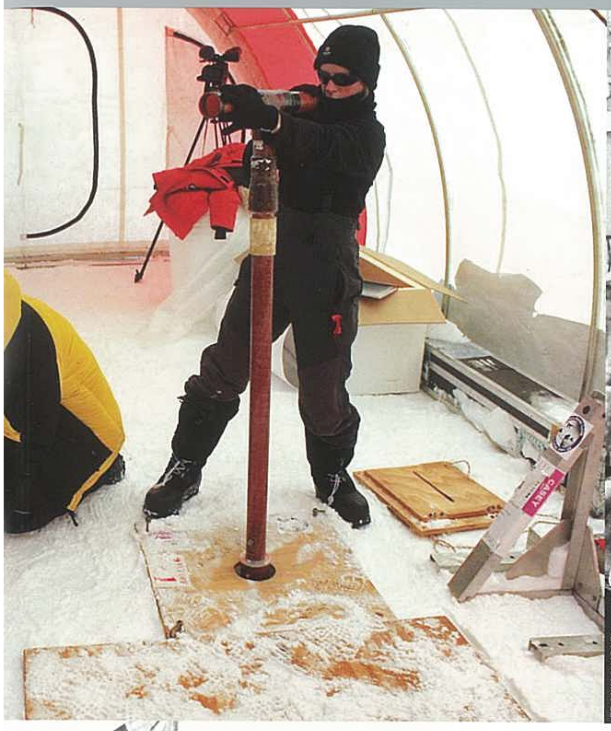

6. On 16 January 1909 (L-R) Alistair Forbes Mackay, T W Edgeworth David and Douglas Mawson arrived at the South Magnetic Pole after a three-month journey.

7. Harold Fletcher (L) and Robert Falla (R) prepare specimens on board *Discovery*.

away before they can be fitted to small fish and even invertebrate species.

The next few decades will see the emergence of ever bigger science with increasing numbers of agencies and research teams collaborating and contributing equipment and expertise. While issues of sovereignty and the politics of Antarctica are never far away, the world has woken up to the fact that Antarctica is no longer a remote, far-away place visited only by adventurers and explorers, but is very much the canary in the global coal mine and also the powerhouse behind much of the world's weather and ocean quality. Australia can be truly proud of its record of scientific research in Antarctica, which has established the basis for much of what is yet to come.

Information about AAE science in this article was collated from The Home of the Blizzard website http://www.mawsonshuts.aq/index.html . The subsequent text (from BANZARE to today) was modified from a chapter written by Professor Michael Stoddart, former Chief Scientist, Australian Antarctic Division (1998-2009), for the new book *Australia and the Antarctic Treaty System: 50 Years of Influence*, published by UNSW Press in September 2011.

A timeline of scientific highlights

1907–1909 Ernest Shackleton's British Antarctic Expedition (Nimrod Expedition) to Cape Royds.

- The scientific team, which included Douglas Mawson, carried out extensive geological, zoological and meteorological work.
- Australian geologist, Edgeworth-David, led Douglas Mawson and Alistair Mackay to the Magnetic South Pole (arriving 16 January, 1909).
- Edgeworth-David published two volumes on the geology of the expedition.

1911–1914 Douglas Mawson's Australasian Antarctic Expedition to Cape Dennison, Commonwealth Bay.

- Routine scientific and meteorological observations were conducted at Cape Dennison and auxillary bases at Macquarie Island and Shackleton Ice Shelf.
- Accessible rock formations of Wilkes Land were examined and the first discoveries were made of a meteorite and a chondrite in Antarctica.
- An extensive program of marine science onboard the *Aurora* documented new marine species.
- Scientific observations on geology, oceanography, zoology, botany, meteorology, tides and terrestrial magnetism were published in an extensive series between 1922 and 1942.

1929–1931 Douglas Mawson's British, Australian (and) New Zealand Antarctic Research Expedition to Heard Island, Kerguelen Island and the Antarctic coast.

- 13 volumes of reports, on geology, oceanography, meteorology, terrestrial magnetism, zoology and botany were produced between 1937 and 1975, from primarily ship-based research (and use of an aircraft).
- Significant tracts of the Antarctic coastline were mapped.

1947–1997 Australian National Antarctic Research Expediton(s)

- ANARE established its expedition headquarters on Macquarie Island on 25 May 1948.
- The International Geophysical Year 1957-58 defined the role of science and the way it is conducted in Antarctica today – internationally coordinated scientific and logistic programs and long-term observatory

8. The light detection and ranging (LIDAR) instrument at Davis investigates temperature, winds and the structure of the middle and upper atmosphere.

9. Scientific divers support a range of projects investigating the impact of human activities on the environment, set up in response to the Protocol on Environmental Protection to the Antarctic Treaty.

studies. Research included upper atmosphere and cosmic ray physics, meteorology, seismology, glaciology, and gravity and magnetic studies.

- Deep drilling commenced on the Law Dome ice cap in 1972–73. It was the start of long-term ice core studies investigating past climate and ice formation and movement.
- The *Nella Dan* supported the biggest combined marine biological experiment ever undertaken – BIOMASS (Biological Investigations of Marine Antarctic Systems and Stocks), which began in 1980–81 and ended in 1991. Fifteen ships from 11 countries were involved. The experiment marked the start of a long-term commitment to Antarctic marine research.
- From the late 1980s the science program began to move from discipline-based science to multi-disciplinary science in support of Australia's policy interests in Antarctica. This included establishment of the first Human Impacts program in response to the Protocol on Environmental Protection to the Antarctic Treaty, and establishment of the Antarctic Marine Living Resources Program in support of the Convention on the Conservation of Antarctic Marine Living Resources (which entered into force in 1982).
- The Antarctic Science Advisory Committee was established in 1985.
- The ice-breaking *Aurora Australis* was launched on 18 September 1989; purpose-built for resupply and marine and sea ice research.
- The first traverse around the head of the Lambert Glacier to measure ice movement was conducted in 1993–94.
- Biologists at the Australian Antarctic Division were the first to successfully breed krill in captivity in the 1990s.

1998 – today

Australian Antarctic program

- The multi-disciplinary approach to research continued with the establishment of the Ice, Oceans, Atmosphere and Climate Program to inform the work of the Intergovernmental Panel on Climate Change.
- Pioneering studies of the stratosphere led to the Davis LIDAR (light detection and ranging) program which, since 2001, has been investigating temperature, winds and the structure of the middle and upper atmosphere.
- The Antarctic Cooperative Research Centre was established in 1995 and evolved into the Antarctic Climate and Ecosystems Cooperative Research Centre in 2003. The advent of the CRC led to a significant increase in the amount and scope of marine research.
- The Agreement on the Conservation of Albatrosses and Petrels entered into force in 2004. ACAP aims to conserve albatrosses and petrels by coordinating international activity to mitigate known threats to albatross and petrel populations.
- During the International Polar Year (IPY; 2007–09) Australia led major programs of research in biology (Census of Antarctic Marine Life) sea ice and climate science (Sea Ice Physics and Ecosystems eXperiment) and biological incursions into Antarctica (Aliens in Antarctica). Australian scientists were prominent in many other programs.
- A link between Australian and Antarctic climate was established using ice cores from Law Dome.
- Major marine science voyages (BROKE, BROKE-West) were conducted to estimate krill abundance and distribution in the Southern Ocean, which contribute to krill fishery management through the Commission for the Conservation of Antarctic Marine Living Resources.
- Remote sensing technology is increasingly used to study the Antarctic ice sheet and bedrock topography and geology.
- A new Australian Antarctic Science Strategic Plan, approved by the Australian Government in 2010, will direct the next 10 years of scientific research, from 2011-12 – 2020-21. The plan will deliver specific scientific outcomes in support of Australian policy in Antarctica. For details see www.antarctica.gov.au/science