



SPQ Module 13 - The Meteorite Store



During their journey to the South Pole, Ray, Richard and Kevin will be passing through a mountain range called the Transantarctic Mountains. Curiously, other than climbing steadily higher they will likely not notice the mountains, even though they will be passing directly through them. Some may presume this is because their view will be obscured by the frequent blizzards that occur in Antarctica. However, even on a crystal clear day they will not notice anything beyond a snow covered gentle rise, because in the area they are passing through the mountains are almost completely buried in the ice.

The Transantarctic Mountains comprise one of the longest mountain ranges on earth, stretching 3,500 kilometers from the Ross Sea to The Ronne Ice Shelf, effectively separating West from East Antarctica. The Transantarctic Mountains rise to a height of about 4,000 meters, about the same height as the Alps in Europe. Scientists believe they were created about 65 million years ago, about the time dinosaurs became extinct. The Transantarctic Mountains act as a dam that holds the Antarctic Ice Cap in place, ice from the Antarctic Plateau 'seeps' through the mountain range to the ice shelves below. The areas of flow through the mountains make up tongues of crevassed glacier. Both Amundsen and Scott had to climb up such glaciers as they passed through the Transantarctic Mountains on their way to the South Pole.



Figure 1: Transantarctic Mountains stretching from the Ross Sea to the Ronne Ice Shelf. The South Pole Quest will be passing through the mountain range where it is largely buried between the Ronne Ice Shelf and the South Pole (Source: NASA).

In order to define the scope of the mountain range, scientists have been using radar to effectively peel away the covering of ice that envelops the Transantarctic Mountains. Other mountain ranges in Antarctica lie fully covered by ice and were only discovered by employing radar techniques to reveal the topography below the ice. The Gambertsevs are sub glacial mountains found by a team of Russian scientists using radar technology. They are fully submerged in ice, and are thought to be the birthplace of the Antarctic ice sheet.

One of the unique byproducts of the Transantarctic Mountains is that they function as a giant sieve that collects meteorites. This property of the Mountain range was not discovered until about thirty years ago, and is quite unique in the scope of the planet. Meteorites are very rare, most falling to earth never to be found. The relationship between the Antarctic Ice Cap and the Transantarctic Mountains creates the perfect setting for the collection of meteorites. Antarctica has supplied as many meteorites as the rest of the

Did You Know?

Islands of rock that are sticking through an ice cap are called Nunataks. In other words Nunataks are mountains wrapped in ice with their tops showing.

world combined.



Figure 2: Recovery of a meteorite in Antarctica. The meteorite is picked up with sterile tongs and put into the clean Teflon bag. The recovery site is marked by a bamboo flagpole with the meteorite's field number, and the relevant data is logged into a notebook (Source: H. Raab).

Meteorites start as meteors that are 'space rocks' that burn up or catch fire when they pass through the earth's atmosphere. These are seen as 'shooting stars' and most completely vaporize before they ever reach the earth. However an estimated 500 meteorites do reach the earth's surface every year, although many are very tiny, perhaps no bigger than a marble. It is believed that meteors fall uniformly over the entire planet.

Why is Antarctica such a great place to collect meteorites if they do not fall preferentially on the continent? The remarkable rate of meteorite recovery in Antarctica is a product of the Antarctic Ice Cap and the manner in which the ice flows through the mountains on the way to the sea. Whereas in most places in the world Meteorites fall to the ground and become 'camouflaged' in the surrounding soil, in Antarctica a meteorite strikes and becomes embedded in the ice cap. This ice, in turn, slowly flows downhill toward the Southern Ocean. Although many meteorites are doubtless borne to and deposited in the sea, a proportion is brought to the surface of the glacier, or is deposited on a barren mountainside. This occurs because as the ice flows around the Transantarctic Mountain, a combination of the turbulent flow and ice loss to the dry winds will deposit the long buried meteorite on the side of the mountain pass. This process has been ongoing for millions of years leaving many meteorites strewn along the mountain passes through which Antarctic glaciers flow.

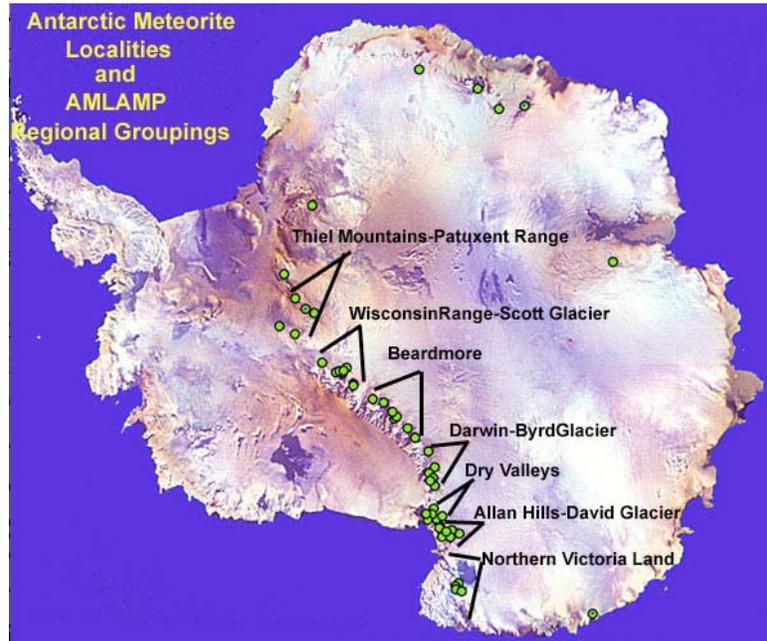


Figure 3: Map of distribution of meteorite finds in Antarctica. Ray, Richard and Kevin will pass through the Thief Mountain area (Source: AMLAMP).

Since 1976 over 35,000 meteorites have been collected from Antarctica. Meteorites have proven an invaluable source of information about the history of the solar system. Careful analysis of a meteorite can provide insight into the structure and composition of planets and other elements of the solar system. Among the more famous of the meteorites found in Antarctica are fragments of rock thought to be from the Moon and Mars. These rocks were likely thrown into space (splatter effect) and propelled to earth by the impact of a large asteroid on the surface of the Moon or Mars. The chemical composition of these meteorites matches that of samples taken from the Moon and Mars during lunar and space probe landings.



Figure 4: The first lunar meteorite found in Antarctica (Source: AMLAMP)

Given that they will be passing through a meteorite collecting zone on their way to the South Pole we have asked Ray, Richard and Kevin to keep their eyes open for dark rocks sitting alone on the snow. Although they are concerned about the weight of their sledges bringing a meteorite back from the South Pole would be remarkable!



Figure 5: Ann Hodges holds the meteorite that struck her, while two men look on (Source: public domain).

Did You Know

The only confirmed case of a human being hit by a meteorite occurred on 30 November 1954 in Sylacauga, Alabama when a 4 kg stone crashed through a roof and bouncing off a radio before hitting Ann Hodges while she snoozed on a couch. She was badly bruised, but not seriously injured.