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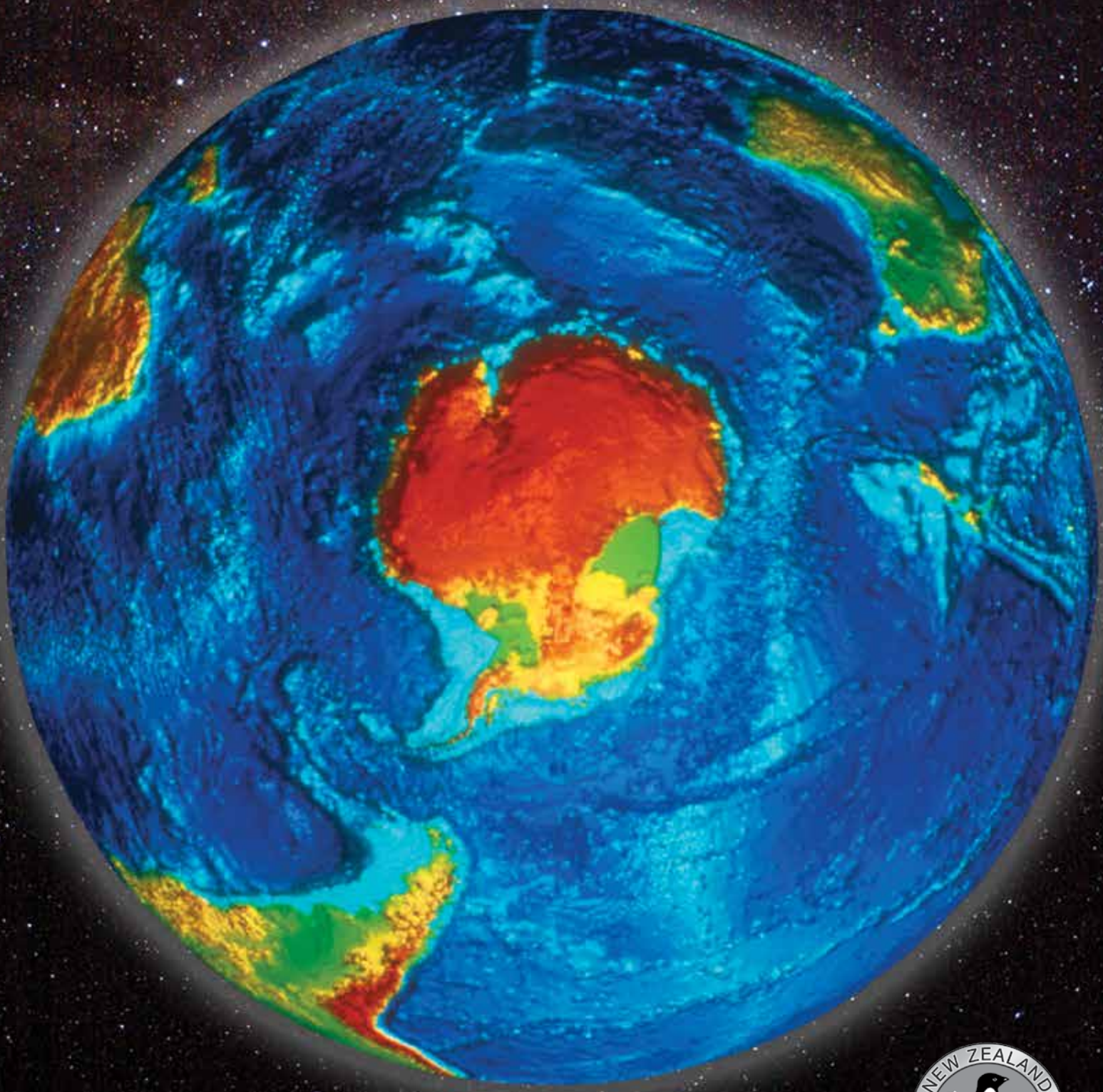
THE MAGAZINE OF THE NEW ZEALAND ANTARCTIC SOCIETY

ANTARCTIC



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NEW ZEALAND ANTARCTIC SOCIETY LIFE MEMBERS

The Society recognises with life membership, those people who excel in furthering the aims and objectives of the Society or who have given outstanding service in Antarctica. They are elected by vote at the Annual General Meeting and are restricted to 15 life members at any time.

Current Life Members by the year elected:

1. Bernard Stonehouse (UK), 1966
2. John Claydon (Canterbury), 1980
3. Jim Lowery (Wellington), 1982
4. Iris Orchard (Canterbury), 1990
5. Robin Ormerod (Wellington), 1996
6. Eric Gibbs (Wellington), 1997
7. Baden Norris (Canterbury), 2003
8. Bill Cranfield (Canterbury), 2003
9. Randal Heke (Wellington), 2003
10. Bill Hopper (Wellington), 2004
11. Malcolm Laird (Canterbury), 2006
12. Arnold Heine (Wellington), 2006
13. Margaret Bradshaw (Canterbury), 2006
14. Ray Dibble (Wellington), 2008
15. Norman Hardie (Canterbury), 2008

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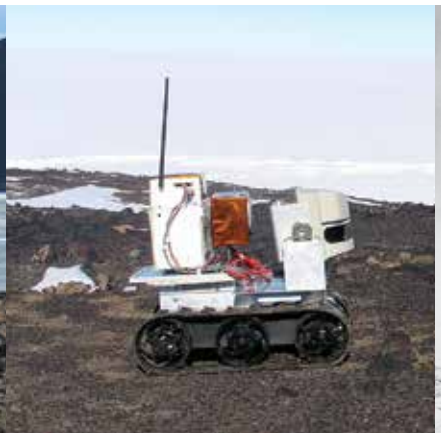


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Conservation Trophy for 2008 awarded to Peter Carey

The New Zealand Antarctic Society's Conservation Trophy, awarded by the Society's Council to organisations or individuals who have made outstanding contributions to the conservation of Antarctic or subantarctic flora and fauna, went late last year to Peter Carey for his work to ecologically restore a group of small islands he purchased in the Falkland Islands.

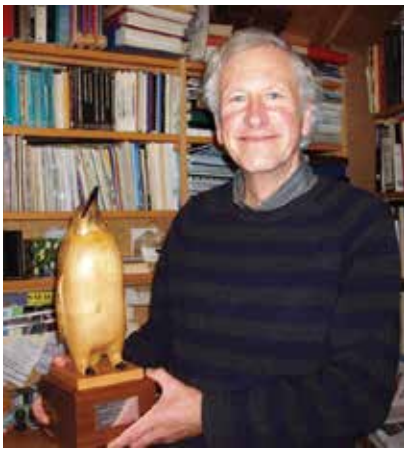
The presentation was made on 25 November 2008 in the Sir Edmund Hillary Room at The Antarctic Attraction at the International Antarctic Centre in Christchurch by Society President Norm McPherson, in the presence of members of the Antarctic community.

Peter, a zoologist, earned his PhD from the University of Canterbury working on wildlife on some of New Zealand's remote outer islands. His post-doctoral research has included efforts to protect native ecosystems from introduced vertebrate pests, as well as ecological studies of various penguin species and other seabirds in Antarctica and the subantarctic. Seeking to utilise both his academic skills and practical field experience for the benefit of ecosystems worldwide, he purchased four small islands in the Falklands and formed the SubAntarctic Foundation for Ecosystems Research (SAFER) in 1996. His goal is to use the islands to develop ways to improve wildlife habitat on remote islands. The techniques perfected there will then be shared with other islands elsewhere in the world to make them safer for wildlife.

Peter lives in Christchurch, New Zealand, and commutes annually to both his SAFER islands and to the USA, where he is an Affiliate Professor with the Geography Program at the University of Alaska. In 2006 he wrote, with Craig Frankland, the *Antarctic Cruising Guide* which includes a section on the threats to Antarctic conservation.

Society President Norm McPherson presents the 2008 Conservation Trophy to Peter Carey.

The Trophy was last awarded in 2004 to Chris Cochran, a conservation architect of Wellington, for his significant work with the historic huts in Antarctica. Chris had worked on heritage conservation projects for the Antarctic Heritage Trust relating to the huts in the Ross Sea region. In addition, he was involved in the mid 1990s with the hut survey and restoration project undertaken for the British Antarctic Survey and the UK Antarctic Heritage Trust.



Chris Cochran with the Conservation Trophy. Image courtesy Nicola Jackson.

Fossil molluscs from Seymour Island, Antarctica

One of the largest known collections of fossilised molluscs from the Antarctic has been donated to The Paleontological Research Institution (PRI) in Ithaca, New York.

The collection of Cretaceous to Eocene fossil molluscs from Seymour Island, Antarctica was assembled over more than four decades by William J. Zinsmeister, a professor of geology at Purdue University.

Gregory Dietl, Director of Collections at PRI said that collection is important for two main reasons:

> *The first is that it includes samples from one of the best K–T Boundary sections in the world (the time interval when dinosaurs became extinct). Recent discoveries from Seymour Island are challenging the view that the K–T extinctions were caused solely by a catastrophic asteroid impact. Instead, a prolonged interval of decline in diversity, prior to the impact event at the end of the Cretaceous Period 65 million years ago, is evident from the fossil record on Seymour Island. These data suggest that more protracted changes in the Earth's climate may also have been important.*
>
> *The second reason this collection is important is that it can help us understand the effects of current climate change on marine communities in Antarctica. Today global warming is enabling crab predators to reinvade Antarctica, after being excluded from the region following the onset of a cooling event in the Eocene some 40 million years ago. Scientists are trying to understand how the indigenous fauna will respond to such changes. The collection's strength during this critical interval in the history of the Antarctic region provides unique information to addressing this problem.*

The Zinsmeister collection is full of fascinating fossils. Most notable is the heteromorphic ammonite (*Diplomoceras*), which is related to the living nautilus. One *Diplomoceras* specimen measures about 1.8 metres in length and resembles a saxophone. The specimen raises questions relating to how the organism lived and whether it was able to swim like most ammonites.

PRI hope to create an online exhibition of the collection, which will highlight its importance for discussions of climate change, evolution, and extinction. More information on the collection is available from www.museumoftheearth.org.

Judith Nagel-Myers, Collections Manager at PRI, with a nearly 1.8 metre-long heteromorphic ammonite. Image courtesy PRI.

Gregory Dietl, Director of Collections at PRI (right), loading William Zinsmeister's (left) collection on to trucks for shipment to PRI. Image courtesy PRI.

Alton Lindsey's Special Congressional Medal: Keeping Alive Memories of the Byrd Antarctic Expedition II, 1933-35

This article is a follow-up to *A Handshake Over a Medal: Dr. Alton A. Lindsey remembers his return from Antarctica in 1935*, by Glenn M. Stein, FRGS (Antarctic, Vol. 26, No. 3, Issue No. 205, 2008).

By Glenn M. Stein

Alton A. Lindsey passed away in Tulsa, Oklahoma, during the final days of December 1999, at the age of 92. He was believed to be the last living scientist from the Byrd Antarctic expeditions. I was tremendously grateful we shared letters two years before, but had no inkling our exchanges regarding his special congressional medal for the 1933–35 expedition would lead to nurturing his memories, and those of the second Byrd Antarctic Expedition.

Beyond a 1937 newspaper photograph of the medal presentation in Washington, DC, I had never seen a picture of Dr. Lindsey's medal. Over the years that followed my contact with Dr. Lindsey, curiosity prodded me into contacting his family in January 2009. I telephoned Louise W. Lindsey, the explorer's daughter, and explained my association with her father. She was extremely gracious and warm, and not only offered to take photographs of the medal, but also put me in touch with her mother, Elizabeth, aged 89.

Early in February I heard from Elizabeth for the first time; like Louise, she was eager to help with my research and learn more about the medal's meaning. Soon images arrived by email, and initially I winced: a naked silver disc filled the computer screen. The two top rings, ribbon, and brooch pin had all gone astray. Upon asking Elizabeth if she knew the whereabouts of these pieces, she vaguely recalled seeing them

at some point in time, but doubted they could now be pinpointed. On a positive note, some images clearly showed the machine-impressed naming on the medal's edge, "A. A. LINDSEY".

Elizabeth's explanation as to how the medal was passed onto her speaks of Alton Lindsey's character. As his 90th birthday approached, his family wanted the celebration to be an extra special one, but Dr. Lindsey would not allow any presents. Instead he turned the tables. He prepared several small gift boxes for some of his relatives, "with treasures from his long life of expeditions and travels. My little box contained his Byrd Antarctic Expedition II Congressional Medal," explained Elizabeth.

I suggested to Elizabeth and Louise to consider restoring the medal and offered to find a length of ribbon and pin brooch which their local jeweller could attach to the silver rings. I also suggested that a portrait photograph be taken, with Elizabeth wearing the medal in honour of her husband. Both ideas were received with good cheer.

My attention now turned to the task of acquiring a ribbon and pin brooch, neither of which were readily available items. As it happened, the second Byrd Antarctic Expedition Medal was issued with a somewhat wider ribbon than what is standard for US medals, and consequently was fitted onto a wider pin brooch as well. A viable substitute for the first came in the form of a length of ribbon from a British Arctic Medal 1818–1855, while the latter was satisfied by with a pin brooch from an American World War I Victory Medal. Not perfect matches, but very close to the originals.

In late February, I despatched the parts to Elizabeth, along with instructions for the repair. Within two weeks, the jeweller carried out the work in a most satisfactory manner, and Elizabeth sewed the ribbon onto the pin brooch. On 17 March 2009, Elizabeth and Louise sat for their portrait, the medal, hanging from its snowy band, standing out boldly against Elizabeth's red lapel – Lindsey's congressional medal had been resurrected!

References and acknowledgements are available from the author.

Website for the McMurdo Dry Valleys launched

A website for the McMurdo Dry Valleys Antarctic Specially Managed Area (ASMA) has been launched by its Management Group. It is intended as a source of information for anyone interested in the McMurdo Dry Valleys Area, and for anyone visiting or conducting research in the Area; it will also be the host site for the ASMA Management Group's work.

The website contains information about the Area's unique environment and features and provides overview maps of the Area. A special image section contains spectacular photos of the Dry Valleys and activities conducted there. The website contains informative pages related to the location of stations and camps as well as activities conducted in the Area, including science, media, art and education programmes and tourism. For those interested, an Activities Directory contains current information on planned science and media visits to the Dry Valleys from all Antarctic programmes for the coming or current Antarctic summer.

Because the Dry Valleys are such a special place, activities within this Area are managed to ensure that its scientific, wilderness, ecological and aesthetic values are protected. A section of the website is dedicated to the management of the Area. This section includes the Dry Valleys ASMA Management Plan, (environmental code of conduct, guidelines for conducting scientific research and for special features, and maps of the facilities and tourism zones), the Management Plans for Specially Protected Areas within the ASMA, and training material for those planning to visit or conduct scientific activities in the Area. There is also information about the Management Group and an area for the Management Group to add and share information about activities, management planning and archiving documents to help co-ordinate activities of different parties working in the Area.

You can view the website at this address:
http://www.mcmurdodryvalleys.aq/

Mt Erebus Disaster Remembered

Memorial cross on Mt Erebus.
Photograph: L Sanson, Antarctica NZ Pictorial Collection: K325 06/07

On 28 November 1979, Air New Zealand flight TE901 crashed on the slopes of Mt Erebus in Antarctica, killing all 257 people on board. This disaster remains a hugely significant event in New Zealand's and Antarctica's history.

Given the size of New Zealand at the time it was thought that every New Zealander either knew, or knew of, someone on board the plane, or one of the many people and agencies involved in the recovery operations, commemorations and inquiries that resulted from the crash.

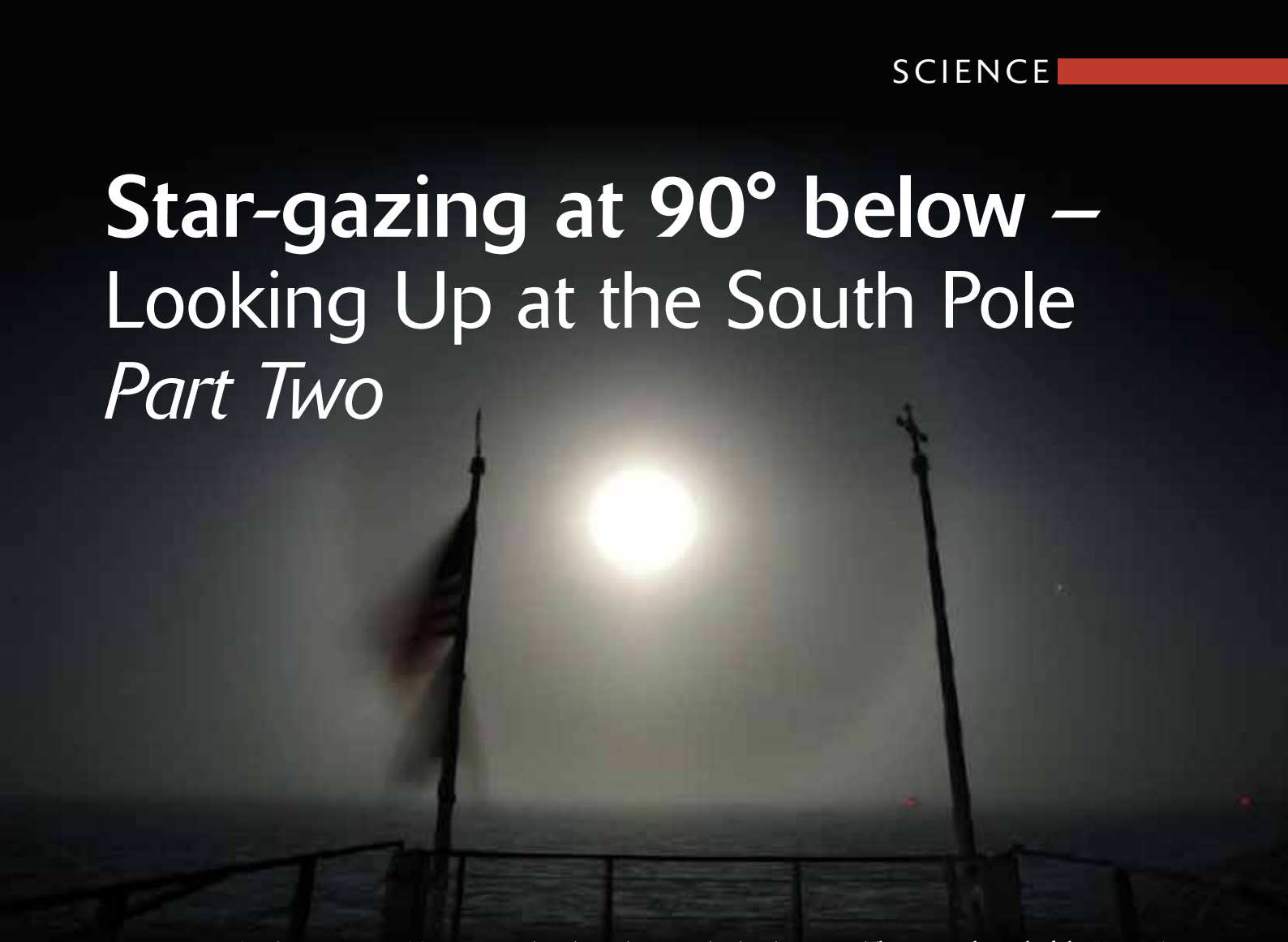
A sculpture titled *Momentum* was unveiled on 23 October 2009 at Air New Zealand headquarters in Auckland. Family members of those who died attended the unveiling where Air New Zealand CEO Rob Fyfe apologised to those affected by the tragedy for Air New Zealand's treatment of the families at the time. The sculpture, by Christchurch artist Phil Price, moves through wind-power and aims to capture the allure and fragile nature of flight and show the interaction between physical and environmental elements.

In late November 2009 Air New Zealand is commemorating the 30th anniversary of the disaster with services both at the memorial cross close to the crash site and at Scott Base. In addition to personnel from both New Zealand's Scott Base and the US base, McMurdo Station, the services will be attended by six people representing the passengers and technical and cabin crew who lost their lives in the disaster. The representatives will fly down to Scott Base on 27 November and, weather permitting, that night will fly by helicopter up to the memorial cross site in Antarctic Specially Protected Area (ASPA) 156. The memorial cross is situated on a rocky outcrop approximately three kilometres from the crash site.

On the actual anniversary day a memorial service, officiated by The Very Reverend Peter Beck, Dean of Christchurch Cathedral, will be held at Scott Base, finishing with a gathering at the Scott Base flagpole at 12:50 pm, the time the crash happened.

After a visit to the Heroic Era huts of Scott and Shackleton and a tour of McMurdo Station the passenger, crew and Air New Zealand representatives will fly back to New Zealand on 30 November. The memorial services will be filmed and shown on television in New Zealand to allow other family members to share in the commemoration.

Star-gazing at 90° below – Looking Up at the South Pole *Part Two*



By Ella Derbyshire, South Pole Physician, Winter 2009

The Sun, Moon and Stars

So what stars are out in the South Pole sky? Well, if someone tries to show you a special chart of the stars that are visible from the South Pole, be ready to gaze upon a star chart of the south celestial hemisphere. That's it, plain and simple. Our horizon is the celestial equator, and the south celestial pole is straight up above us. If the moon, the sun or any star or planet is north of the celestial equator, then the Earth will hide it from our view. Between the spring equinox in September and the fall equinox in March, the sun is above our horizon. The stars are all still in their proper places, but we don't see them because the sun's brilliance overpowers them all. Once the sun has set, travelling as it does to the northern part of the Earth's sky, the South Pole stars have their chance to shine. And shine they do, non-stop for four to five months, depending on the brightness of the star.

Every month the moon is in our sky for two uninterrupted weeks. Then it disappears, passing northward over the celestial equator and below our horizon, where it will stay for the next two weeks. When the moon is in the sky, the Milky Way and the dimmer stars disappear in the moonlight. The moonlit nights are the best times to study the constellations, which can get lost among the sea of stars that circles the Pole. However, it is best to study the Milky Way and to look for dim stars, nebulae and star clusters in the two weeks between moonset and moonrise.

I've mentioned that from here we can't see stars that are located north of the celestial equator. Perhaps the most famous of northern constellations are the starry bears, Ursa Major and Ursa Minor, which are both north circumpolar constellations. We will never, ever see them from the South Pole. The star at the end of the Ursa Minor's tail is Polaris, the North Star, and its declination is very close to 90° N. The origin of the term *Arctic* to describe the far north is derived from *Arktos*, which is the Greek word for bear. The name *Antarctica* refers to the location on Earth that is opposite the Arctic. And so it is fitting that *Antarctica* literally means the land opposite the bears.

Now, when you think about the sun and the moon and the path that they travel through our sky, it seems obvious, but not necessarily intuitive, that there are times when the great orbs of light are in parts of the zodiac that we can't see from here. The constellations Libra, Scorpius, Sagittarius, and Capricornus are always completely above our horizon. All but the northernmost part of Aquarius is also visible here. When the sun is in this part of the sky, it is daylight at the South Pole and fall and winter in the northern hemisphere.

Continued over ▶▶

When the sun is in the northern part of the zodiac, among the stars of Aries, Taurus, Gemini, Cancer or Leo, the South Pole is in darkness and the northern hemisphere is enjoying the warm rays of the sun.

We observed the sun set in March into the stars of western Pisces, which straddles the celestial equator, and it passed northward through Aries as we watched the sun's light fade on the horizon. The faint glow of the returning sun appeared in early August, while the sun travelled across the stars of Leo. It will rise into the stars of Virgo with the equinox in late September, bringing six months of constant sun and daylight. And so, we have about four months of deep darkness, two months of twilight and six months of starless daylight in a South Pole year.

The Unveiling of the Night Sky

Right after the 2009 sunset we experienced a few weeks of civil twilight, when the sky was too bright for any stars or planets to shine through. On April 2, within a few weeks of sunset, nautical twilight began when we saw our first "star". It was a single light about 15° above the horizon, steady, not twinkling, and brilliant. Some of us thought that it was a star; others thought that it was a planet – but which one? The passing of a few more days brought enough darkness to see through a large pair of binoculars four tiny points of light lined up beside our first star. And so, we confirmed that we were seeing the planet Jupiter, which has circled us with the stars of Capricornus throughout the 2009 winter.

As the darkness deepened, real stars appeared, sometimes only one a day, and on some days maybe two or three. First Canopus appeared high above the glow of the sinking sun, and then Sirius about a third of the way up the sky. Alpha and Beta Centauri, Antares, Rigel, Achernar, Fomalhaut and Spica followed. The horizon was still visible when two stars appeared close to Alpha and Beta Centauri. Astronomical twilight began with the appearance of great numbers of lesser stars, allowing us to see some star patterns in the constellations, and among those we saw the five stars of Crux. It was a wonderful sight for those of us who have never before seen the Southern Cross in the sky. But there were more stars to come. With the setting of the moon in early May, the Milky Way appeared, spreading a creamy light from the horizon under the teapot in Sagittarius, climbing up across the dome of the sky and descending on the opposite horizon near Canis Major. Astronomical twilight had ended and the South Pole night sky was complete.

Globular Clusters

I do like stars and constellations, but I have an uncommon passion for globular clusters, which are great spheres that are made up of millions of stars. The globulars formed in the early days of the galaxies, and they are found in galactic halos. The Milky Way has over a hundred of them, some of which I have observed in the north, where they look as though a celestial artist applied some glow-in-the-dark paint to the sky, using a cotton bud.

With the unveiling of the Milky Way came the Large Magellanic Cloud. And then I saw the Small Magellanic Cloud and knew that this was going to be a memorable observation. I looked carefully at the darkness near the Small Cloud and I saw there something that I have waited decades to see: 47 Tucanae. It was a dim, round, glowing patch of light that stood out even without binoculars. It would have been a sensible time to come inside, because I was getting a bit cold out there, looking high above me and standing quite still to avoid falling over in the dark.

47 Tucanae is a nice prize for a night of observing, but it is neither the biggest nor the brightest globular cluster in the sky. The hunt was on! I started at 47 Tucanae, crossed the Milky Way and continued through the gap between the pointer stars and the Southern Cross. I went just a little ways further and there it was: Omega Centauri, the largest, brightest globular cluster in Earth's sky. I came in more chilled than I would have liked, but there was no denying it: despite that fact that it was still early afternoon, I had just experienced the best night of star-gazing night that I have ever had.

Artificial Satellites

An experienced stargazer knows that the moon, stars and planets are not the only objects of interest in the sky. When we are outside looking at stars, we sometimes see satellites crossing the sky. There are web sites that post the times of satellite passes, and such predictions are useful in planning some variety in a trip outside.

Sometimes bright flashes of light in the night sky can be seen that are due to sunlight reflecting off of the mirrors of orbiting Iridium communications satellites. These are called Iridium flares and appear as fleeting lights that wax to become brighter than Jupiter and then wane and disappear. They come in crops that last for days, with flares occurring with sufficient reliability that we have posted the times of predicted flares for people to watch them. Consecutive flares tend to occur in the same spot in the sky, so when a flare appeared east of Sirius one afternoon, the rest

of the flares for that day were easy to find without worrying about altitude and heading. We could just aim our cameras at Sirius, watch the clock and push the shutter release a few seconds before the appointed time. A 30-second exposure was usually sufficient to capture the flare and the stars behind it. The flares became a popular target for the shutterbugs among us.

The Aurora

Aurora Australis is also called the Southern Lights. It is the result of charged solar particles hitting the upper atmosphere and creating a glow. The particles are deflected by the Earth's magnetic field towards the North and South Poles. 2009 is a very quiet solar year, and I wasn't expecting much aurora activity. There are on-line sites that predict aurora activity based on solar storms, and we have certainly had our disappointments trying to follow the predictions. You see, the aurora from a storm may be over McMurdo and nowhere near the Pole.

Happily, there are other days when we are not expecting auroras and we find the sky is full of pale, dancing lights. Most of the auroras are white, but we have had our share of greens and pinks, and we were delighted to watch a blue aurora during a dark moonless night in July. The lights come in different shapes. Some look like glowing clouds; others appear as curtains or arcs in the sky. My favourite are the ones that look like spikes of rain falling from a thunder cloud. The auroras are dynamic. A river of light can crawl from horizon to zenith and down to the opposite horizon, and I have seen some intersect the Milky Way. The lights can swirl and change shapes with considerable speed. They make the curtains ripple, as if they were in a breeze. Because they come and go unpredictably we have an aurora channel on our radios. We use it to alert interested crew members that there is an aurora that is worth a trip outside.

Meteors

Meteors are another difficult-to-predict phenomenon. There are on-line sites that list the times that major meteor showers will peak and how many to expect. During the last week of July and the first week of August we were seeing quite a few meteors. When the showers peak as predicted, meteors are fun to watch as they streak across the sky. We have seen some coloured meteors this winter, and we have seen some break up into several parallel trails of light. Of course there are no rules about ignoring the stars when we are looking for meteors, and a predicted meteor shower can bring a lot of incidental star-gazers outside.

There also seems to be a lot of background meteor activity here that is far removed from the predicted peaks of the reliable showers. A casual star-gazer may be surprised at just about any time by a stray streak of light zipping across the sky.

By the Light of the Moon

When the moon is above the horizon, there is less opportunity to observe the Milky Way and dimmer stars: they can get lost in the light of the moon. On such nights, the moon itself can be the focus of our attention. The moon is a fine target for binoculars. There is a measure of satisfaction to be had in watching the terminator (the border between the lit and unlit portions of the moon) cross the lunar mountains and valleys. This month's crescent moon has been especially good for this activity. Moon dogs and halos are fun to see. Ice crystals in the upper atmosphere can catch the moonlight, creating a pale ring around the moon. Moon dogs are points of light in the halo that appear on opposite sides of the moon, like white diamonds in the ring of light.

Conclusion of the Winter 2009

As I write this it is late August. The Milky Way has disappeared, and with it the globular clusters are also gone. Many of the dimmer stars have left the sky. Soon we will be watching the last aurora of the winter of 2009, and the last of the bright stars will fade into the light of the approaching sunrise. Finally, Jupiter will disappear in the weeks before sunrise. It is with some sadness that I watch the stars fade. Star-gazing at the South Pole during the winter of 2009 is an experience that I will not easily forget.

With the return of twilight, I think about all that I have seen here this winter. I think about all of the stars in their constellations turning above the South Pole, hidden in the light of the sun from the people who come to the Pole only during the summer. Most of them will never experience a starry night such as we have enjoyed these past four months. To see the stars above the Pole, you have to spend an entire winter here, and so far only 1267 people have had the opportunity to stand on the snow by the South Pole marker and look up into dark sky to see the wonders there. I am very glad to count myself as one of them.

Author: Ella Derbyshire

Current work position: South Pole Physician Summer 2008–09 and Winter 2009

Usual job: Staff physician, Maniilaq Health Center, Kotzebue Alaska, USA

Member: Albany Area Amateur Astronomers, Albany, New York USA

Member: Planetary Society

Former a planetarium lecturer: Schenectady Museum and Planetarium, Schenectady, New York USA

Former contributor: Skywatch Line, Dudley Observatory, Schenectady, New York USA

The Latitudinal Gradient Project (LGP) – a first for Antarctic multidisciplinary research

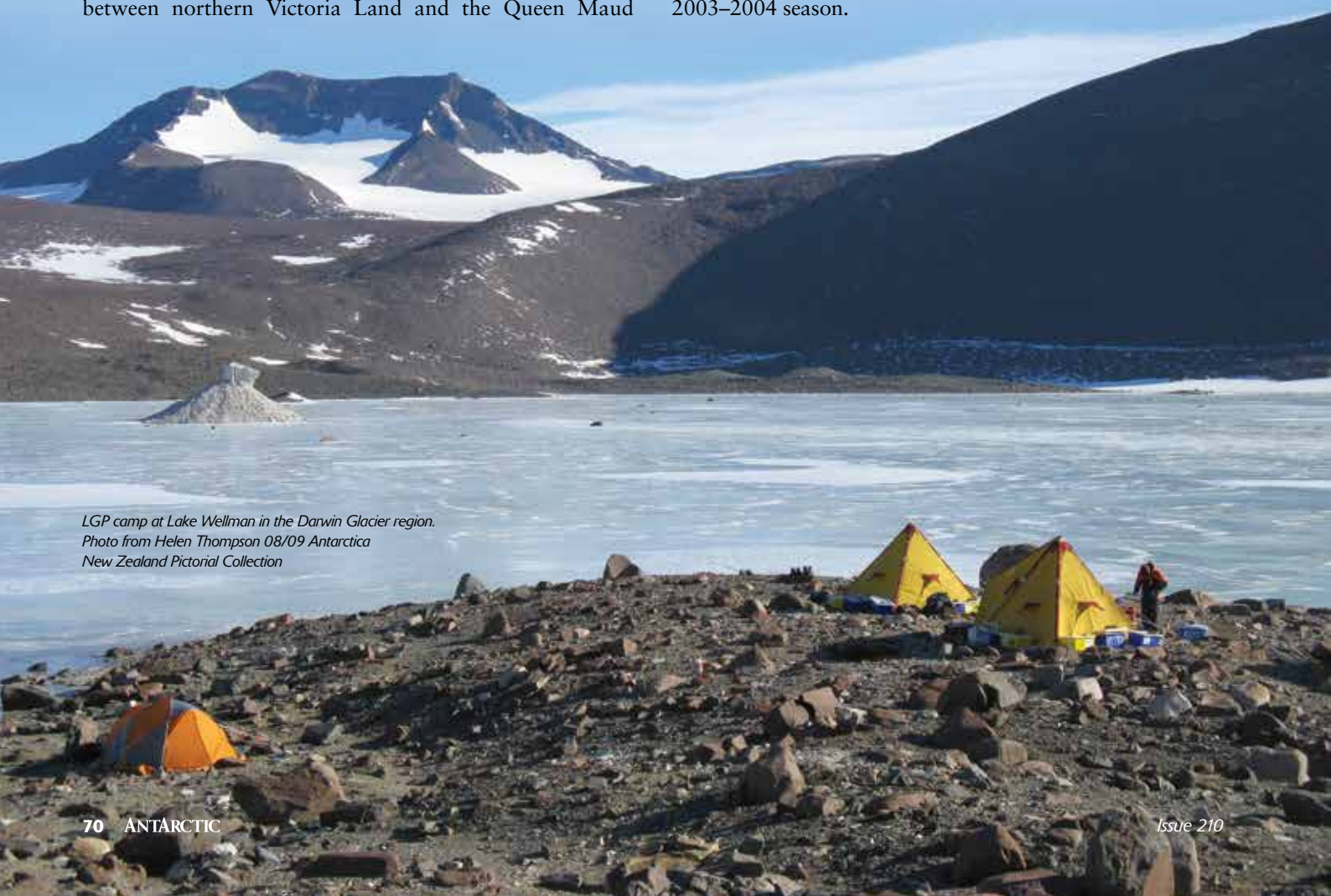
The Latitudinal Gradient Project (LGP) is a successful multidisciplinary, international Antarctic research programme. Its approach focuses on marine, terrestrial and freshwater ecosystems along the north–south latitudinal gradient between northern Victoria Land (72° S) and the Queen Maud Mountains (86° S) in the Ross Sea region, using this gradient as a proxy of climate change. From humble beginnings it now promises big science.

By Mark Stevens from the South Australian Museum in Adelaide and Shulamit Gordon, Science Advisor, Antarctica New Zealand

Now in its eighth year, the programme, spearheaded by Antarctica New Zealand, has become a flagship for the promotion of multidisciplinary research in Antarctica.

The Latitudinal Gradient Project (LGP) consists of coordinated, multidisciplinary research embedded within a latitudinal gradient framework. It is the first example of such a research programme in the Antarctic region and it aims to look at how marine, terrestrial and freshwater ecosystems vary along the north–south latitudinal gradient between northern Victoria Land and the Queen Maud Mountains in the Ross Sea region. The transect spans over 1500 kilometres with five main sites running from Cape Hallett (northern Victoria Land, 72° S) to the Beardmore and Shackleton Glaciers (85° S).

The LGP was born in the late 1990s when researchers from various disciplines working in the Ross Sea region began to seriously discuss the possibility of using a latitudinal gradient along the Victoria Land coast as a proxy for climate change. But it was not until after the 2001 Scientific Committee for Antarctic Research (SCAR) biology symposium in Amsterdam that Antarctica New Zealand took decisive action and the LGP framework was developed, followed by the first LGP scientific field camp in the 2003–2004 season.



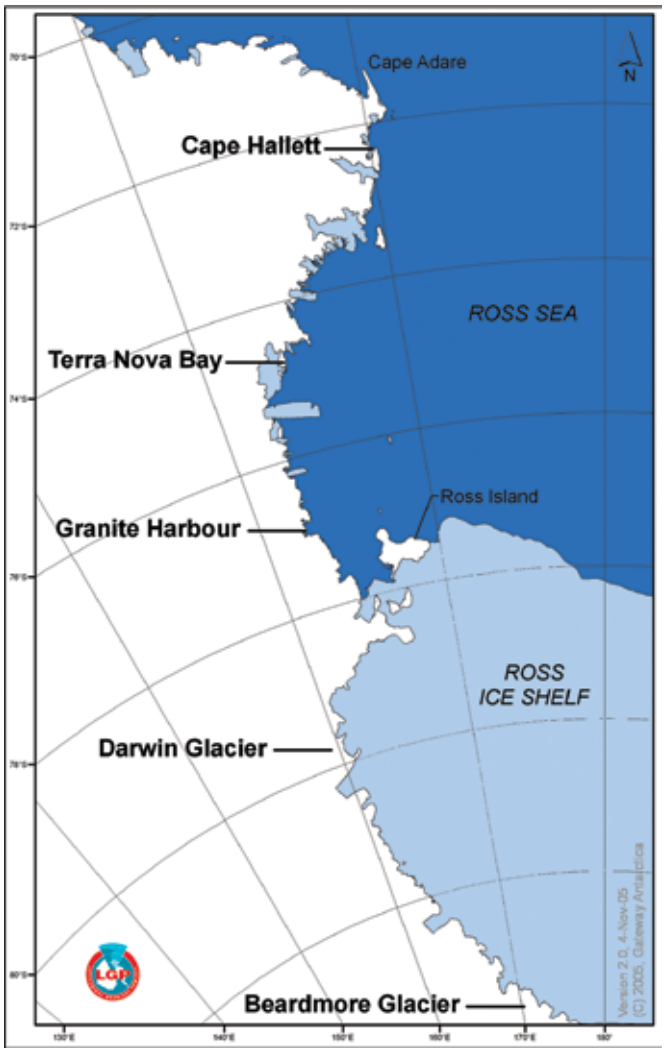
LGP camp at Lake Wellman in the Darwin Glacier region. Photo from Helen Thompson 08/09 Antarctica New Zealand Pictorial Collection

Researchers jointly formulated a general hypothesis and eight key questions that have guided the studies undertaken within the LGP framework. The LGP's general hypothesis is that *ice-driven dynamics control the structure and function of marine, terrestrial and freshwater ecosystems along the Victoria Land coast*. All research conducted under the LGP umbrella aims to answer at least one of the eight key questions that supports this hypothesis:

1. How does ecosystem structure and function change with latitude, and why?
2. What is the role of persistent, large-scale ice structures in defining community composition?
3. How do snow and ice dynamics influence ecosystems and ecosystem processes?
4. How does climate affect the availability and composition of free water?
5. How does climate affect the predictability, persistence and extent of sea ice cover?
6. How are key marine biological processes influenced by sea ice conditions?
7. How does soil development influence terrestrial ecosystems?
8. To what extent are past conditions preserved in paleoindicators?

Now in 2009, eight years since its conception became a reality, the LGP has come of age. It is highly regarded within SCAR's framework, and in particular within SCAR's biology programme "Evolution and Biodiversity in the Antarctic: A Response of Life to Change" (EBA). The LGP is an international project that involves mostly New Zealand, Italian, United States, United Kingdom and Australian researchers. The LGP aims to increase our understanding of the marine, freshwater and terrestrial ecosystems that exist along the Ross Sea region, and determine the effects of environmental change on these ecosystems. It is a scientific and logistic framework encouraging collaboration between different disciplines, particularly by concentrating research at specific sites, thus enabling direct comparisons between sites and allowing for a "complete ecosystem" picture to be built.

Each nation's approach and contribution to the LGP are different. New Zealand currently has nine LGP-related research projects with Antarctica New Zealand committing significant resources to the LGP and its research activities across the five locations. The individual projects within the LGP framework are already building a picture of the differences and similarities between sites that have been visited so far, and a significant compilation of LGP-related papers was published in a 2006 special edition of *Antarctic Science*, with a second LGP publication planned for 2010. A full latitudinal comparison will be possible once the remaining sites along the Antarctic gradient have been completed.



Map of the Victoria Land coast showing the five sites chosen for study under the LGP

Building on the success of the LGP is important, and as noted above it is already a key project of SCAR's EBA programme. The results and value of the LGP have been demonstrated by interdisciplinary and international collaborations, scientific output to rival any other Antarctic programme, and significant achievements in terms of field support and international recognition. The potential to now explore gradient comparisons between Victoria Land, the Antarctic Peninsula and other areas in Antarctica opens the door to some very exciting, multidisciplinary research that would not have been possible only a few years ago. A critical next step in the development of an Antarctic Gradients concept relies on creating linkages, fostering multidisciplinary research across nations, and thereby providing the means for comparisons across the continent. In the wake of an LGP legacy the future of Antarctic research is exciting!

More information is available from the project's website http://www.lgp.aq

ATS-3 Satellite in rocket prior to launch in 1967.

Reaching for the Ice – NASA in Antarctica

The technological development of the primus stove allowed people to reach the South Pole and enabled the exploration of the Antarctic continent. The continent seems in many ways more like another hostile planet than a piece of Earth with the main roadblocks to exploration chiefly being access, communications, and survival. It makes sense therefore that technologies developed by the US National Aeronautics and Space Administration (NASA) to enable exploration of Space and other planetary surfaces, would find applications in Antarctica as well.

By Mike Comberiate

Back around 1420 AD the Chinese were sailing around the world with a very large fleet of wooden ships. They sailed below the southern tips of Africa and South America and Australia, and stopped only when the ice pack became too dense for them to penetrate it further. They saw floating icebergs in that ice pack, which were 30 metres above the sea surface and tens of kilometres long. They knew these bergs were even bigger below the sea surface and that such enormous bergs could not have formed this high on the sea; they had to have formed on land. Yet any land the Chinese had seen in their travels south was too warm to form that much ice. So, they deduced that there had to be more land even further south of the point at which they could penetrate this ice pack no further. They estimated where this southern continent had to be in their charts, even though they never reached it themselves. And they were essentially right.

Decades later, European explorers used maps developed from these Chinese charts to retrace their steps. When technology had finally developed enough, mankind was able to actually penetrate the full extent of the ice pack and set foot on this Terra Australis Incognita (Unknown Land of the South).

It was technology that has always enabled mankind to overcome such long-standing roadblocks, and that is true in modern times as well. Antarctica is the last continent on Earth to be explored by mankind and the roadblocks have chiefly been *access*, *communications*, and *survival*. This continent in many ways is more like another hostile planet than a piece of Earth. So it figures that technologies developed by the US National Aeronautics and Space Administration (NASA) to enable exploration of Space and other planetary surfaces, would find applications in Antarctica as well.

Notice that the first to reach the geographic South Pole did so by dog sled and by foot in 1911 and 1912, and that there was then a long lull before anyone went there again. The rewards of being first justify the enormous sacrifices that pioneers need to make, but after that, to induce us to follow, the rest of us need a safer, more cost effective mode of transportation and some reasonable business returns.

It was in late 1956 and during the International Geophysical Year of 1957–58 that aeroplanes were used to fly over the barren expanse of ice from the coast of Antarctica to the interior, and to actually land at 90° S.[1] With all its military technology, the USA was able to set up the first permanent camp at the geographic South Pole, and to begin to maintain a routine year-round presence there. That station was named the Amundsen–Scott Station in memory of the first pioneers to set foot on 90° S.

On October 4, 1957 we saw the first man-made satellite, *Sputnik*, orbit the Earth. In 1958 NASA was formed to apply current technologies and to develop the new technologies that would be necessary to take Man to the Moon and beyond. So it began in earnest then, and it continues today. Technologies developed for use in Space have been used in Antarctica as well, as a spin-off of "Reaching for the Stars".

In 1957 the US military set up high-frequency (HF) radio communications from that first station at 90° S. This form of communications was good for scratchy voice- and teletype-messages at 75 bps with errors every 100 bits on a good day. When the ionosphere was noisy because of solar flares, HF radio would be disrupted for days and even weeks at a time. In 1976–77 NASA set up the first voice and data communication services to Antarctica

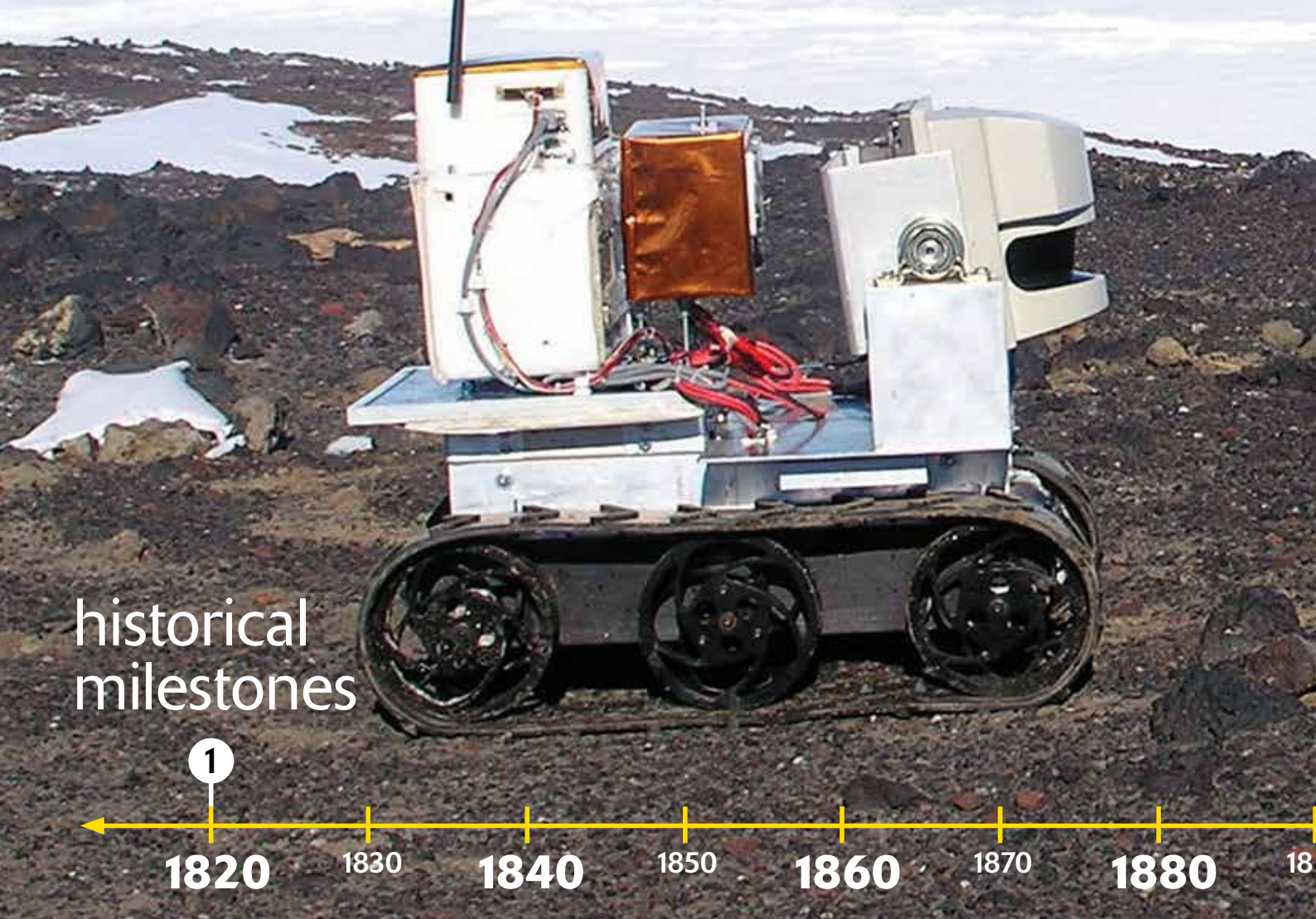
Continued over ▶▶

1 On 31 October, 1956, Navy Lt. Com. Gus Shinn landed a ski-equipped R4D-5 (a Navy version of the DC-3) named *Que Sera Sera* at the South Pole. On that landmark day, with temperatures near -50° C, Shinn kept the engines running while Navy Adm. George Dufek stepped out of the plane to stand at the Pole.

that used satellites. The Advanced Technology Satellite (*ATS-1*) had been launched in 1966 to test various ways that VHF (i.e. amateur radio) could be linked via a satellite. This is the frequency band used by radio and television stations and taxi cabs for line-of-sight broadcasting and communications. *ATS-1* was used to communicate with ships at sea, without needing to bounce signals off the noisy ionosphere, but ideally, it required a direct line of sight, which the satellite acting as a relay could extend significantly. *ATS-1* brought the first reliable and weather-independent voice and data services to Palmer Station at 64° S 64° W on the northern extreme of the Antarctic Peninsula. It was not able to see the bulk of the continent of Antarctica because this satellite was kept in a geostationary orbit above the equator. At that position, the curvature of the Earth prevents visibility to the satellite from any place on Earth below 81° latitude. Also, if a viewer on Earth is not on the same longitude as the satellite, the latitude from which it can be seen is further limited.

It was not until *ATS-3*, which was launched in 1967, ran out of station-keeping gas and its orbit inclination started to drift, that it became visible to the station at 90° S. Imagine the orbit plane tilting a little each year until finally the satellite can see 90° S at one extreme every 24-hour orbit. It will also see 90° N half a day later, every day. At that time the author brought a standard ATS ground station to the South Pole and made the first voice and email contacts with the rest of the world via satellite. It was on December 15, 1984 that the South Pole contacted NASA's Goddard Space Flight Center by satellite, with a push-to-talk voice link that was clear and reliable and with a 2400 bps data service. These services were available reliably for about four hours every day and they were used with the already old *ATS-3* satellite for another 20 years.

This idea of using old communications satellites that were still functioning, but that had drifted out of their geostationary orbits far enough to see the poles each day, evolved into a small network of satellites that now brings voice and data services to 90° S. Satellites, including *ATS-3*, *LES-8* & *-9*, *GOES-2* & *-3* and *Marisat-F1*, have all contributed to improving South Pole communications. In addition, another NASA pathfinder, called the South Pole



Satellite Data Link (SPSDL), initiated in 1984 by this author, used polar-orbiting satellites that pass over the poles every orbit (nominally 14 times every day) to get data off the pole at high speeds to a geostationary satellite link from the coastal station, McMurdo (next to New Zealand's Scott Base at 78° S 166° E). This technique provided dozens of ten-minute bursts each day, using scientific satellites that happen to have the right kind of bent-pipe transponder on board. It worked reliably at 20,000 bps for about a decade.

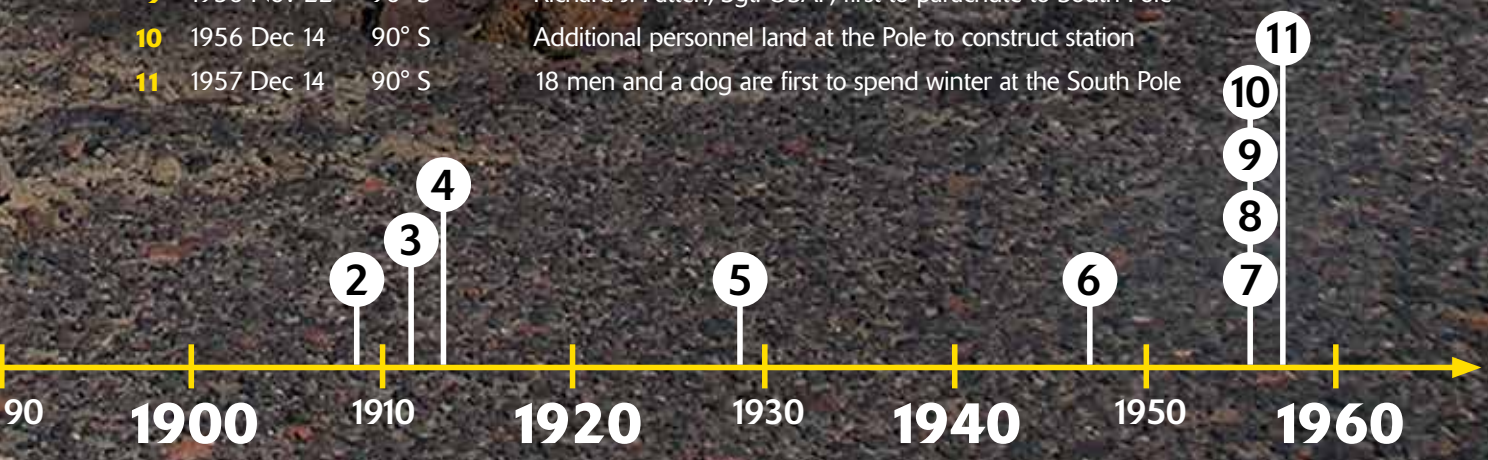
NASA also introduced some novel satellite communications systems at McMurdo. Back in 1984 the other half of the SPSDL service was set up at this station. Here and at the Pole was the first steerable satellite tracking antennae to survive year-round. These systems were pathfinders for all those satellite services that followed. The system that was at the Pole for about 18 years is now an exhibit in Christchurch, New Zealand, at the International Antarctic Centre's Antarctic Attraction. The McMurdo system has evolved over the last 25 years to support satellite launches out of California, USA and on-orbit operations for US National Oceanic and Atmospheric Administration (NOAA) and NASA satellites (i.e. SPSDL evolved into the NASA Antarctic Interactive Launch Support (NAILS) system); it also developed into a research tool.

In 1995 NASA set up the 10 m McMurdo Ground Station, which is a fully functional, standard NASA satellite service capable of collecting 150 Mbps of telemetry and doing all the complex command and tracking functions as well. To unload this vast amount of data, NASA set up two Tracking and Data Relay Satellite (TDRS) links to McMurdo. In 1996 a McMurdo TDRS link, which had been demonstrated back in 1991–92, was set up on Black Island. Then in 2000 a second TDRS link, MTRS-2, was set up on Ross Island, where the TDRS satellites could finally see it.

In January 1997 a VIP group from NASA visited the South Pole Station and realized that the science there was getting sophisticated enough to need better high-speed data services and Internet. For example, NASA and the US National Science Foundation (NSF) were both sponsoring telescopes that observed the stars and the sun for six months a year without interruptions, with the best atmospheric conditions on Earth. That trip was the impetus

Continued over ▶▶

	Date	Position	Event
1	1820 Nov 17		Captain Nathaniel B. Palmer, first to sight continent of Antarctica
2	1909 Jan 09	88° 23' S	Earnest Shackleton and 3 men come within 97 miles of Pole on foot
3	1911 Dec 14	90° S	Roald Amundsen and 4 men first to reach exact South Pole – on dog sleds
4	1912 Jan 17	90° S	Captain Robert F. Scott and 4 men next to reach exact South Pole – on foot
5	1929 Nov 29	90° S	Admiral Richard E. Byrd and 3 men first to fly over South Pole
6	1947 Feb 15	90° S	2 US Navy R4D aircraft complete second flight over South Pole
7	1956 Oct 31	90° S	Rear Admiral George J. Dufek, first test landing at South Pole
8	1956 Nov 20	90° S (-8 m)	2 US Navy R4D aircraft land near the Pole to prepare building of first station
9	1956 Nov 22	90° S	Richard J. Patten, Sgt. USAF, first to parachute to South Pole
10	1956 Dec 14	90° S	Additional personnel land at the Pole to construct station
11	1957 Dec 14	90° S	18 men and a dog are first to spend winter at the South Pole



for NASA to fund a station at 90° S for its first Tracking and Data Relay Satellite, *TDRS-F1*, which was launched in 1983 and which by 1997 had drifted into an inclined orbit where it could see the Pole for a few hours each day. *TDRS-F1* has on board two 5 m steerable antennas that look down on and track low Earth-orbiting satellites and relay data between them and the NASA ground station in New Mexico. An Internet link was set up from that Earth station in New Mexico and a TDRS terminal was established at 90° S in January 1998, which provided 5 Mbps Internet connectivity and 50 Mbps data transfer capability from the Pole. This was only a fraction of what *TDRS-F1* is capable of (i.e. 300 Mbps) but more was not yet deemed necessary so it used only a 1.8 m dish antenna at the Pole end. When Dr Jerri Nielsen, the doctor wintering-over at the Pole, needed a surgical operation, NASA and the NSF air-dropped some video equipment for the TDRS link to the Pole and conducted the first telemedicine activity there.

NASA's involvement in Antarctica included launches of some sounding rockets from McMurdo in the early 1980s, and the routine launching and recovery of Long Duration Balloons (LDB), starting in 1998 from Willy Field near Scott Base. Sounding rockets typically get into outer Space but not into orbit. They deploy their scientific payload in Space and then parachute down to Earth in less than 30 minutes total. The LDB missions involve launching a balloon that starts out as big as a house and expands to the size of an entire soccer stadium. This gigantic bubble rides on top of the stratosphere, circumnavigating the Earth at approximately the same latitude until it returns to the point of origin.

NASA 10-m Ground Station in McMurdo, circa 1994.

First Steerable Satellite Tracking System at 90° S – 1984.

The balloons travel at 250 kph and can stay aloft for weeks. They carry a payload, which looks like a satellite and hangs below the balloon and can weigh a tonne or more. When the mission is over the payload is released by command and parachutes to Earth, where it can be recovered and even flown again.

Now NASA is using Antarctica as an analog for Mars. We have particularly liked the exposed terrain of the Dry Valleys on the coast of Antarctica across from Scott Base, when it comes to simulating Martian terrain and the search for dormant microscopic life forms in the rocks. (We also search for pieces of Mars that show up on the polar ice cap in the form of meteorites, which are just sitting there waiting to be discovered.) To this end NASA has sent some robotic test vehicles to the Dry Valleys and directed them from the control centre back in the USA, as though they were on Mars. We have also simulated the extensive array of various communications services that would be typical of a link between Earth and Mars, so we can test our networking protocols. While the Internet requires a constant connection and a less than 3-second delay between messages and responses, any link to Mars is going to have longer delays and routine disruptions. So, we need to experiment with this, and Antarctica is the perfect place to simulate it.

As we continue to "reach for the stars", with ever-increasing kinds of far-out technologies, Antarctica is going to be a place where NASA needs to work. It is a mutually beneficial arrangement, where NASA can provide solutions to long-standing communications issues in Antarctica, and Antarctica can provide a unique location for communications to all polar-orbiting satellites, a platform for science that is uniquely valuable, and a place on Earth to test for the conditions we will encounter in Space.

The Power of Poetry IV

This poem is the work of a student, Janet Wainscott, from the Hagley Writers' Institute, established in 2008 in Christchurch. Morrin Rout is the director of the Institute; the tutors are well known local writers, Fiona Farrell and Bernadette Hall.

Scott's polar party at the South Pole, left to right - Oates, Bowers, Scott, Wilson and Evans. Canterbury Museum 1980.12.76

Continental Drift

By Janet Wainscott

The ancient Greek philosophers
Saw the sun and the moon and the stars
Revolve in perfect circles round the earth
Moving to the music of the spheres.

They saw Europe Asia and Africa,
Three continents by Homer's wine dark sea,
And for a counterweight invented a land
In the south, so earth could stand upright.

They didn't live to see their southern land,
Terra australis incognita, clothed by cartographers
In fantasies of flora and strange fauna
Unknown to man and god alike.

Nor see the land grow cold and shrink from maps
As centuries and sailing ships passed by.
And didn't see doomed men and dogs
Pose for photographs on plains of ice.

Janet Wainscott used objects on display in the Antarctic gallery of Canterbury Museum as inspiration for her writing, which takes a long historical view. Her poem moves from Antarctica as an act of imagination, a brilliant hypothesis constructed by the ancient Greeks, to the reality of the place as captured in a 20th century photograph. The power of the poem breaks out in the final image of explorers, tiny figures stranded in a vast, unrelenting landscape.

Double Honours for African-American Antarctic Explorer George W. Gibbs Jr.

As a young man, George Washington Gibbs Jr. ventured to the Earth's seventh continent: Antarctica. It is a place of unimaginable cold, stillness and quiet; at times not a sound can be heard: there is absolute silence.

By Glenn M. Stein

On 2 September 2009, the Advisory Committee on Antarctic Names (the US Board on Geographic Names) confirmed a place name in Antarctica for the first black explorer to set foot on the frozen continent. Gibbs Point is a rock point forming the northwest entrance to Gaul Cove, on the northeast of Horseshoe Island, Marguerite Bay, Antarctic Peninsula (67° 48' 22" S, 067° 09' 38" W).

This is Gibbs' second posthumous honour within a year. As a result of his civic and business leadership, the George W. Gibbs Jr. Elementary School was approved last year by the school board of Rochester, Minnesota; the school's formal dedication took take place on 11 October 2009. In 2002, Rochester's West Soldiers Field Drive was renamed in Gibbs' honour.

Gibbs was born on 7 November 1916, in Jacksonville, Florida, and raised in that port city, afterward spending many years of his life connected to the sea. He enlisted in the US Navy in Macon, Georgia in 1935, and four years later Gibbs was chosen from hundreds of applicants to join an expedition with the United States Antarctic Service (USAS).

In that year, 1939, Congress had established the USAS, and an expedition under veteran polar explorer Admiral Richard E Byrd went south, "to consolidate previous American exploration and to examine more closely the land in the Pacific sector". Serving as a Mess Attendant 1st Class aboard the lead expedition ship, USS *Bear*, Gibbs earned official praise from Lieutenant Commander Richard H Cruzen, before the vessel ever departed American shores:

> *Especially commended by the Commanding Officer at meritorious mast for his zeal, initiative, and untiring industry, entailing much personal sacrifice, during the period the U.S.S. BEAR was outfitting and preparing for duty with the U.S. Antarctic Service.*

On the morning of 14 January 1940, the *Bear* steamed into the Bay of Whales, an indentation in the massive Ross Ice Shelf, which stretches out into the Ross Sea. It was a special day for Gibbs, who recorded the events in his journal:

> *When the Bear came up to the ice close enough for me to get ashore, I was the first man aboard the ship to set foot in [Byrd's old base] Little America, and help tie her lines deep into the snow. I met Admiral Byrd; he shook my hand and welcomed me to Little America and for being the first Negro to set foot in Little America.*

The expedition then began carrying out a wide range of scientific studies, with Gibbs helping to establish West Base (Little America III), near the Bay of Whales, and East Base on Stonington Island, Marguerite Bay, on the Antarctic Peninsula. He also made two round trips between the United States and Antarctica on the *Bear*. Due to rising international tensions however, both bases were evacuated by March 1941. At this time, Gibbs

GW Gibbs Jr. on board the USS Bear.
Photograph courtesy of Leilani Rashida Henry

was rated an Officer's Cook 3rd Class, again receiving recognition from the *Bear*'s commanding officer, in May 1941:

> *Commended at meritorious mast for his outstanding zeal and energy, and for the unusual spirit of loyalty and cooperation which he has invariably displayed under trying conditions encountered during the assignment of this vessel to duty with the U.S. Antarctic Service.*

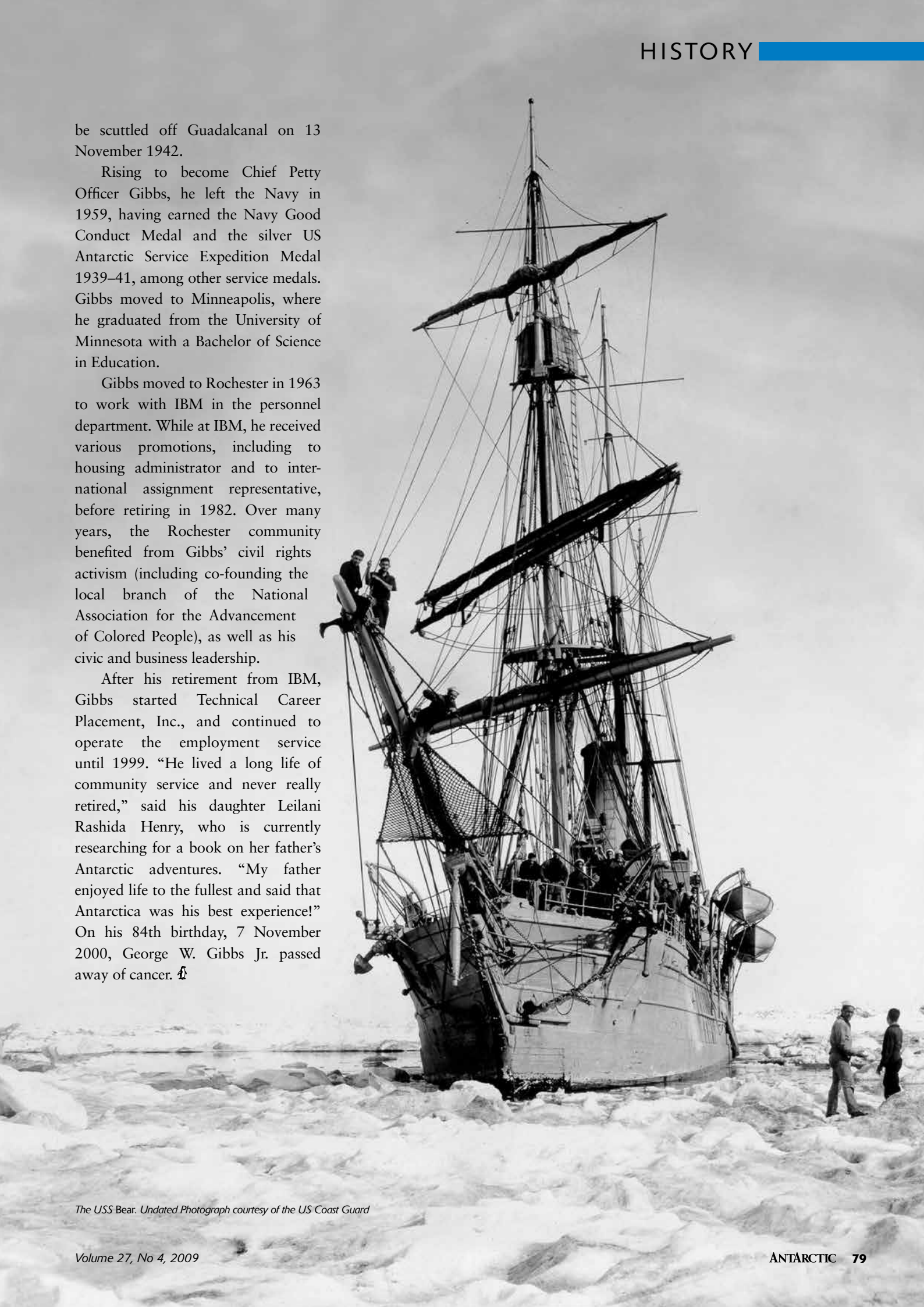
Though he never returned to Antarctica, America's entry into World War II was just around the corner, and Gibbs saw much combat in the South Pacific during the conflict. This included service on the cruiser USS *Atlanta*, when she was wrecked by gunfire from the Japanese battleship *Hiei* and a torpedo from the destroyer *Akatsuki*, forcing the Atlanta to

be scuttled off Guadalcanal on 13 November 1942.

Rising to become Chief Petty Officer Gibbs, he left the Navy in 1959, having earned the Navy Good Conduct Medal and the silver US Antarctic Service Expedition Medal 1939–41, among other service medals. Gibbs moved to Minneapolis, where he graduated from the University of Minnesota with a Bachelor of Science in Education.

Gibbs moved to Rochester in 1963 to work with IBM in the personnel department. While at IBM, he received various promotions, including to housing administrator and to international assignment representative, before retiring in 1982. Over many years, the Rochester community benefited from Gibbs' civil rights activism (including co-founding the local branch of the National Association for the Advancement of Colored People), as well as his civic and business leadership.

After his retirement from IBM, Gibbs started Technical Career Placement, Inc., and continued to operate the employment service until 1999. "He lived a long life of community service and never really retired," said his daughter Leilani Rashida Henry, who is currently researching for a book on her father's Antarctic adventures. "My father enjoyed life to the fullest and said that Antarctica was his best experience!" On his 84th birthday, 7 November 2000, George W. Gibbs Jr. passed away of cancer.



The USS Bear. *Undated Photograph courtesy of the US Coast Guard*

Courage Sacrifice Devotion

By Noel Gillespie

Courage Sacrifice Devotion is the story of the United States Navy Squadron (VX-6) that operated aircraft in support of United States Antarctic operations from 1955 until the work was taken over by the United States Air Force in 1999. The squadron was formed to support the United States contribution to the International Geophysical Year of 1957–58. It operated from Christchurch for all of its 44-year history, although it was officially based in America.

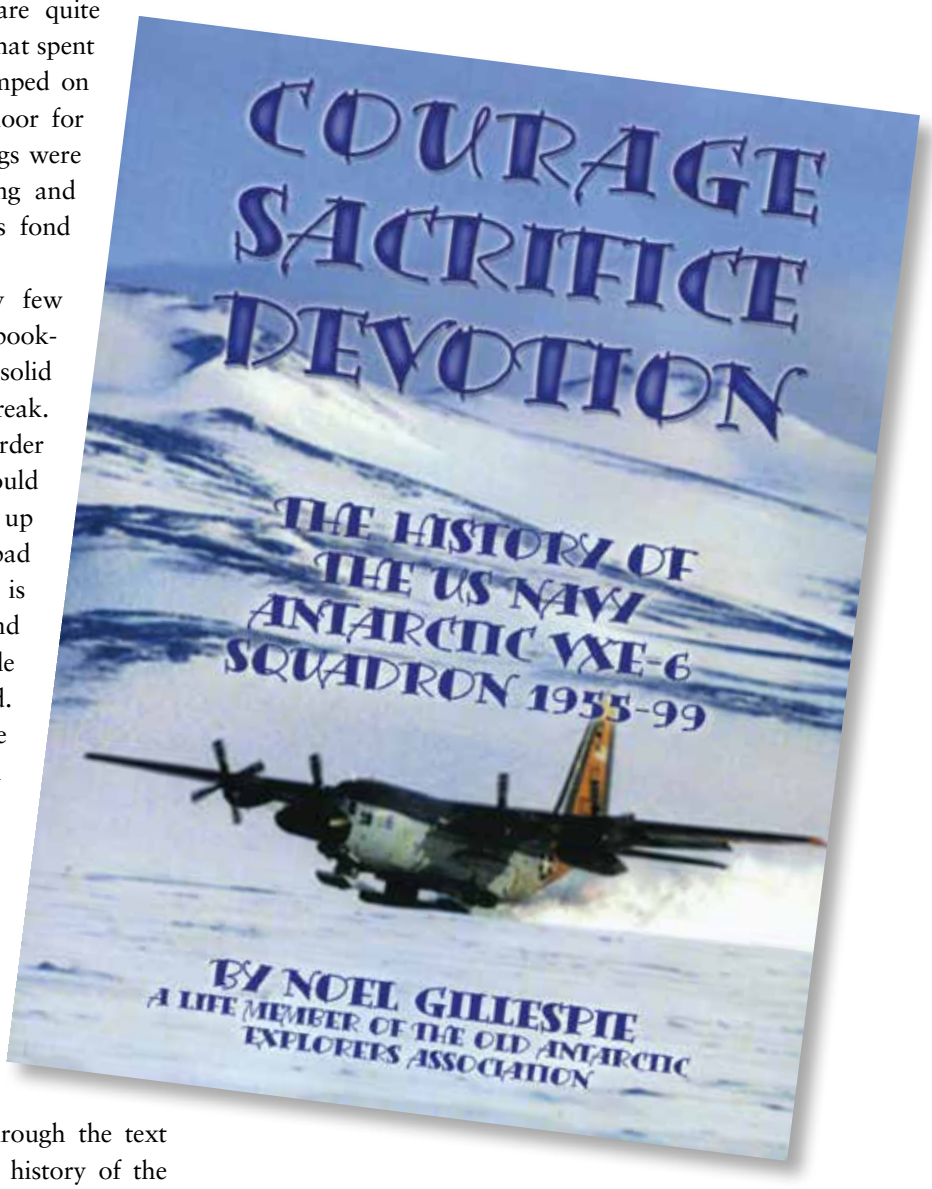
The book is made up of extensive quotes from autobiographies or interviews and some are quite compelling, like the story of the pilot's dog that spent much time on the ice and then happily jumped on board the aircraft and curled up on the floor for the flight. The description of how whole eggs were air-dropped to the South Pole is interesting and it's nice to hear an American serviceman's fond memories of Christchurch and the residents.

Unfortunately, there are only a very few highlights in the book which is a telephone book-sized tome with over 320 A4 sized pages of solid text, broken only by the occasional chapter break. All photos are at the back, in no particular order with some that are simply not relevant. It would have been nice to use the photos to break up the text. Many of the photos are of such bad quality as to be useless. Generally the work is badly worded with terrible punctuation and inconsistent and incorrect spelling, for example Roald Amundsen's name given as Ronald. Factual inaccuracies are rife including five different altitudes being given for the South Pole, all incorrect. Confusion is caused by the author using the terms ton and tonne in the same paragraph when talking about the weight of an aircraft and switching between Roman numerals and Arabic numbers throughout the text.

The chronology of the story is inconsistent as the author jumps between events, happening at different times, seemingly at random. At least half-way through the text the author is still only four years into the history of the squadron. The final forty years is skimmed over in the last half of the book and it lacks any bibliography. The book has been self published and reads as if it was a first draft and would have benefited greatly from the services of an editor or proof-reader.

Despite the author obviously putting a lot of effort into gathering the information for this book, its lack of readability means that there is room in the future for a comprehensive history of this very significant squadron of the United States Navy to be written.

Book reviewed by Matthew Sullivan



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Jan Clayton-Greene, Ship Representative with Dick Barwick (biologist on the Trans Antarctic Expedition 1956–57) 51 years after his last visit to the Ice. Dick is wearing his original issue clothing (except for the boots) while Jan is kitted out in the latest gear from Antarctica New Zealand. Image courtesy Jan Clayton-Greene.