Where's Scott Now?

A review of current reports on the location of the body of Capt Robert Falcon Scott, who died in Antarctica in 1912.

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Introduction

The expedition

In 1901, Commander Robert Falcon Scott lead a small group of men to the Antarctica in what is now known as the Discovery Expedition, after their ship, the *Discovery*. The expedition landed in McMurdo Bay and built a hut, establishing a base there, from where they undertook scientific observations and land/ice based voyages of discovery. The expedition stayed for three years, during which time Scott, together with Shackleton and Wilson set off southwards toward the South Pole. They established a new record for furthest south, and returned in poor health, but with a vision to attain their goal of reaching the Pole.

Shackleton returned with his own expedition in 1908, and established a new furthest south record, reaching within 100 miles of the South Pole, and then Scott returned again in 1910, with his main purpose being to be the first man to reach the South Pole. At the same time as Scott’s *Terra Nova* expedition was preparing for and travelling to Antarctica from England, via Australia and New Zealand, Norwegian, Roald Amundsen, was also preparing to be the first to the South Pole.

The trip to the Pole

Amundsen and Scott took totally different approaches to their expeditions. Amundsen had a background in Arctic travel, having drifted through the Northwest Passage while ice-bound in a ship. Like Scott, Amundsen had previous experience in the Antarctic. He was one of the crew on de Gerlache’s *Belgica* expedition in 1898.

There were major differences between the two expeditions. Amundsen’s was small, he had considered diet carefully, he used dogs, and had made better use of the lessons of his earlier voyages. Scott’s expedition was large, in part because he was also undertaking
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scientific research; his diet was poor and ultimately inadequate. He used ponies and although he took dogs, he did not know how to use them or appreciate their benefits. He appeared to have ignored the lessons of the past, both his own and those of other expeditions. Ultimately, Scott believed in man hauling vs. dogs or even ponies, and in this manner, he attained his goal.

Ultimately, Amundsen beat Scott to the South Pole, and Scott arrived to find a Norwegian flag at the Pole, and a note from Amundsen asking him to convey the attached letter back to King Haakon advising that Amundsen had reached his goal. This was to have been a safety net for Amundsen, in the event that he did not return from his journey. How ironic.

Scott arrived at the South Pole with four other men – Bowers, Evans, Oates and Wilson. He had originally planned for a party of four only (Scott, 1913), and the numbers in his final team may also have jeopardised his ultimate success. It also threatened the survival of the support group who had travelled with him for part of the way, as they had to return one man short.

The return from the Pole
Returning from the Pole, the group of five men struggled with altitude, poor food, exhaustion and a broken spirit after having seen the Norwegian flag flying in the place they had intended to fly the Union Jack. Retracing their southward path, they travelled north across the polar plateau and down the Beardmore Glacier. Two things of significance happened here; they stopped in good weather for a geological foray, and collected 35lb (~15.8kg) of geological specimens, which produced the first proof that Antarctica had once had a temperate climate. The rocks included fossil remains of beech trees. These rocks were loaded onto the sledge and man-hauled north by the small party. Also, while descending the glacier, Seaman Evans fell and
was injured. He died a short while later and was buried at the foot of the glacier.

Evans had been a strong man, and one on whom Scott had relied for his brute strength (Scott, 1913). The remaining four men continued north, struggling to attain their poorly marked food depots, and twice arriving at depots having completely finished the last of the food they carried with them. Heading north across the Ross Ice Shelf, Oates was weakening rapidly, and was aware that he was becoming a burden, which threatened the survival of the other three men. He struggled on, possibly with scurvy, and one morning, on his birthday early in March 1912, left the tent, where they all slept, and crawled out into the snow to die. From the diaries of the remaining men, it appears that they knew his intention, but made no move to stop him.

Prior to the expedition, Oates and Nelson had discussed what should be done if a member of the final polar party suffered an injury, or collapsed from some other cause. "Oates emphatically expressed the opinion that there was only one possible choice – self-sacrifice. He thought that a revolver should be available, so that if anyone broke down, he should have the privilege of using it" (Pound, 1966, p.267).

The polar party carried a supply of opium tablets, and morphine, and Scott had compelled Wilson to hand over the tablets "For each one to do away with himself, if he wanted" (Huntford, 1979, p.539). Wilson may have given Oates a morphine injection to help him sleep, but would not end his life. Nor, it appears, could Oates take the opium tablets either (Huntford, 1979).

**The deaths**
The remaining men, now numbering three, continued on, aiming for a big depot of stores that had been established at 79° 29' south. Eleven miles short of their goal, they pitched their tent with enough food for two
days and enough fuel for one day. The end was in sight, but Scott had severe frostbite to his leg, and was unable to travel further. Wilson and Bowers proposed to make a dash for the depot, known as One Ton Depot for the amount of stores there, but blizzard conditions, and Scott, held them back in their tent. The three men all died in their tent on or about 30 March 1912 (Huntford, 1979).

Originally, Scott had intended that this depot be positioned at 80° south. One degree of latitude equals 60 nautical miles, so one minute equals one mile. Scott’s last tent site was at 79° 50‘ south, eleven miles short of the depot, and ten miles north of the originally intended position.

The discovery

The remaining men from that expedition had given up all hope of the safe return of the polar party, and following the winter, made up an expedition party to travel south to locate the five men they had last seen the previous year. South of One Ton Depot, the tip of a tent was sighted. Wright, a member of that party wrote that he saw a ‘dark patch’, about a quarter of a mile away. “I left the column and ski’d over to investigate. It turned out to be about six inches of the top of the tent at their last camp” (Pound, 1966, p.307). Inside the tent, the searchers found the bodies of Bowers, Scott and Wilson.

Scott was found lying in his sleeping bag, with Wilson and Bowers lying on either side of him (Pound, 1966). Had they taken their opium tablets, or had they died from starvation and the cold? This question may only be answered by an autopsy of the bodies.

The burial

The leader of this relief expedition, Surgeon E L Atkinson RN, read the diaries of the men, and determined what had happened (Huntford, 1979). This took quite some time, after which they removed the
personal possessions of the men, (watches, diaries, etc), removed the bamboo tent poles, and collapsed the tent over them. Above the collapsed tent, they built a huge cairn of snow, topped with a simple cross, made of two skis lashed together. To either side of the tent, they erected another cairn topped with a sledge on its end. By the side of the eastern cairn they left a metal cylinder in which was enclosed a paper telling who was buried there.

The following record was signed by all the members of the party, and left in the cylinder:

“November 12, 1912, lat. 79 degrees, 50 mins. South. This cross and cairn are erected over the bodies of Captain Scott, C.V.O., R.N., Doctor E.A. Wilson, M.B., B.C. Cantab., and Lieutenant H.R. Bowers, Royal Indian Marine – a slight token to perpetuate their successful and gallant attempt to reach the Pole. This they did on January 17, 1912, after the Norwegian Expedition had already done so. Inclement weather with lack of fuel was the cause of their death. Also to commemorate their two gallant comrades, Captain L.E.G. Oates of the Inniskilling Dragoons, who walked to his death in a blizzard to save his comrades about eighteen miles south of this position; also of Seamen Edgar Evans, who died at the foot of the Beardmore Glacier. “The Lord gave and the Lord taketh away; blessed be the name of the Lord” (Scott, 1913, p.467).

When digging snow for the cairns, they uncovered the sled with the geological specimens. On the sled, they also found all manner of items, which the men had been hauling with them. This included worn out clothes and dog harnesses. The sled was taken back with the recovery party, and finally unpacked. It was then that the men found the Norwegian flag from the South Pole.
They travelled south looking for the body of Oates, but were unable to find him, only finding a sleeping bag, which the other three men had left for him in the vain hope that it would be of use to him. Again, they erected a marker in the vicinity, and left a note recording his death thereafter.

There is no recorded reason for leaving the bodies where they were found. Nicholai Hanson, who died during Borchgrevink's Southern Cross expedition was buried on a hill above Cape Adare, and men lost during Scott's earlier expedition, and from Shackleton's 1908 expedition, lost at sea, were remembered through memorial crosses. Most likely, the practicalities of returning the bodies of Bowers, Scott and Wilson, even to Hut Point, were beyond the means of the relief party.

Methodology of this Review

This paper is a review of the limited number of printed articles written on the whereabouts of the bodies of Scott's party (Head, 1998; Hyde, 1999; Irwin, 1998; & Williams, 1999). It is not a scientific paper, minutely examining, for example, the snowfalls on the Ross Ice Shelf since 1912 to determine the rate of accretion of snow. While some examination has been made of the use of Ground Penetrating Radar (GPR) and Magnetometry in determining the positions of items buried in snow, this paper does not attempt to cover these techniques in anything other than a general way.

Estimates discussed in this paper of ice movement and snow accumulation have been received from a number of prominent internationally recognised geophysicists, and have been accepted as
stated. When an attempt was made to determine the basis of those calculations, one person replied, "The calculations are best done by you again as an education of anyone showing interest" (Whillans, 1999, Personal Comment).

Given the recommendations that this paper makes, it will become necessary to closely examine the determinants of location, in order to determine a likely position. Similarly, it will be necessary to investigate the wide range of GPR and Magnetometry options available, together with any investigation techniques likely to yield a result.

Discussion

Where’s Scott Now?
Since November, 1912 there are no recorded sightings of Scott's grave, nor any record of anybody attempting to locate it. However, recently there have been a number of magazine articles speculating as to where the grave might be (Head, 1998; Hyde, 1999; Irwin, 1998; & Williams, 1999), and it is generally accepted that it has been well covered by snow, and has drifted northward with the movement of the ice shelf.

An attempt to locate the grave site must consider the drift of the ice shelf, and the accretion of snow at the site, in attempting to determine a location and depth. Having done that, it will be then necessary to confirm the theoretical location by some means of field test, and the two most likely tests are with GPR and Magnetometry. If a likely site is found, it could be explored by a preliminary excavation.
However, having located Scott’s grave, then what? Should he be recovered? Is there any sociological or scientific value in recovering his body, or is it sufficient to know where he is? Should we be tampering with gravesites at all? Does the legend of the man preclude the need to know the more practical data that discovery, exhumation and autopsy would reveal?

**Current Thinking**

There appear to be no published reports on Scott’s current location, in recognised scientific journals. However, there has been mention of possible, or probable, positions in newspapers and magazines. The idea that Scott may have drifted off on an iceberg appears to have a certain romantic appeal for some.

In 1966, Pound wrote, “A computation recently made by American scientists at their station in McMurdo Sound suggests that blizzards have driven frozen snow over the burial cairn to a depth of fifty feet, and that the site is now fifteen miles nearer the Ice Shelf edge” (p.315).

The predominant thought of these popular-press articles (Head, 1998; Hyde, 1999; Irwin, 1998; & Williams, 1999) is that the position of Scott’s body and those of his companions has moved 30 - 50km northwards, and that they are some 30m deep, under the Ross Ice Shelf. Given the current rate of drift, it is expected that the shelf area he is on will break off to form an iceberg in 225 – 250 years. At that time, Scott and his companions will drift out to sea, and eventually fall to the seafloor as the iceberg melts.

Head (1998) speculates that the bodies have been carried about 60km from the spot where they were buried. Head quotes Dr Ian Whillans, a geophysicist with the Byrd Polar Research Centre, Ohio as saying, “Scott and his two companions now lie about 30m below the surface, covered by about 30cm of new ice each year. Their bodies have been
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moving at just under one kilometre a year, and Dr Whillans believes that will accelerate at the edge of faster ice flow. He considers that in about 250 years the frozen grave will break into icebergs” (p.81). The article continues with New Zealand glaciologist, Dr Harry Keys quoted as agreeing with these calculations. In the article Dr Keys states, “The bodies moving north-north-easterly, will emerge about 120km west of Ross Island in a little over 250 years... The bodies will be perfectly preserved but dehydrated” (p.81).

Enquiries at Scott Polar Research Institute indicated that Dr Bentley, Crary Professor Emeritus of Geophysics at the Geophysical and Polar Research Centre of University of Wisconsin would also have information on drift and accretion. Dr Bentley was particularly helpful, and was also the source of Jack Williams articles, writing in USA Today. Bentley forwarded copies of his previous e-mails, which included the following, “Assuming that the tent started at 80degS at the intersection with a straight line from Mt. Terror to the mouth of Beardmore Glacier, I find an accumulation [accretion] rate of 15 cm/yr. and a speed that starts at 600 m/yr. and increases to 1000 m/yr. at the ice front. Based on those numbers, I calculate a depth of burial of 23 m, a movement to date of 52 km, and an emergence time of 275 years from now” (Bentley, 1999, Personal Comment).

He later wrote, “You will see that I estimated a time until emergence of 275 years based on an assumed starting point of 80deg South, but that ... the starting point was actually 79deg 50min South. The difference amounts to 3 years less travel time, which is negligibly small compared to the uncertainties in the estimate” (Bentley, 1999, Personal Comment).

When asked about the condition of the bodies, Bentley replied, “There are two factors involved in the pressure on the tent and bodies. The first is the simple overburden pressure, which is equivalent to that
under 12m of water -- just a little over one additional atmosphere... The second is the pressure that arises from the compaction of the snow to reach ice density... In my opinion, the tent and bodies would be a tightly compressed package but that there would be no obvious crushing of the bodies, except perhaps where an obstacle, like a tent pole, lay across a body” (Bentley, 1999, Personal Comment).

The most significant factor in when the bodies reach the sea has to do with the calving behaviour of the ice front. The normal course of events at the front is a long period (in the order of a century) of advance followed by a break-off of a large iceberg that moves the ice front back to where it started after the previous break-off. Melting at the front during its long period of advance is negligible (Bentley, 1999). That means that it is extremely unlikely that the bodies will ever emerge at the front. Instead, they will be carried off in an iceberg when they get close enough to the front. That in turn means that there is an inherent uncertainty in their departure date from the ice shelf in the order of the length of the advance/break-off period, which is very poorly known and probably not very regular anyway. Their final resting place is then dependent on the ocean currents, how the iceberg breaks up, whether the piece that holds the bodies ever capsizes (because melting takes place mainly on the underside), and other unpredictable factors (Bentley, 1999).

Hyde (1999) states, “They remain where they were found, a cairn marking the spot where they rest, now covered in 15 metres of ice” (p.16).

There appear to be some thought amongst current Antarctic scientists, made in general conversation with the writer, that the process of the ice shelf calving has all ready occurred, and that Scott has long since departed the continent. None of these opinions are in print, and are not supported by estimates of drift given by international geophysicists.
Drift of the Ice Shelf

The weight of accumulated snow on the Polar Plateau causes it to flow north and to a lower altitude, rather like icing flowing off a cake. The snow, and ice, crosses the Trans Antarctic Mountains through a number of glaciers, and flows towards the sea. In the area of Antarctica immediately south of New Zealand the sea, known as the Ross Sea, is frozen at its southern end to form a permanent ice shelf. It is more correctly a compacted snow shelf.

The ice flowing down the glaciers meets the ice shelf, and pushes it northward. Eventually, the flow of the ice shelf reaches the sea, and the shelf breaks off, or calves and an iceberg is created. These drift with the circum-polar currents, and eventually melt. At times, where the drift of the ice shelf meets the frozen sea-ice, pressure ridges form, as the ice is unable to move north, and is deformed up, or down, to create a mini mountain range.

A general estimate (Bentley, 1999) of the rate of flow of the Ross Ice Shelf is 800 – 1000m per year, and within the last year, caches of stores left by Peter Hillary’s Iridium Ice Trek, have been recovered some 650m from where they were originally located, and marked using Global Positioning Systems (GPS) plots (Peterson, 2000).

Snow Accretion

At the same time as ice is flowing onto the Ice Shelf from the polar plateau, snow is being deposited both from blizzards and from wind. The tendency of snow to blow, both removes and deposits snow on the shelf, but ultimately there appears to be an overall deposit of approximately 30cm per year (Whillans, 1998).

As well, snow tends to form in deep drifts about any object causing an obstacle in its path. For this reason, snow will accumulate faster in some areas than others, but will ultimately average itself out.
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relief party discovered Scott's tent after eight months, it was almost completely buried. This would have been a seven to eight foot high tent, which was buried until just the tip showed (Pound, 1966). The same party failed to find Oates' body, which would have been covered by snow probably within two weeks of his death by the same blizzard that kept Scott in his tent.

Ground Penetrating Radar (GPR)
Finding objects buried either in the ground or in snow and ice can now be assisted by GPR. GPR sends a radar signal into the ice to determine irregularities in the conformation of the ice, and is used to locate archaeological sites, and by the police to find murder victims in unmarked graves. There has been some research done in the use of GPR to locate avalanche victims (Nobes & Tyndall, 1995), and it is widely used around the world for geological study, including glacier study in Antarctica.

It is likely that the site of Scott's tent, now his grave, could be located using GPR provided the final search area is small enough. GPR is a well-proven method used for locating bodies, and would likely give a return such that they could be identified as bodies. However, GPR is more likely to pick up a return from the metal cylinder buried beside one of the cairns, which marked the grave. It is this cylinder that probably holds the key to the location of the site.

Magnetometry
Another tool for locating objects is magnetometry, which measures irregularities in the magnetic measure of an area. It is used for a variety of purposes, and has been used to locate sunken ships, and buried treasure. It has commercial purpose in locating lost pipes and underground excavations (Turner, 2000).
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It seems unlikely that magnetometry would be sufficiently accurate or powerful to detect objects down to 30m which is one estimate of the depth of Scott's tent, particularly as there is very little metal in the area. However, because of its bigger size and higher metal content, it may be possible to use magnetometry to locate the site of the depot, which Scott never reached. This contained a large number of tins, both of food and fuel, some of which will still be there, even after the visits of the relief party (Scott, 1913).

Social Impact

However, having located Scott's grave, then what? Is there any sociological or scientific value in recovering his body, or is it sufficient to know where he is? Should he be recovered? Should we be tampering with gravesites at all, and does this open the door to an exhumation of Nicholai Hanson at Cape Adare, and others?

Questions that may be able to be resolved include the cause(s) of Scott’s death. Possible causes include scurvy, frostbite, gangrene, starvation, exhaustion (hypothermia) and even anthrax, which one of Scott's men died from after working with the ponies. This is quite apart from the causes of weather, or poor management. That there is scientific value in conducting an autopsy on Scott’s body, and those of his men, is without question. It will answer a lot of questions about the conduct of his expedition, and may assist future expeditions, particularly foot based expeditions in The Antarctic, and also in the Arctic.

Having recovered the bodies, should they then be returned to their families, or re-interred either in the ice shelf, or at another more permanent location in Antarctica? An appropriate parallel here is the recent discovery of the body of Mallory who died on Everest c. 1920. He was not removed, but was buried where he lay. For Bowers, Scott and Wilson it may be appropriate that they are returned to Antarctica.
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Re-interring them in the ice shelf will again give them an anonymous resting-place, and perhaps this is proper.

Having recovered their bodies, and studied the causes of their deaths, it is right to give peace to the dead. Any marker on an ice shelf site, will quickly be obscured by snow, and will continue to drift. The first marker was probably covered over within twelve months, and any new marker or locator would be similarly covered, and as quickly.

**Recommendation**

**A new expedition in three stages**

This paper recommends that an expedition be mounted to locate the bodies of Bowers, Scott and Wilson and also, the stores at the One Ton Depot.

Having recovered the bodies, they should be autopsied to determine the cause(s) of death, and then returned for burial in the ice shelf. A marker of the site, being effectively useless, it may be appropriate to include a locator beacon with the bodies, so that they can be tracked to their final resting-place in the Ross Sea.

This expedition should be mounted in three stages:

**Determination of drift and accretion**

A preliminary investigation needs to occur, to determine the current measure of movement of the ice shelf, and its direction, and also the levels of snow deposits currently occurring. From these figures, and from climate models over the last 90 years, it should be possible to estimate a search area for both the graves, and the depot sites.
It should be possible to establish inert markers at the original sites of both locations, and others across a band of nearby points. These markers could be buried in the snow at a known depth so that they do not cause any site contamination from drift snow. They should also be capable of being tracked, and/or relocated the following year.

A monitoring program of two to three years may be sufficient to give reliable estimates of locations for the next stage of the search.

Survey of probable sites using and location and/or Confirmation of those sites.
Following the determination of a likely site, it is then necessary to grid-search the area using GPR and magnetometry, to pin point the locations of the two items – the grave and the depot. These two surveys could be undertaken concurrently. Similar surveys have been undertaken by National Science Foundation (NSF), with their Support Office for Aerogeophysical Research (SOAR) project¹. These were aerial surveys, and a more appropriate method here, is likely to be a surface survey.

The location of either site would lend support to the location of the other, as they were recorded as being eleven miles apart, and we assume along an almost direct north-south axis.

Recovery of the Bodies and/or a permanent marker location.
Having located either or both sites, the depot site could be fully excavated, and its contents removed for further study. The gravesite could initially be excavated to remove the sleds, and the metal cylinder, with the bodies then being removed for autopsy and further study. The tent and any contents could also be removed, also for further study.

¹ Information on SOAR is available from http://www.ig.utexas.edu/soar
Following autopsies, the bodies would be returned to Antarctica for re-
burial, perhaps on the ice shelf, at the point from which they were
taken, or perhaps at a point near the hut from which they set off on the
final journey at Cape Evans.

Conclusion

In recent years the bodies of members of the ill-fated 1840s Arctic
expedition of Sir John Franklin were found well preserved in the
permafrost, enabling scientists to find out why members of the
expedition died (Head, 1998, p.81).

No one knows where the bodies of Scott and his two companions lie.
There is obviously a range of locations available; from the point where
they died, to a scenario that has all ready seen them drop into the Ross
Sea.

The only reliable way to determine Scott's position is by a search along
the lines of that outlined above. To be sure of the search result, it
becomes necessary to recover at least one item from the sites located.
From the One Ton Depot, there is plenty of choice, but from Scott's
grave, there is perhaps the two sleds, the metal cylinder, and the tent,
with the three bodies within.

Tampering with history is a risky business. Scott's death impacted on
the British Empire in a way similar to that of perhaps a Prime Minister
or great statesman. His final letters written from the tent where he lay
dying inspired the world. He had written a final "Message to the Public\(^2\), which was printed and owned by nearly every home in the Empire. The message was read to British and Colonial troops in the trenches during World War One, and was the inspiration of a generation. "Scott's worth to his country lay not only in his power to do and lead; it was even more in his power to express, convey and transmit the spirit, which prompted men to high adventure and nerves them to face whatever might come of it, in a great cause" (Gwynn, 1929, p.228).

Dr Keys said, "We know why Scott died. It would be better to leave them in peace" (Head, 1998, p.81). To find, even now, that this hero had feet of clay may upset many people. Yet, questions do remain about his death. Did he have an early onset of scurvy? Did Scott and his men take their opium tablets, to ease those final hours, or to hasten their deaths? Scientific information needs to be balanced against the human factor of inspirational events and people.

Whatever else may then happen to the bodies, they should be returned to Antarctica to rest forever. In a letter to Bowers' mother, Appsly Cherry-Garrard wrote "Your son would rather lie where he is (having done what he has done) than have returned safely without doing it" (Cherry-Garrard, 1913).

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\(^2\) The full text of this "Message to the Public" is printed in Scott (1913), pp.476-477.
References


