fram*.

BOOK REVIEW

TERRA INCOGNITA —
TRAVELS IN ANTARCTICA

Jonathan Cape — London 1996

Sara Wheeler — \$29.95

Reviewed by Colin Monteath

By coincidence two copies of Sara Wheeler's new book arrived in the same week. This was probably just as well for a battle was narrowly averted. My wife and I could both sit up in bed and each read our own copies! For two Antarctic buffs, grounded for the summer out of sight of an iceberg and desperate for a long-overdue quality piece of writing to come out of Antarctica, *Terra Incognita's* arrival was timely.

Wheeler, an Englishwoman, is the first non-American to visit the Ross Sea region under the United States Antarctic Program Artists and Writer's Grant scheme. She makes good use of the ultimate tiki-tour by hitch-hiking McMurdo helicopters or long-range C-130 flights to visit various field camps strung out from the Dry Valleys to the newly-studied Ice Streams on the Polar Plateau. Camping excursions are interspersed with sojourns at the Amundsen-Scott South Pole Station, Terra Nova Bay and Scott Base. She provides an accurate, lucid and up-to-date portrayal of scientific endeavour and the idiosyncrasies of life at US, Italian and New Zealand bases.

The Antarctic is a bizarre place, attracting a host of unusual characters. Often as not they become 'lifers' and keep on returning to pursue their passion, be it quirky science or pushing snow in a bulldozer. By living and working alongside these people, Wheeler tunes in to their irreverent brand of humour engendered by the strangeness of their working routine and otherworldly nature of the environment. A keen observer, perhaps a cross between Colin Thubron and Diane Ackerman, Wheeler is able to probe beneath the surface to reach the heartbeat of the Antarctic sciences and scientists she encounters.

With a different scale and scope than Barry Lopez's famous book *Arctic Dreams* which focuses on the opposite end of the polar spectrum, *Terra Incognita* is pleasantly chatty and certainly more witty. And yet, Wheeler's use of language is precise, evocative and highly informative. She packs a lot of detailed information into this book, so much so that it should be compulsory reading for short-term visitors such as government VIPs before they journey south.

Wheeler's great coup was in being able to organise officialdom in the UK so she could dash home from McMurdo and New Zealand to London, water the plants in her flat, then board a flight to the Falklands, bound for the Antarctic Peninsula. (Direct flights across Antarctica are still extremely rare). It is unprecedented to be the guest of both the US and British governments in Antarctica in a single season. Getting her foot in the door of the (still!) male bastion of British Antarctic Survey is perhaps a further indication of her credentials as a writer.

After the flight from the Falklands to Adelaide Island had landed on the newly-completed airstrip at Rothera base, Wheeler finds herself the only woman among a horde of males predominantly in their early twenties. This situation is in contrast to her life at McMurdo where the staff are 40% female. It takes a while before she is accepted at Rothera and can move on to remote camps further south. Some of the lads do not even acknowledge her presence. In taking a close look at her countrymen, Wheeler goes to some length to explain the boy's-own adventure club atmosphere of BAS operations compared to the cosmopolitan, almost casual approach to American science. Despite the retention of some quaint and very British traditions, the BAS system is efficient and produces good science. Never before have I read a more cohesive and succinct comparison of the two principal polar nations currently working in Antarctica.

It is extremely refreshing to see how Wheeler has interwoven historical snippets throughout the book. In preparation for the task ahead, she has read widely on Antarctica so it is with considerable deftness that she has pulled out pertinent pieces and integrated them into her own text. She has also gone to some trouble to track down and interview some of the hard-bitten old timers who are still able to reminisce about epic dog sledging trips and life before the Dear John letters arrived by e-mail. The mix is a delightful polar potpourri of ideas, information and humour.

Returning to normal life in English suburbia proves to be difficult for Wheeler. Before long, she is winging her way back to New Zealand for another flight to Ross Island. The US Program is to be congratulated for coupling Wheeler with a US woman painter and letting them live in a hut on the sea-ice near Cape Evans. By now it is September, the coldest spring month, so they are able to experience and interpret with brush stroke and pencil the raw beauty of the sun commencing its swing south.

Cherry-Garrad's *Worst Journey* in the World has stood the test of time alongside graphic prints by Hurley and Ponting. Similarly, the extended support which has allowed *Terra Incognita* to emerge is proof that more high-quality written work needs to come from modern-day Antarctica to balance the profusion of visual information frozen on film each year.

Thus far, I haven't been able to track down Sara Wheeler's earlier book (*Travels in a Thin Country — Chile*) which covers a fleeting visit to a Chilean Antarctic Station. On the flight back to Chile Wheeler becomes intrigued to know more about the Seventh Continent. She scratches *Terra Incognita* on the cover of an empty note book. I'm glad that notebook is now full. Hopefully, when the Chilean book surfaces there'll somehow be two copies, so once again we can avoid a dust-up at home!

A YEAR ON ICE — LIVING AND WORKING IN ANTARCTICA

by Warren Herrick

(Published by: Shoal Bay Press 1997,
\$39.95)

Reviewed by Arnold Heine.

In 1968 Adrian Hayter published his book *The Year of the Quiet Sun*, the story of his year (1964-65) at Scott Base. As Base Leader of the 14-strong wintering-over party, he found it a unique experience and his book describes this very well.

Now, 34 years on, Scott Base has been rebuilt and enlarged, science projects have greatly increased, and the inclusion of women in both field parties and Base support has vastly changed the challenges of running an effective Antarctic programme.

Warren Herrick in *A Year on Ice* describes how he met these challenges. This splendid book is essential reading for OAEs and "wannabe" Antarcticans. Warren, together with his publishers, Shoal Bay Press, have produced a really neat book. So what is it all about?

The introduction describes very clearly the sun/darkness 12-month cycle at Scott Base, and the mountains and valleys nearby. This important background to working and living at Scott Base has seldom been described, and it clearly sets the tone of this book. Interwoven with the cheerful record of day-to-day life and conversations of his Scott Base team, Warren has carefully recorded many basic "bits" of information about Antarctic living. While this book will invoke many memories of similar incidents among the thousand or so New Zealanders who have been lucky enough to "go south", *A Year on Ice* should be read by any one heading south, particularly if it is for the first time.

While relationships and incidents may be unique to a particular group of individuals, history does repeat itself (many times) and it is useful to know that the happy and sad times that must always make up "a year on ice" are bound to happen and do contribute to a worthwhile memory bank.

A brief history of Scott Base is followed by a continuous series of observations/conversations/comments on the lives of the 10 wintering-over

staff at Scott Base in 1994-95. Beginning with the fire control training in Christchurch, the flight south and the Base staff handover, Warren then sets about detailing the Antarctic Field Training (AFT), the New Zealand Science programme, a day in the life of Scott Base, recreation, and relations with the nearby US McMurdo Base.

The mid-winter highlight of an air drop by C-141-Starlifter with its mail, fresh fruit, etc and its welcome from the wintering-over people is detailed, though regrettably this air drop has now been discontinued for economic reasons.

Warren goes on to describe in some detail the "highs" and "lows" of his team and how he himself approached the personal conflicts within a small team living and working together, 24 hours a day, in relatively confined spaces.

He details the changes that creep in with the approach of Winfly, the restricted spring flights from Christchurch, when the wintering-over period begins to break up. New faces, new ideas, (and new bugs), are beginning to intrude in the close-knit community. It is coming close to their turn to be "supplanted and to go home".

Placed throughout the main text of this book are brief articles by early New Zealand Antarctic people, like Ray Logie, Rex Hendry, Tony Bromley, Leo Slattery and others, offering their comments on their times "down south". Four appendices give details of the '94-'95 Science Programme, the Scott Base Met. Record, the '94-'95 Support Staff. Appendix 5 records the Scott Base and Vanda Wintering-over Teams from 1956-57 to 1995-96 — a particularly useful record. As well a splendid mix of colour photographs provides visual backdrops to the text.

Antarctica is very much part of the New Zealand world of mountains and wilderness valleys. It has brought a great deal of pleasure and challenge to many New Zealanders. Here then is a record of one brief period "down south" which will evoke memories as well as stir new emotions.

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LETTER TO THE EDITOR

Dear Madam,

In an article on the celebrations of the 40th Anniversary of Scott Base, the March issue of the Society's Journal, *Antarctic*, repeats, from a poorly researched article in *The Dominion*, a claim about "the disproportionate costs of keeping Scott Base operational for about 31 science projects each year". Historically the Society has supported involvement in Antarctica, and it is important to ask in what way the costs of Scott Base are disproportionate.

Currently the operations of Antarctica New Zealand cost nearly \$5.2 million, of which 9.3% is spent on the staffing of Scott base. A further 17% is spent on "Antarctic operations", of which I suspect at least half is on the direct support of science, making a total of about \$0.9m for the base. Funding for Antarctic science through the Foundation for Research Science and Technology is under \$2.0 million and it is believed that the Universities support research which would cost an equivalent amount if funded on the same basis, making a total of about \$3.5m. A further 6.7% of Antarctica New Zealand's budget is being spent in support of the

Cape Roberts project.

None of these numbers are quite what they seem. Foundation funding includes 12.5% GST on the salary component and a contribution to capital charges and costs of maintaining establishments in New Zealand. Likewise 13% of Antarctica New Zealand's budget is capital charges to the Government and is unavailable to support Antarctic operations.

The total overt costs of New Zealand's operations in Antarctica are under \$9.0m of which between 10 & 12% is spent simply on the running of Scott Base (one might ask whether a capital charge of 13% is a "disproportionate cost" for an Antarctic operation). I do not think the cost of Scott Base is an excessive proportion. In addition, it is wrong to charge the full costs of the base to science. The existence and manning of the base underpins New Zealand's diplomacy and status as a Southern Hemisphere nation and a member of the Antarctic Treaty system, it facilitates our monitoring of the environment and of Antarctic tourism, and it contributes indirectly to the New Zealand economy by enhancing our status as an Antarctic

Gateway. Further, users of the base include a stream of other visitors such as artists, musician, teachers, politician diplomats, administrators, reporters, boy scouts and cross-continent walkers. All these functions are recognised as parts of the brief of Antarctica New Zealand and all must bear a share of the costs of the base.

Operating the base has high fixed costs which do not relate simply to the size of the science programme. The proportionate cost of the base could be reduced by increasing the miserable size of the science budget which has been set at a level that has decreased the scope, scale, and breadth of outlook of New Zealand's Antarctic science.

It is a pity The Dominion of "politically attuned Wellington" could not have employed a reporter with a better grasp of arithmetic, and one who could have perceived a little more of the background above the roar of grinding axes.

Yours sincerely,
J D Bradshaw (Dr)
C/-Department of Geological Sciences
University of Canterbury
17 June 1997

A YEAR ON ICE

LIVING AND WORKING IN ANTARCTICA



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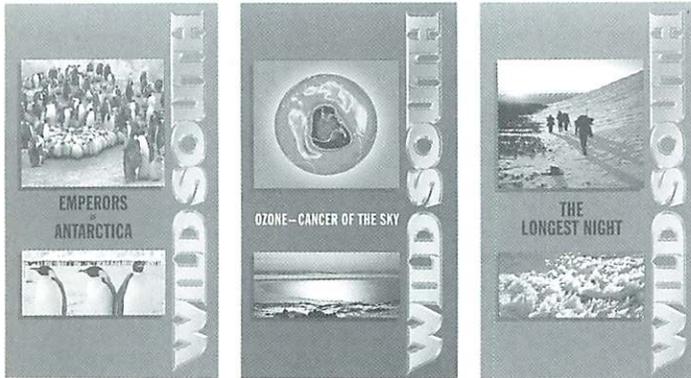
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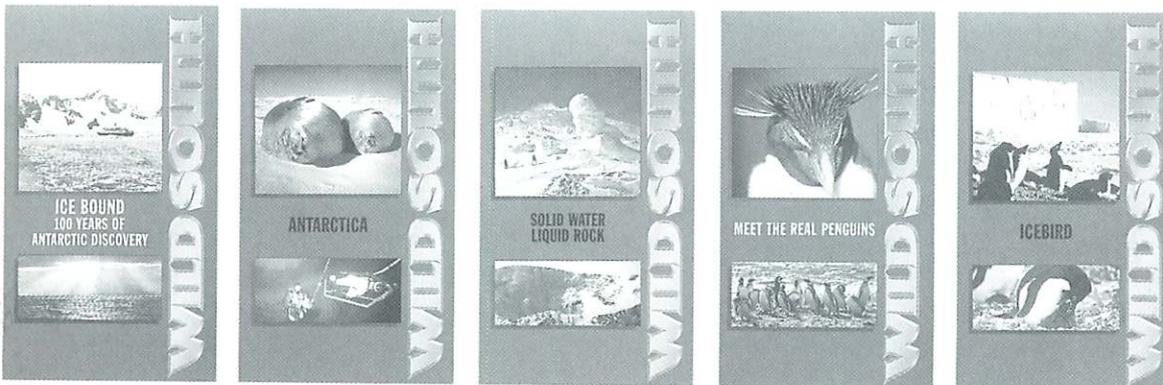
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