



ANTARCTIC HERITAGE TRUST

Celebrating the Legacy of Adventure, Discovery and Endurance

SOME FAST FACTS IN CELEBRATION OF THE CENTENARY OF REACHING THE SOUTH MAGNETIC POLE (16 JANUARY 1909)

SO WHAT IS THE SOUTH MAGNETIC POLE?

The South Magnetic Pole is the point in the Southern Hemisphere where a dip needle (a freely suspended magnet on a horizontal axis) points towards the Earth's centre. Both the North and South Magnetic Poles wander as the Earth's magnetic field changes.

Beau Riffenberg (2007) Encyclopedia of Antarctica

The Earth's South Magnetic Pole is the wandering point on the Earth's surface where the geomagnetic field lines are directed vertically upwards. Due to polar drift, the pole is moving north west by about 10 to 15 kilometers per year.

http://en.wikipedia.org/wiki/South_Magnetic_Pole

SO WHO CAME UP WITH THE IDEA THE EARTH ACTS AS A GIANT MAGNET?

In early times European navigators believed that compass needles were attracted either to a "magnetic mountain" or "magnetic island" somewhere in the far north, or to the Pole Star.

The idea that the Earth acts as a giant magnet was first proposed in 1600 by Sir William Gilbert (who wrote his famous book *de magnete* in 1600), a courtier of Queen Elizabeth I.

Born 1544 and died 1603 Gilbert was an English physician and a natural philosopher, educated at St John's College, Cambridge.

http://en.wikipedia.org/wiki/North_Magnetic_Pole#Polarity

Gilbert was the first to hypothesize that the earth itself was a great magnet, and the force that directs a compass needle lies within the earth, not in some lodestone mountain (see explanation of lodestones below) or in the celestial spheres.

He defined the magnetic poles as the two places on the surface of the earth where a magnetized needle would stand vertically.

http://gsc.nrcan.gc.ca/geomag/nmp/early_nmp_e.php

SO WHEN WAS THE SOUTH MAGNETIC POLE FIRST FOUND?

The South Magnetic Pole was first reached in Victoria Land on **16 January 1909** by T W Edgeworth David, Douglas Mawson and Alistair Mackay. These three men were part of Sir Ernest Shackleton's British Antarctic [Nimrod] Expedition 1907 – 09.

It was next approached from the north in December 1912 by a party under Robert Bage on Mawson's Australasian Antarctic Expedition.

As at 2007 it was located off the coast of Terre Adelie.

Beau Riffenberg (2007) Encyclopedia of Antarctica

THEIR STORY?

The story of the first men to reach the South Magnetic Pole makes a great read. If you want to read about the other amazing stories associated with these expeditions log on to the Trust's website ([w: nzaht.org](http://www.nzaht.org)) and check out the history section.

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While Sir Ernest Shackleton, together with Adams, Marshall and Wild would make their attempt to be the first to reach the South Pole, Edgeworth (aged 50) would lead the Northern Party on a 1260-mile journey to reach the South Magnetic Pole. His companions would be Mackay (aged 30) and Mawson (aged 26). See the end of this section for a brief bio on each of the men.

At the start, they used the motor car to establish two depots 10 and 15 miles from their expedition base located at Cape Royds, Antarctica.

On September 25 the engine overheated and they actually had to wait in the blistering cold for it to cool down. When the party finally left winter quarters the next day, Mackay's wrist was in a sling after an accident with the car's starter. It seemed a rather ominous beginning to a journey into the unknown with the doctor's arm in a sling! By November 1 they were becoming worried at the rate the rations were diminishing. Appetite consumed them but by November 5 they limited themselves to one plasmon biscuit each for breakfast and dinner, discovering in the process that "we had never before fully realised how very nice those plasmon biscuits were".

The three explorers used the traditional method for dividing food: the cook would put three biscuits on the cooker cover, then point to one, asking one of the others with his back turned, "Whose?" By this means there would be no opportunity to create a squabble over who was getting the biggest portion. In the beginning, no attention was paid to the crumbs; by early November they were breaking their biscuits over their pannikins to make sure they left no precious crumbs. Even their conversation was dominated by food as David wrote, "We could discuss nothing but the different dishes with which we had been regaled in our former lifetime at various famous restaurants and hotels".

On December 11, a mile short of the Drygalski Ice Tongue, David fell into a crevasse only 20 feet from their tent. He managed to save himself, catching the edge on either side but needed Mawson's assistance, with an ice axe, to pull him out. The next day it was Mackay's turn. While hunting for emperor penguins he fell through an ice bridge up to his waist in water. On December 20, Mawson had a brush with death. David heard a "slight crash" and noticed that Mawson had disappeared.

David and Mackay found him dangling over a deep crevasse, suspended by his harness attached to the sledge rope. Mawson, ever the curious scientist, took the opportunity to inspect the ice crystals on the crevasse wall.

David wrote, "After this episode we were extra cautious in crossing the crevasses, but the ice was simply seamed with them. Twice when our sledge was being dragged up ice-pressure ridges it rolled over sideways with one runner in a crevasse and once the whole sledge all but disappeared into a crevasse...Had it gone down completely it would certainly have dragged the three of us down with it, as it weighed nearly one-third of a ton".

On Christmas day, David and Mawson offered Mackay, who was suffering from snow-blindness, some sennegrass--dried Norwegian grass they used to line their boots--as substitute pipe tobacco. It was the only gift they had to offer. The sun and cold temperatures constantly wreaked havoc with the men. Mawson's right cheek and the tip of David's nose were frostbitten while the sun burned David's hands. The cold stripped skin from their lips and Mawson woke each morning with his mouth glued shut from congealed blood. As they neared the magnetic pole, David wrote, "The heavy runners of the sledge rustled gently as they crushed the crystals by the thousand". On January 15, 1909, Mawson's compass was only 15 minutes off the vertical.

The men depoted most of the heavy gear and set out on a forced march to the pole. Arriving a short time later, David and Mackay planted a flagpole at the spot. The three men bared their heads, hoisted the Union Jack and posed in front of the camera which David triggered with a string. David said, "I hereby take possession of this area now containing the Magnetic Pole for the British Empire" and then gave three cheers for His Majesty King Edward VII. They were awfully tired but still managed to march back to the depot (24 miles) where they slept soundly knowing that they had indeed accomplished their objective. Now they just had to find a way to stay alive.

They calculated that in order to reach the Drygalski depot and signal the NIMROD (the expedition's ship) on time, they would need to average nearly 17 miles a day from January 17 to February 1. On February 5, 1909, they were within one mile of the Drygalski depot. With the NIMROD nowhere in sight, their attention was turned to the possibility of striking out for Ross Island (where their expedition base was located at Cape Royds).

About this time two sudden explosions were heard in the distance. Mawson screamed, "A gun from the ship!" and scrambled out of the tent. Mackay and David followed close behind and as they emerged, Mawson was already 300 feet away. Mawson turned and shouted, "Bring something to wave!" David grabbed a rucksack and "as I ran forward this time, what a sight met my gaze. There was the dear old NIMROD, not a quarter of a mile away, steaming straight towards us up the inlet..." Mackay shouted to the ship, "Mawson has fallen down a crevasse, and we got to the Magnetic Pole!" By the afternoon the men were enjoying tea aboard the NIMROD. Later they enjoyed their first bath in over four months, followed by a wonderful dinner. As the men went to bed, David wrote, "None but those whose bed for months has been on snow and ice can realise the luxury of a real bunk, blankets and pillow, in a snug little cabin".

They had traveled 1260 miles with no dogs or ponies in the coldest place on earth. Upon completion of the trek, David felt they could have done it in half the time with a team of dogs. "We pioneered a route to the magnetic pole and we hope that the path thus found will prove of use to future observers".

<http://www.south-pole.com/p0000097.htm>

Douglas Mawson: 25, Physicist.

(Douglas) Born Shipley, England, 5 May 1882. Family migrated to Australia, 1884. Educated Fort Street High School and University of Sydney. Member of first ascent of Mount Erebus and of Western (South Magnetic Pole) Party. Leader Australasian Antarctic Expedition 1911–14. Knighted 1914. Elected Fellow Royal Society 1923. Leader British, Australian, New Zealand Antarctic Expedition (banzare) 1929–31. Died 1958.

Tannatt William Edgeworth David frs (Professor): 49, Director of Scientific Staff.

Born Wales, 1858. Educated Magdalen School and New College, Oxford. Professor of Geology, Sydney University. Leader of party of first ascent of Mount Erebus, and leader

of Western (South Magnetic Pole) Party. Lieutenant Colonel and awarded the dso, 1918. Knighted 1920. Died 1934.

AF Mackay: 30, Assistant Surgeon.

(Alistair Forbes) Born Argyllshire, Scotland, 1877. Signed on Nimrod at Poplar, 26 July 1907, discharged Antarctic Regions 22 January 1908 (to serve on Shore Party). Trooper in South African War, one of Baden Powell's police. Navy surgeon for four years. Member of first ascent of Mount Erebus and Western (South Magnetic Pole) Party. Lost in February 1914 on Vilhjalmur Stefansson's Canadian Arctic Expedition.

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South Magnetic Pole, January 1909. Credit: Royal Geographical Society

OTHER HISTORY: THE FIRST MAGNETIC COMPASS—LODESTONES

Magnetic Compass

The magnetic compass is an old Chinese invention, probably first made in China during the Qin dynasty (221-206 B.C.). Chinese fortune tellers used lodestones (a mineral composed of an iron oxide which aligns itself in a north-south direction) to construct their fortune telling boards.

Electromagnetic Compass

Eventually someone noticed that the lodestones were better at pointing out real directions, leading to the first compasses. They designed the compass on a square slab which had markings for the cardinal points and the constellations.

The pointing needle was a lodestone spoon-shaped device, with a handle that would always point south. Magnetized needles used as direction pointers instead of the spoon-shaped lodestones appeared in the 8th century AD, again in China, and between 850 and 1050 they seem to have become common as navigational devices on ships.

The first person recorded to have used the compass as a navigational aid was Zheng He (1371-1435), from the Yunnan province in China, who made seven ocean voyages between 1405 and 1433.

<http://www.solarnavigator.net/compass.htm>

DID YOU KNOW OVER THOUSANDS OF YEARS THE NORTH POLE IS TRANSFORMED INTO A SOUTH POLE AND THE SOUTH POLE BECOMES A NORTH POLE?

What do we mean by a magnetic reversal or a magnetic 'flip' of the Earth?

The Earth has a magnetic field. It is mainly generated in the very hot molten core of the planet and has probably existed throughout most of the Earth's lifetime.

The magnetic field is largely that of a dipole, by which we mean that it has one North pole and one South pole.

By magnetic reversal, or 'flip', we mean the process by which the North pole is transformed into a South pole and the South pole becomes a North pole.

Interestingly, the magnetic field may sometimes only undergo an 'excursion', rather than a reversal. Here, it suffers a large decrease in its overall strength, that is, the force that moves the compass needle. During an excursion the field does not reverse, but later regenerates itself with the same polarity, that is, North remains North and South remains South.

How often do reversals occur?

In the last 10 million years, there have been, on average, 4 or 5 reversals per million years.

As a matter of geological record, the Earth's magnetic field has undergone numerous reversals of polarity. We can see this in the magnetic patterns found in volcanic rocks, especially those recovered from the ocean floors.

At other times in Earth's history, for example during the Cretaceous era, there have been much longer periods when no reversals occurred. Reversals are not predictable and are certainly not periodic in nature. Hence we can only speak about the average reversal interval.

How quickly do the poles 'flip'?

We have no complete record of the history of any reversal, so any claims we can make are mostly on the basis of mathematical models of the field behaviour and partly on limited evidence from rocks that retain an imprint of the ancient magnetic field present when they were formed.

For example, the mathematical simulations seem to suggest that a full reversal may take about one to several thousand years to complete. This is fast by geological standards but slow on a human time scale.

British Geological Survey: <http://www.geomag.bgs.ac.uk/reversals.html>