

100 years of Antarctic

December 2011 marks the 100 year anniversary of Sir Douglas Mawson's first Australian Antarctic expedition. Young Sydney alumnus, Archibald Lang McLean, accompanied Mawson as Chief Medical Officer and Bacteriologist and set the stage for future generations of Antarctic medical officers.



Background photo: The surface of the plateau at the 220 mile camp. Southern Journey. Photographer Archibald Lang McLean, December 1912. Courtesy of State Library of New South Wales.

Opposite left to right:

Archie McLean on board the Aurora. Photographer David Watson. December 1911. Courtesy of State Library of New South Wales.

At 65 miles, Southern journey. Bage instructing Hunter in the use of the artificial horizon. Photographer Archibald Lang McLean, December 1912. Courtesy of State Library of New South Wales.

Medical Officer swimming in the middle of an Antarctic winter.

By Lise Mellor

ARCHIBALD LANG MCLEAN (MBBS 1910)

When Douglas Mawson led the first Australian Antarctic expedition, Archibald McLean, a fresh young intern at Lewisham Hospital, was selected to be Chief Medical Officer and Bacteriologist for one year, residing at Main Base. Although he lacked medical experience, his youth and enthusiasm ran in his favour.

McLean's MD thesis, *Bacteriology and Other Researches* (published 1917 and available online) states that the scientific aims of the Australian Antarctic Expedition were directed so as to be "as wide and embracing as possible." Essentially, he was stepping into uncharted territory. Previous Antarctic expeditions had produced some bacteriological research which McLean was only able to read through once before departure.

Mawson and his team sailed aboard the *Aurora* first to Macquarie Island then south to Commonwealth Bay, arriving January 7, 1912. On arrival, all of the men engaged in the pressing duties around the base, such as the building of the huts and daily meteorological and tidal observations.

McLean began studying the physiology of the expedition team before departure from Hobart, measuring blood pressure and examining blood tests. One of his earliest observations was that it took six weeks for men to acclimatise to the extreme cold and that during periods of constant physical labour, red cell numbers increased quickly, totalling in one instance more than 7,000,000. All men put on substantial weight, the average weight gain being ten pounds and in two cases, twenty-eight.

McLean's account of the beginnings of his research give a glimpse of the tribulations:

A small corner of the hut was reserved for bacteriology. Here, a few shelves and a table accommodated stains and other reagents, slides, a spirit lamp, a centrifuge, a microscope, a steriliser and other miscellaneous apparatus. For more than four months I was unable to make up Gram's iodine, owing to the potassium iodide and the iodine having been misplaced... The heat for the incubator was supplied by a kerosene lamp. The ether capsule and lever regulators worked well, so that it was possible to grow cultures either at 18 to 20 degrees Celsius, or at 37 degrees Celsius except in the cases of even more extreme cold... Boxes containing my stock of materials were buried in snow outside the hut and were only accessible on the rare fine days, when they had to be dug out, opened and re-packed.

McLean amassed a substantial collection of bacteriological specimens of Antarctic ice, soil, mud, sea, mammals, birds and fishes. He grew cultures from swabs he had taken from Antarctic animals. He engaged in his own work systematically however, he lamented that Bacteriology needed to become more systematic before comparisons could be made. He dedicated that work to future generations.

When Mawson returned from his tragic sledging accident, it was McLean who nursed him back to health. Mawson, McLean and four others were then captive on the ice for another year. During this time, McLean continued his work collecting specimens but began to write about other aspects of Antarctic exploration. He wrote up his findings as to the physiology, immunity and what he called the dietetics of the

explorer. Watching Mawson recover, he became fascinated by the psychology of the Antarctic explorer and these observations formed the culminating chapter of the thesis for which he received the University Medal. This work still sets the stage for Antarctic research concerns.

MEDICAL MICROBIOLOGIST ROD GIVNEY (MBBS 1983)

Dr Rod Givney spent two terms as a medical officer in Antarctica, the first in 1990 and the second in 1996. Accompanied by his wife Adele, he found the experiences challenging but ultimately uplifting.

The impetus to go to Antarctica came from Adele, a post-doc science graduate. He had accompanied her when she had undertaken research in Antarctica during the 1980s and was inspired to apply for the position of medical officer at Casey Station.

"It was quite drawn out. They need doctors able to cope with all sorts of medical crises, including surgery, and survive the challenges of Antarctica."

His experience in rural general practice gave him the confidence of being able to handle diverse medical situations but he had "a fear of surgery and no anaesthetic training." Medical officers undergo a three month training period in cold climate medicine, including two weeks at Melbourne Dental Hospital. Rod's 'fear of surgery' meant that he talked to surgeons and watched them perform in the operating theatre. Despite their advice to him "not to attempt surgery" the reality is that surgery may well need to be carried out.

medicine

Posted at Casey Station, like McLean, Rod found himself the solo doctor responsible for the medical needs of a team of workers. At the time they were attempting to build a landing strip at Casey Station. "I had 24 people to look after. It was the last year of construction and they were mostly labourers. In Mawson's day, they were all young and mostly upper middle class, not candidates for cardiovascular emergencies. The population is more diverse now, still mostly male but older in their 40s and 50s. If someone comes to you with chest pain you really need to check it out."

The medical officer is on duty 24/7 and "you have to look out for every catastrophe." When not responding to patients, there is a flow of maintenance required so that things function when you need them. "It was like a tiny country hospital. There was a theatre and a little ward. You have to keep all the surgical gear at the ready, make sure there is the right supply of pharmaceuticals and keep everything sterilized. The entire theatre needs sterilization every three months. You take your own X-rays and in quiet moments I used to practice on dead animals."

During Rod's time, he treated a lot of work related injuries and occasional cold injuries, such as hypothermia and corneal ulcerations from snow blindness. In addition, he treated patients for alcohol related illnesses.

As for bacteriological research, he continued his research interest with retroviruses. He attempted collecting serum for herpes viruses but laments that he found the research conditions difficult. Nonetheless, he says that medical officers do have plenty of opportunity to pursue research interests, but the conditions of collection and investigation are complex.

On a personal level, the experience was exhilarating. He and his wife enjoyed the unique experiences that Antarctica offers:

"It was fabulous. Out of my office window, as far as I could see, were beached icebergs. There was a special place in the ice where the Weddell seals liked to get up onto the ice and give birth. Adele and I skied across the ice to see them in birthing season. There were hundreds of seals and their pups. It was beautiful."

Looking back, Dr Givney stresses the psychological endurance that is needed to survive the challenges of Antarctica.

"You are living with 23 strangers. They went mad and so did I."

DR JEFF AYTON, CHIEF MEDICAL OFFICER, AUSTRALIAN ANTARCTIC DIVISION (SINCE 2002)

Based in Hobart, Dr Jeff Ayton runs the Polar Medicine Unit responsible for training and supporting the Antarctic doctors who are at the front line.

"The biggest challenge remains the remoteness and isolation," he says.

He argues, however, that the challenge is the attraction. Like the expeditioners, they want to put themselves in a situation where they are personally and professionally extended. There is still, mostly, a single doctor looking after a team of approximately 16 to 20 workers with no hope of evacuation in winter, so although there is greater support now from the medical unit in Hobart, the doctor needs to be able to deal with whatever situation presents.

"Mawson was instrumental in establishing radio communication between Antarctic and Australia and we rely heavily on modern telecommunications now. Doctors have access to phone, internet, email and 'tele-health' via satellite. When a doctor needs support to provide medical care they have a network of medical specialists available to advise on medicine in the extreme.

They are better equipped for diagnosis. In Antarctica they have digital 3D and 4D ultrasound, digital radiography which means that they can transmit clinical images back to the Polar Medical Unit and gain assistance from a 'real-time video consultant'.

The biggest health concerns for Antarctic workers remain work related injuries from manual labour in tough conditions. Dental care remains an ongoing concern but clothing assemblages, accommodation and technology improvements have meant less incidences of cold injury.

It is the long polar night that challenges Antarctic human health more than anything else. It is taxing on the mind and body and doctors are often called to treat patients for mental health concerns, part and parcel with sleep disorders and a disruption to their circadian rhythms. So much so, that NASA has funded a pilot research project studying these concerns.

"NASA considers Antarctica a space analogue because of the isolation; it is a real expedition, with real hazards. For them, they want to know everything about human physiological and psychological function in extreme environments, to understand how a human can go on a three year round trip to Mars and come back to earth safely and be well and functioning, emotionally, mentally and physically."

As far flung as that sounds, their intent has its beginnings in the work of McLean and Mawson.

"McLean was instrumental in setting the example that the role of the Medical Officer is to look after the medical and psychological state of the expedition team so that they come back safely", says Ayton. *radius*

More about Archibald Lang McLean in *Radius* (Issue 21 March 2008) and in the Sydney Medical School Online Museum.

