

# Hitler's Antarctic base: the myth and the reality

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**ABSTRACT.** In January–February 1939, a secret German expedition visited Dronning (or Queen) Maud Land, Antarctica, apparently with the intention *inter alia* of establishing a base there. Between 1943 and 1945 the British launched a secret wartime Antarctic operation, code-named Tabarin. Men from the Special Air Services Regiment (SAS), Britain's covert forces for operating behind the lines, appeared to be involved. In July and August 1945, after the German surrender, two U-boats arrived in Argentina. Had they been to Antarctica to land Nazi treasure or officials? In the southern summer of 1946–1947, the US Navy appeared to 'invade' Antarctica using a large force. The operation, code-named Highjump, was classified confidential. In 1958, three nuclear weapons were exploded in the region, as part of another classified US operation, code-named Argus. Given the initial lack of information about these various activities, it is not, perhaps, surprising that some people would connect them to produce a pattern in which governments would be accused of suppressing information about 'what really happened', and would use these pieces of information to construct a myth of a large German base existing in Antarctica and of allied efforts to destroy it. Using background knowledge of Antarctica and information concerning these activities that has been published since the early 1940s, it is demonstrated: that the two U-Boats could not have reached Antarctica; that there was no secret wartime German base in Dronning Maud Land; that SAS troops did not attack the alleged German base; that the SAS men in the region at the time had civilian jobs; that Operation Highjump was designed to train the US Navy for a possible war with the Soviet Union in the Arctic, and not to attack an alleged German base in Antarctica; and that Operation Argus took place over the ocean more than 2000 km north of Dronning Maud Land. Activities that were classified have subsequently been declassified and it is no longer difficult to separate fact from fancy, despite the fact that many find it attractive not to do so.

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## Introduction

One of the less well-known Antarctic expeditions is that of the Germans, using a vessel named *Schwabenland*, between 17 December 1938 and 12 April 1939, some months before the outbreak of World War II. This expedition visited the western part of what is now known as Dronning Maud Land (Fig. 1).

The expedition arose out of concerns within the German government about the future of the German whaling industry. At that time, whaling was an important activity supplying oil, lubricants, glycerine (for nitroglycerine used in explosives), margarine and other essential

products (Lüdecke 2004: 75; Mills 2003: 552). Germany's investment in the industry was large and its whaling fleet comprised fifty whale-catchers and seven factory ships, with an output of 492,532 barrels of oil in the 1938–1939 whaling season. The fleet operated off the coast of Dronning Maud Land, which had been discovered by Norwegian whaling fleets (Christensen 1935, 1939), but was not yet officially known by that name. Claims to this land had been made on behalf of Norway, though not officially announced by royal proclamation (Mills 2003). The German government was keen not to find itself in the same situation as pertained in the South Atlantic, where Great Britain asserted the right to charge heavy fees for whaling concessions, and imposed restrictions on whaling activity. A secret expedition was therefore planned to claim a piece of Antarctica for Germany, and to find there a place suitable for a base for the German whaling fleet (Lüdecke 2004; Mills 2003).

The expedition was authorised by Herman Goering as part of the German four-year plan for economic development. Among its publicly avowed aims was a continuation of the scientific studies begun earlier in the century by Erich von Drygalski around 90°E and Wilhelm Filchner in the Weddell Sea. But it also had some secret military aims. On its return journey it was to investigate the suitability of the isolated Brazilian islands of Ilha Trindade and Ilhas Martin Vas, almost 1000 km east of Vitoria in Brazil, for landing places for the German Navy, especially U-boats (Lüdecke 2004: 81). In addition,

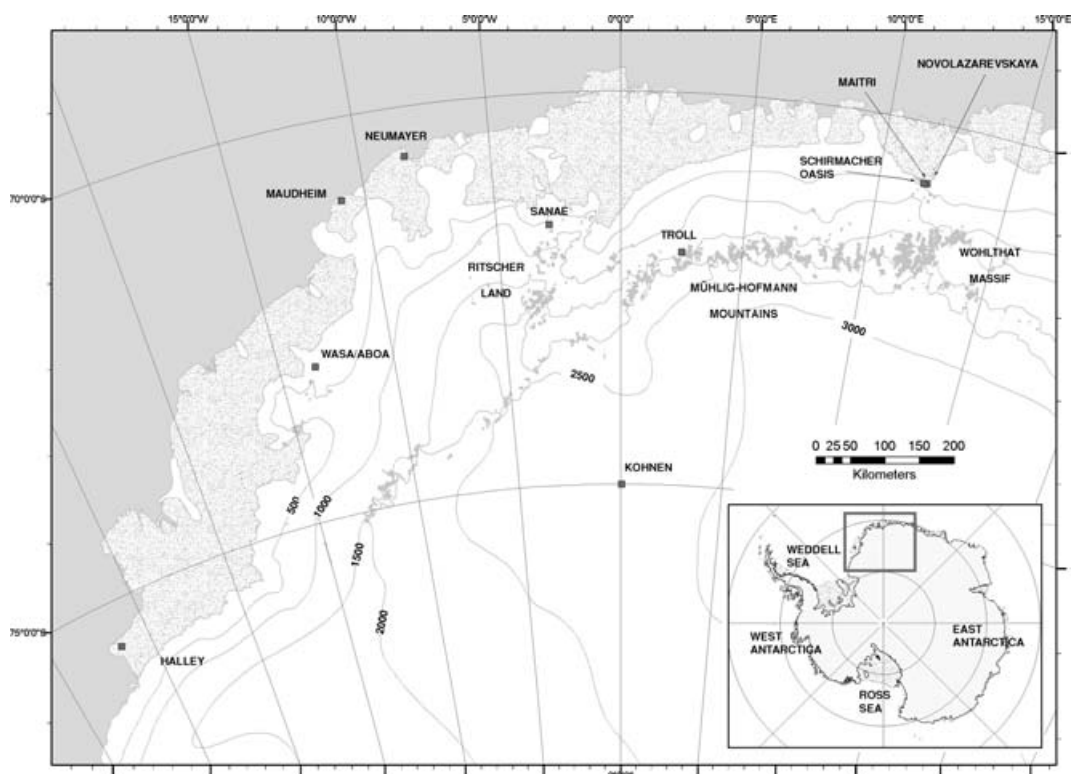


Fig. 1. Dronning Maud Land, the Mühlig-Hofmann and other mountains, the location of the Maudheim base of the Norwegian/British/Swedish Antarctic Expedition of 1949–52, and the locations of current national bases. An inset shows Dronning Maud Land's place in Antarctica. Contours are at intervals of 500 metres. Shading denotes the ice shelves along the coast. Rocky outcrops are depicted in solid colour. (Courtesy of Stein Tronstad, Norwegian Polar Institute).

according to Mills (2003: 552), Goering wished to learn more about whatever strategic opportunities the Antarctic might offer, and wanted to know about the functioning of aircraft at low temperatures, knowledge that was to prove useful during the German invasion of the Soviet Union.

A series of expeditions was planned. The first, in 1938–1939, was to map the region by air for the purposes of discovery and exploration, before either making territorial claims or deciding where to locate a whaling base. The expedition succeeded, largely due to good weather, in flying over land between 5°W and 15°E and in using oblique aerial photography to map an area of some 250,000 km<sup>2</sup> between roughly 11°W and 20°E, which they named NeuSchwabenland (Brunk 1986: map 3; Mills 2003). In this area they discovered a new mountain range more than 800 km long and 3000 m high some 200 km inland from the coast (Ritscher 1942).

The Norwegians had not seen these new mountains when they explored and photographed the ice edge off Dronning Maud Land from the air during the *Norvegia* expedition of 1929. They had, however, discovered the Sør Rondane Mountains 200 km inland from the coast near 26°E, on 6 February 1937 (Christensen, 1939).

The follow-up German expeditions planned for 1939–1940 and 1940–1941, which might have led to the construction of a base had the reconnaissance proved successful, could not be carried out because of the

outbreak of war (Lüdecke 2004: 86–89). The authors have been unable to locate any German documents indicating that German activity continued in Dronning Maud Land after the *Schwabenland* expedition and during World War II (see also Lüdecke 2004). Indeed, there was no official German activity in Antarctica until after 1959 when the first Germans set foot in Dronning Maud Land with the Russian expedition to the Schirmacher Oasis (Gernandt 1984).

In contrast, the British were active in Antarctica during the war. As part of its colonial aspirations, Great Britain laid claim to the segment of Antarctica lying between longitudes 20°W and 80°W, which includes the Antarctic Peninsula and almost all of the surrounding islands, the South Shetland, South Orkney and South Sandwich Islands, and South Georgia, all of which became known collectively as the Falkland Islands Dependencies, the Falkland Islands being the nearest British Colony (Fuchs 1982: 20). Formal acquisition of these lands was promulgated by Letters Patent in 1908 (amended in 1917). Between 1925 and 1947 Argentina claimed much the same region, as did Chile in 1940 (Fuchs 1982: 20–21).

Bearing in mind that, early in World War II, Argentina and Chile were friendly with Germany, Great Britain decided, during the war, that it needed to demonstrate occupancy as one means of rebutting these competing claims. The British chose to do this by establishing

permanently manned bases that could be used to obtain information on shipping activity, to deny the use of harbours to German ships, and to support teams of researchers engaged in geographical discovery and scientific investigation (Fuchs 1982: 22–54). Denial of the islands as bases to potential enemies began with the visit of HMS *Queen of Bermuda* to Deception Island, on the west coast of the Antarctic Peninsula, in March 1941 to destroy stocks of coal and to puncture fuel tanks. Argentina had placed marks of sovereignty on Deception Island in 1942. They were obliterated in January 1943 by HMS *Carnarvon Castle*, which hoisted the Union Flag there (Sullivan 1957).

In 1943, Great Britain began planning to occupy the territory. A secret military exercise, code named Operation Tabarin, was mounted by the Royal Navy to establish bases on the peninsula and in the islands to the west (Fuchs 1982: 22–54; Mills 2003: 489). According to these authors, British wartime interests did not extend to Dronning Maud Land, 1000 km to the east across the Weddell Sea.

The next well-documented event bearing on the subject of this paper occurred early on 10 July 1945, two months after the German surrender, when a German U-boat, *U-530*, entered the Argentine naval base at Mar del Plata (NARA 1985; Blair 1998). Leutnant Otto Wermuth, the Captain of *U-530*, appears to have believed that he would be well received by the Argentines. His arrival created much speculation. Disregarding the news of Hitler's suicide on 30 April, many believed that *U-530* had somehow spirited Hitler, Eva Braun, Martin Bormann and others out of Germany and had landed them either on the coast of Patagonia or at a 'New Berchtesgaden' in Antarctica. On 16 July, a detailed account of Hitler's supposed flight and hiding place in Dronning Maud Land, Antarctica, was published in the Argentine newspaper *La Critica*, by Ladislav Szabo, a Hungarian exile living in Argentina (Szabo 1947: 8). It was repeated in major newspapers worldwide, for example under the headline 'Hitler's on Ice in Antarctic' in Toronto (*Toronto Daily Star* 18 July 1945). Speculation increased when *U-977*, under the command of Oberleutnant Heinz Schaeffer, appeared at Mar del Plata on 17 August (Schaeffer 1952; NARA 1985; Blair 1998).

As Argentina was a combatant power at the end of the war, Wermuth and Schaeffer and their crews became prisoners of war and were interrogated by the Argentine Navy, the US Navy, and the Royal Navy (Schaeffer 1952). Interrogation focussed on whether Hitler and/or other high-ranking Nazis had, in fact, escaped from Germany by submarine. Eventually, the interrogators were satisfied that the late arrival of the submarines in the South Atlantic was entirely innocuous. Wermuth and Schaeffer were released.

That did not stop speculation. In his 1947 book *Hitler is alive*, Szabo claimed that both submarines were part of a submarine convoy that had taken Hitler and other senior figures from the Third Reich to Antarctica,

where 'New Berchtesgaden' had been set up in 1938–39 by *Schwabenland*, on the orders of Admiral Dönitz. Despite Schaeffer's denials (Schaeffer 1952), the rumour continued to spread (see Mattern and Friedrich 1975: 68; Landig 1980).

Buechner and Bernhart (1989: 216) provided a different version, claiming that Hitler had indeed died in his bunker in Berlin, but that *U-977* had then transported his ashes to Antarctica, in convoy with other submarines, *en route* to Mar del Plata. According to these authors, the ashes were deposited along with other Nazi treasures packed in six bronze, lead-lined boxes that had been landed in Dronning Maud Land by *U-530*, and placed in a 'very special natural ice cave in the Mühlig-Hofmann Mountains' (Buechner and Bernhart 1989: 188). To lend an air of authenticity to this tale, Bernhart claimed to have been one of the crew of *U-530*, although his name is not on the *U-530* manifest provided by the Argentine Navy (Szabo 1947: 13–14).

'New Berchtesgaden' appears, like the phantom convoy, to be the brainchild of Szabo (1947: 155), and has been a favourite element of Nazi mythology ever since (Goodrick-Clarke 2002). Several writers accept the existence of the supposed base, and that there was a conspiracy to suppress information about it (for example Mattern and Friedrich 1975; Friedrich 1979; Stevens 1997, 2003; Choron date unknown; Farrell 2005; and Robert 2005a 2005b, 2005c). Expanding on Szabo (1947: 200–202), and each of them building on the one before, they go on to suggest that US forces attacked the German base during Operation Highjump in the southern summer of 1946–1947, that those forces were repulsed by the secret weapons of the German defenders, and that as a result the US forces had to leave the area sooner than planned. The tale has become more elaborate with the passage of time.

A different version of these events has recently been published by Robert (2005a, 2005b, 2005c) in a trilogy entitled *Britain's secret war in Antarctica*. Robert claims not only that there was indeed a secret German base in Dronning Maud Land during World War II, but also that the British spied on it from their own secret base in Dronning Maud Land. He claims that the British Army's SAS attacked and tried to destroy the German base around Christmas 1945. According to Robert (2005c), that attempt was ineffective, as were the subsequent attempts by the USA's Operation Highjump, and the German base was finally destroyed by secretly exploding three atomic bombs above it in 1958 as part of the activities of the IGY. Robert (2005c) claims that the truth about the German base and the attacks on it by Britain and the United States have been deliberately suppressed by the US and British governments. This supposed suppression he describes as 'A travesty of history'.

If they were true, the propositions of Szabo, Robert and others listed above would be fascinating for history and for science. Indeed, there is an element of truth in all of these tales. The Germans *did* intend to build a base

in Dronning Maud Land. There *were* secret British bases in Antarctica during World War II. Operation Highjump *was* primarily a military exercise whose results were initially classified and hidden from public view. Three secret nuclear explosions *did* take place in the general region in 1958. But can these facts be woven into a comprehensive tale with a common thread, as Robert, Stevens, Farrell, Friedrich, Mattern and Choron would have us believe? Or are they merely groundless parts of the Hitler survival legend of Nazi mythology as Goodrick-Clarke (2002) suggests?

### Methodology

Thorough investigations by others have failed to produce any documentary evidence to support the allegations made by the press in 1945, or those made since by Szabo, Bernhart, or Robert concerning the supposed roles of *U-530* or *U-977* in the movements of senior Nazi officials or treasure at the end of the war (Newton 1998; Meding 1992).

However, as is often stated, the absence of evidence is not evidence of absence. Perhaps there were cover-ups. Perhaps they were successful. After all it is clear that aspects of the German, British, and US activities in the region were, at least initially, either partly or wholly in the realm of military or state secrets, even though they have been subsequently declassified for many years.

While there is something undoubtedly seductive about the idea of a secret Nazi base in Antarctica, in the absence of proofs for its existence one is left wondering if one might not be dealing with the literature of the absurd as represented by such works as von Daniken's (1968) *Chariots of the Gods: unsolved mysteries of the past*, which interweave the gold of fact with the dross of speculation, invention, and misrepresentation. The burden of proof should fall on the shoulders of those making the claims. It is not sufficient to propose an idea and then claim that the hypothesis is untestable because the evidence for it has been covered up.

In science, as pointed out by Sagan (1999: 210–216) we may start with experimental results, data, observations, and measurements regarded as facts. We then invent possible explanations and systematically confront each explanation with those facts, until we find an explanation that meets the facts in all respects as far as we can tell. Training in this approach thus provides scientists with what Sagan calls a 'baloney detection kit', which is applied whenever new ideas are offered for consideration. If the new idea survives examination by our kit, we grant it tentative acceptance. The kit comprises tools for sceptical thinking that are common to any well-trained researcher, detective, or investigative journalist (Sagan 1999; Park 2001, 2003). It helps us to test whether or not Szabo, Robert, Stevens, and the others really prove their point.

The tools include:

- 1 wherever possible there must be independent confirmation of the facts;

- 2 arguments based on authority are not sufficient (they can be wrong);
- 3 where possible, use quantification: avoid the vague and qualitative;
- 4 if there is a chain of argument, every link must work;
- 5 use Occam's Razor: where there are competing hypotheses to explain the same facts, use the simplest;
- 6 see if the hypothesis can be falsified. Check out assertions.

In this work we use these tools. Among other approaches we place an emphasis on measurement, geographical analysis and environmental analysis as analytical tools. We ask such questions as: given what is known about U-boat performance, and knowing when *U-530* and *U-977* left Germany, could either of them have visited both Antarctica and Argentina in the same voyage? Given what is known about sea ice, could any submarine have visited Antarctica in the middle of the southern winter (May-July) of 1945? Given what is known about where and when the secret nuclear explosions took place, could they have been directed against the supposed German base? Where was the supposed German base and what did it look like?

We also look in detail at the precise timing and geography of various Antarctic operations. Was there sufficient time for *Schwabenland* to have built a base in the Mühlig-Hofmann Mountains in 1939? Did Operation Highjump visit Dronning Maud Land and if so did it spend any significant amount of time there? Were British forces active in Dronning Maud Land during the war?

By these various means we aim to expose the fallacy of reasoning of Szabo, Robert, Stevens, Farrell, Bernhart, Friedrich, Mattern and others, and to convince the reader that the supposed mysteries surrounding German, British and American activities in Antarctica in this period result from a combination of inadequate research, vivid imagination, pure fakery and wishful thinking.

When the mysteries disappear, so too do the conspiracies. But that is as it should be. After all, as Sagan (1999: 210) reminds us: 'It is not whether we like the conclusion that emerges out of a train of reasoning, but whether the conclusion follows from the premise or starting point and whether that premise is true.'

### The German Antarctic expedition of 1938–1939

The German Antarctic Expedition of 1938/39 (Fig. 2) was led by Captain Alfred Ritscher. It was not a military expedition, and Ritscher was not a military man, even though he was on the staff of the Kriegsmarine, the German naval high command. He served the navy in a civilian capacity. He had been loaned to the expedition because he was one of Germany's most experienced polar (Arctic) explorers, a mariner, and an accomplished aircraft pilot. The expedition left Germany on 17 December 1938, and was active along the Dronning Maud Land coast only from 19 January to 15 February 1939. *Schwabenland* was



Fig. 2. The seal of the German Antarctic expedition 1938–1939.



Fig. 3. *Boreas* flying boat on *Schwabenland*'s catapault (Courtesy Lufthansa).

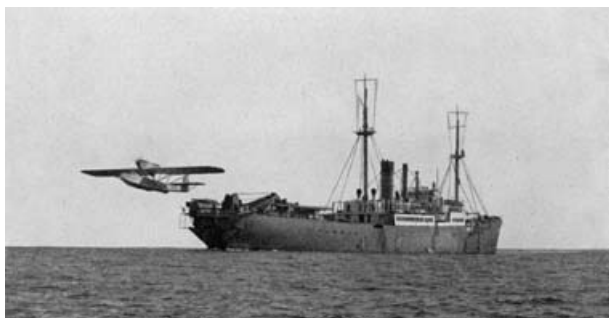


Fig. 4. *Schwabenland* launching a flying boat (from Ritscher 1942: 48, Fig. 14).

an 8000-ton floating airport, equipped to catapult flying boats into the air, and to crane them out of the water once they had landed on it, and with full servicing and fuelling facilities (Figs. 3, 4). It belonged to the German airline, Lufthansa, whose crews piloted and maintained the Lufthansa planes during the expedition (Ritscher 1942; Lüdecke 2004; Sullivan 1957; Mills 2003: 552–554).

To ensure that the expedition sought a whaling base in the right area, the crew included a seasoned whaler, Otto Kraul, who had worked in this region (Kraul 1939). Kraul

was also the ice pilot, and contributed a section on ice conditions to the expedition report (Kraul 1942). As well as Kraul, there was a complement of scientists.

The *Schwabenland*'s initial results were widely described in the German scientific literature (Deutsche Seewarte 1939; Wohlthat 1939; Ritscher 1942), and also in popular accounts by Kraul (1939) and Herrmann, the expedition's geographer (Herrmann 1942). However, with the outbreak of war on 1 September 1939 the work remained incomplete, and the results were spread much less widely internationally than they might otherwise have been. Even after the war many of the publications concerning the expedition were in German (Ritscher 1946, 1948, 1958; Brunk 1986, 1987; Lüdecke 2004), although there were some references to the expedition in English (for example Sullivan 1957: 124–128), and Kraul's (1939) book was translated into other languages. Nevertheless, crude plots of the mountains mapped by Ritscher and his crew were quickly made available, and appeared on new maps of Antarctica (Bayliss 1939; Bayliss and Cumpston 1939; US Hydrographic Office 1943). The expedition reports were read by Swedish scientist Hans Ahlmann in the early 1940s, and led him to form a proposal in 1945 for an international expedition that became the Norwegian/British/Swedish Antarctic (NBSA) Expedition of 1949–52 (Gjaever 1954). The German maps were used to guide the NBSA Expedition, and, later, the expeditions of countries planning to set up bases in Dronning Maud Land.

While *Schwabenland* steamed along the coast taking soundings and collecting marine samples, its two ten-ton Dornier-Wal flying boats, *Boreas* and *Passat*, conducted the first systematic aerial photographic survey of Dronning Maud Land, and indeed one of the first such surveys anywhere in Antarctica, flying over the hinterland between latitudes 69°S and 74°S, and longitudes 5°W and 18°E (Brunk 1987). It was later realised that in the absence of supporting ground-truth measurements, the topographic maps made from the aerial photographs were somewhat inaccurate, with peaks being out of position by up to 50 km and too high by up to 1000 m (Gjaever 1954). The maps were corrected in the mid-1950s (Ritscher 1958), based on ground-truth data supplied by the NBSA Expedition, and again in the 1980s, by Brunk (1986, 1987), who compared the expedition photographs with LANDSAT satellite photographs to establish where the planes had flown. In this paper we use the corrected heights.

The expedition discovered that most of the north coast was an ice cliff some tens of metres high at the seaward edge of a 100 km-wide, flat ice shelf floating on the ocean at around latitude 70°S. The ice shelf was the floating edge of a massive ice sheet that rose steadily towards the South Pole and culminated in a plateau at a height of around 2500–3000 m. The smooth rise of the ice sheet towards the polar plateau was interrupted here and there by a few nunataks, then, at around the 1500 m contour, by a vast east-west trending range of rocky mountains



Fig. 5. *Boreas* moored at the edge of the ice shelf. (Photo Courtesy: Scherl/SV-Bilderdienst).

at around latitude 72°S, some 200–250 km inland from the seaward edge of the ice shelf (Fig. 1). The snow-mantled, exposed, rocky peaks rose 500 to 1000 m above the ice sheet, reaching a maximum height of 3,148 m at Jökulkyrka in the Mühlig-Hofmann Mountains (Mills 2003). To their surprise, the expedition discovered near the coast a 34 km<sup>2</sup> area of exposed rock containing several small ice-free lakes, which they named the Schirmacher Oasis, after the pilot who discovered it (Ritscher 1942).

Only three landings were made, all on the ice shelf. In each case small groups of people landed either from a ship's boat or from one of the ship's two aircraft, for brief visits of less than one day (Ritscher 1942; Fig. 5).

Prior to the German expedition, most exploration in that area had been carried out by Norwegians and had been confined to the coast (Christensen 1935, 1939; Royal Geographical Society 1939; Mills 2003: 535, 549). The mountains had not been seen. When the German expedition sailed for Antarctica, Norway decided formally to lay claim to the region on the basis of their prior discovery of much of the coast. This was done on 14 January 1939 (Giaever 1954; Lüdecke 2004). Nevertheless, as planned, the expedition placed German flags at a few strategic points on the coast, and dropped swastika flags from aircraft over the hinterland as the basis for a claim to what Germany would refer to as Neuschwabenland. According to Giaever (1954) the Germans succeeded in keeping their expedition a secret until an official announcement was made on 9 March 1939 that it had discovered and surveyed a large area of Antarctic and mapped the area from aircraft.

Perhaps because of the Norwegian claim, no German claims for annexation of the territory were advanced. Indeed, the advent of the Norwegian claim seems to have set the Germans off in a different direction, because shortly after *Schwabenland* returned to Germany, plans were discussed to return to Antarctica in the southern summer of 1939–1940 to visit the Pacific sector between 80°W and 130°W (Lüdecke 2004: 86). At that time, the coast in that area was unclaimed by any country.

### The supposed German Base

There is no mention in any of the German documents of any intention to establish a base during the expedition of 1938–1939, nor that any attempt was made to do so at that time or afterwards (Deutsche Seewarte 1939; Wohlthat 1939; Ritscher 1942, 1946, 1948, 1958; Kraul 1939, 1942; Herrmann 1942; Lüdecke 2004). Furthermore, the claims by Szabo (1947), Mattern and Friedrich (1975), Friedrich (1979), Stevens (1997, 2003) Farrell (2005) and Robert (2005c) that the expedition established a secret German base in Dronning Maud Land would appear to be entirely speculative because they differ from one another as to the location of the supposed base, and as to the timing and manner of its construction, because one of them has fabricated the evidence, and because none of them are able to cite original literature sources in support of their claims. For instance (in date order):

1. Szabo (1947: 185) surmised that the ice-free Schirmacher Oasis, located close to the coast near longitude 12°E on the eastern side of Dronning Maud Land (Fig. 1), would have made an ideal refuge. He goes on to claim that an initial coastal base was established by the German Antarctic Expedition, that it was then used by German raiding ships in the South Atlantic, and that it collected material brought by submarines for the construction of a base in the interior (Szabo 1947: 161–163).
2. Mattern and Friedrich (1975: 72) suggested that the supposed German base lay in a broad area centred on 75°S and 40°E (that is well to the east of the area shown on the map in Fig. 1). Their hypothesis required the base to have been attacked in 1947 by the US planes of Operation Highjump, and so it had to lie under the area flown over by those planes, in order to for their story to be internally consistent. That location is at odds with their statement that the supposed base was in the area surveyed by the German Antarctic Expedition, which went no further east than about 15°E.
3. As part of his attempt to establish that the Germans built a base in the area, Friedrich (1979) faked photographic evidence as the basis for a claim that one of the German survey aircraft landed on one of the lakes in the Schirmacher Oasis. The photograph on Friedrich's p. 65, captioned 'Flying boat anchored on one of the warm water ponds', is a copy of a photograph taken at the edge of the sea ice and displayed by Herrmann (1942: 164–165) with the caption 'Das erste deutsche Flugzeug ist am Rande des Südpolkontinents gelandet', which translates as: 'The first German aircraft has landed at the border of the South Pole continent.' Mattern and Friedrich (1975: 189) try a similar approach, with a photograph captioned 'German flying boat on the ice-free oasis, warm

- water lakes'. The photograph shows the seaplane moored at the edge of a flat expanse of ice that is as high as the top of the aircraft's fuselage, with men standing on the ice and looking down at it. Given what is known about both the coastal ice shelf and the Schirmacher Oasis (for example see Borman and Fritzsche 1995), it is clear that the picture shows the flat, thick, ice shelf abutting the ocean, and not a lake in the Oasis. Indeed an almost identical photograph, known to be from the edge of the ice shelf is given in Schön (2004: 57) and a further example is presented as Fig. 5. The German expedition's aircraft logs confirm our interpretation (Ritscher 1942: 263–264). None of the lakes was big enough to land a plane on. That disappointed Ritscher, who flew over the oasis and noted that it provided favourable conditions for a logistical base for future Antarctic research activity (Borman and Fritzsche 1995: preface).
4. Landig (1980) placed the base close to longitude 12°E in the Wohlthat Massif (Fig. 1) between the Conrad Mountains in the west and the Ritscher Peak in the east, inland from the Schirmacher Oasis, and east of the Mühlig-Hofmann Mountains.
  5. Buechner and Bernhart (1989: 188) state that in 1945 men from *U-530* visited a very special natural ice cave that had been discovered in the Mühlig-Hofmann Mountains by the Ritscher expedition of 1938–1939, the entrance of which had been reinforced with steel walls and stairs by a later expedition in 1943. While one might assume that these authors knew what they were talking about, since one of them (Bernhart) claimed to have served on a submarine (*U-530*) which carried treasure to this cave in 1945, and to have retrieved it in May 1979, the reader should note that they contradict their claim that Ritscher discovered the caves by writing that 'Shore parties from early U-boat expeditions had discovered one or more natural ice caves in the Mühlig-Hofmann Mountains' (Buechner and Bernhart 1989: 147).
  6. Stevens (1997: 48) states that the base was at 71°30'S, 14°51'W, which is near the Wohlthat Mountains and the Schirmacher Oasis, and about 150 miles from the Mühlig-Hofmann Mountains. As can be seen from Fig. 1, this is on the gentle open slopes of the ice sheet about half way between the Schirmacher Oasis and the Wohlthat Massif. With regard to timing, Stevens (2003: 246) cites a report claiming that: 'during the war repeated trips were made to this vicinity at which time a permanent base was established there'. In support he cites German novels by Landig (1980, 1991), which, he indicates, describe 'this and other secret post-war German bases in Antarctica' (Stevens 2003: 246).
  7. Having stated that 'the Nazi outpost . . . was rumoured to have existed amid the Mühlig-Hofmann Mountains', Robert (2005a, 2005c) goes on to state that it was located within 320 km (200 miles) of where the British built their own secret wartime base. So that must first be found. According to Robert (2005a), the British named their base 'Maudheim'. We refer to this supposed wartime British base as 'Maudheim-1', to avoid confusion with the base of the NBSA Expedition of 1949–52, which was also named Maudheim (located in Fig. 1; and see Giaever 1954; Swithinbank 1999). Robert (2005a) states that: 'The base at Maudheim [that is 'Maudheim-1' as referred to above], near the Mühlig-Hoffmann Mountain Range in Queen Maud Land . . . was so secret that it was never given a name or even a grid reference on official maps'. Nevertheless, he confirmed its location in a personal communication to one of us (P.B. 26 October 2005) as follows: 'the coordinates for the 1945/46 expedition are presumed to be the same as the joint British/Swedish/Norwegian expedition 1949/52.' (that is Maudheim in Fig. 1). Thus Robert assumes that the alleged wartime 'Maudheim-1' and the actual NBSA Expedition's Maudheim were in the same place. That is hard to believe given that the NBSA Expedition stumbled upon their site by chance in February 1950, and there is no evidence that they found any sign of previous occupancy in the area (Giaever 1954; Swithinbank 1999). In any case, the supposed German base cannot both be in the Mühlig-Hofmann Mountains and at the same time within 320 km (200 miles) of Maudheim, as the Mühlig-Hofmann Mountains are at least 440 km east of Maudheim between longitudes 7.5°E and 0°E (Fig. 1). The reader must judge the reliability of Robert's anecdotal testimony, which comes from 'a story dispensed by a wartime SAS officer' (Robert 2005a, 2005b).
  8. With regard to timing, Robert (2005a) states that: 'a month after hostilities had commenced in Europe, the Germans returned to Neuschwabenland to finish what had been started, with many suggesting that a base was being constructed.'
- Clearly there are almost as many opinions as to the location of the supposed base as there are authors writing about it. Equally, while several authors seem to agree that construction might have been started by Ritscher (in early 1939), opinions differ as to when construction continued (for example, in late 1939, a month after hostilities began in Europe, 'in 1943', or throughout the war). According to Buechner and Bernhart (1989: 145) the idea that U-boats plied back and forth between Germany and Neuschwabenland carrying cargo and shore parties to the base 'has not been verified.'
- Several of the claimants support their claims by appealing to either one or two statements attributed to

Admiral Dönitz. In the first quotation, Buechner and Bernhart (1989: 154) tell us that, in 1943, Dönitz said ‘The German submarine fleet is proud of having built for the Führer, in another part of the world, a Shangri-La on land, an impregnable fortress’. Much the same quote appears in Szabo (1947: 128), Barton (1960), Mattern and Friedrich (1975: 44), Beuchner and Bernhar (1989: 172), Stevens (1997: 2), Robert (2005b), and Farrell (2005), each of the later authors appearing to have copied from an earlier one. In the second quotation, Robert (2005b) tells us that: ‘Dönitz made a statement in 1946, supposedly during his trial at Nuremberg, boasting of an “invulnerable fortress, a paradise-like oasis in the middle of eternal ice”’. Farrell (2005) used this same quotation, taking it from Stevens (1997: 2) who in turn took it from Mattern (1974). None of these authors cites any original published source for the quotes, so whether or not Dönitz made the statements attributed to him remains to be seen. Even if he did, he could just as well have been referring to the Arctic as the Antarctic.

How feasible is the notion that among its many other tasks *Schwabenland* and its crew had the time to build a base either at the coast or 250 km inland in the Mühlighofmann Mountains? It took the NBSA Expedition 18 days to build their first hut at their Maudheim base in February 1950 (Gjaever 1954). They had the use of ‘weasels’ with caterpillar tracks for moving equipment. It took Amundsen’s south polar party 14 days to build their hut at their Framheim base in January 1911 (Amundsen 1912). They had the use of sledges, and 80 dogs. In contrast, *Schwabenland* was only off the coast for one month. The ship’s logs and other publications show that it spent most of its time steaming up and down and launching and retrieving flying boats, and the rest taking marine samples (Ritscher 1942; Hermann 1942). There would have been little time for it to offload the stores and equipment needed to build a base either at the coast or inland. Indeed, before the first plane had flown inland the Germans did not even know there was a mountain range in which to build a base. Theirs was a voyage of discovery in which they made their maps as they went along. And without a map it is not possible to plan to build a base.

As there is no evidence that the ship carried either motorised equipment or dogs, the building of a base in the mountains would mean that the crew had to do as Scott and Shackleton did, and, once they knew from the aerial photos where the mountains were, walk towards them across unmapped, dangerous, crevasse-ridden terrain tugging their stores and equipment behind them. Scott and Shackleton made about 24 km a day on good days on their South Pole treks (Solomon 2001: Fig. 43), and that was often with the benefit of supply depots previously laid. The authors calculate that under the best of circumstances, and without heavy loads, it would have taken the German crew, given their inexperience, at least 10 days to get to the mountains and another 10 to get back, leaving them less than 10 days to build a mountain base. If they had to transport the heavy equipment too, the exercise would

have taken them much longer. None of this seems likely, not least because until the aerial survey had finished there would have been no map to guide them. In any case the only sledges on the expedition seem to have been those that each aircraft carried in case of accident (Ritscher 1942). The crew would have stood a higher chance of building a hut near the coast, but there is no sign from the official or unofficial reports of the expedition that they brought with them the materials to do so.

Our analysis neglects the possibility that the aircraft did not merely do survey duty but also acted as transports carrying people and equipment into the mountains. The aircraft were not large, and, at most, might carry a load of 10 people. Photographs from the expedition reports and from Lufthansa and German Newspaper files clearly show that the expedition’s flying boats, were not equipped for landing on solid surfaces. A Dornier-Wal had been known to take off from an ice floe, when Amundsen and Ellsworth and their colleagues were stranded near the North Pole in May-June 1925 (Amundsen 1927). But that was in an emergency after Amundsen’s aircraft had first landed on the water, only to find that the leads closed up. It is unlikely in the extreme that *Boreas* or *Passat* landed on the unmapped inland ice among the mountains, and there is no evidence in the written reports or photographs that they did so.

The authors conclude that time, lack of maps, and ice conditions (hidden crevasses) would have militated against any attempt to build a base in the mountains during the expedition’s short time in the area, and that the most that could have been achieved would have been to build a coastal hut of some kind, for which there is no evidence whatsoever. Our conclusion is consistent with the German documents (for example Deutsche Seewarte 1939; Ritscher 1942; Hermann 1942; Lüdecke 2004), which make it plain that the task for 1939 was reconnaissance. Similarly, the claim that the Germans returned in the southern summer of 1939/40 or later to continue work on the hypothetical base is not supported by the German scientific or historical literature.

Aside from the location and the timing, we need to consider the scale of the operation. Szabo (1947: 162, 163, 173) surmises that the refuge would have been vast, serving several hundreds if not some thousands of people who, if Germany lost the war, could continue to make powerful new weapons for an eventual resurgence. Buechner and Bernhart (1989: 156) state that ‘by the middle of 1940 submarines were bringing in vast stores of food, clothing, fuel and every other conceivable item necessary for setting up Hitler’s refuge. Construction materials, tractors, arms, distillation apparatus, machinery, radio equipment, personnel, engineers and scientists were included. During the next four years shelters were built and a mountain was scooped out.’ Stevens (1997: 39) indicates that the base was a very large permanent facility tunnelled out of solid rock and supplied by U-boat and flying disc. Robert (2005a, 2005b), citing the alleged last survivor of a British SAS raid on the base, tells us that



the base was in 'a vast underground cavern that was' apparently 'warmed geothermally'. 'In the huge cavern were underground lakes. . .The Nazis had constructed a huge base into the caverns and had even built docks for U-boats, and one was identified supposedly.' There were also: 'hangars for strange planes and excavations galore had been documented. . .The power that the Nazis were utilising was by volcanic activity, which gave them heat for steam and also helped produce electricity. . .we were overwhelmed by the numbers of personnel scurrying about like ants. . .huge constructions. . .were being built. . .the Nazis, it appeared, had been on Antarctica a long time'.

Do these tales carry any credibility? Let us focus on Robert's tale, the source for which was a supposed SAS man who Robert states, in a personal communication to one of us (P.B. 26 October 2005) he is not permitted to name because he (Robert) works for the UK's Ministry of Defence. The reader may find it odd that while Robert (2005a) says that: 'the last survivor gave me the following account', he told one of us in the personal communication referred to above that 'the story of the SAS Officer was one that was told to me by a close relative (now deceased)'.

Perhaps his tale might seem a little more believable if there exists any geological evidence for geothermal activity in this part of Antarctica. There is none. The idea that there was some comes from Herrmann, the German expedition's geographer, who thought that the ice-free lakes in the Schirmacher Oasis must be heated geothermally by volcanic emanations from within the Earth. In Herrmann (1942: 164), he surmised that a line of weakness in the Earth's crust ran down the middle of the Atlantic through the volcanoes of Jan Mayen, the Azores, Ascension, Tristan da Cunha, and Bouvetøya, and assumed that it continued south to cross Dronning Maud Land more or less through the Schirmacher Oasis to connect with Mount Erebus on the other side of Antarctica. He was partly right and should receive credit for this early insight. The volcanoes of the central Atlantic do indeed lie along a rift in the earth's crust between two tectonic plates: the American Plate and the African Plate. This is, of course, the median rift zone of the Mid-Atlantic Ridge. As well as active volcanoes it boasts abundant hydrothermal vents of hot water (German and others 1996). Unfortunately for Herrmann's theory, the Mid-Atlantic Ridge stops at a T-junction in the mid-ocean ridge system at around latitude 54°S, close to the island of Bouvetøya (see German and others 1996: Fig.10.1; *Times Atlas* 2000: 32–33, plate 122). The mid-ocean ridge system reaches no further south than 60°S in this area, which means that its volcanoes and hydrothermal fluids are all more than 1200 km north of Dronning Maud Land. In addition, while there are volcanoes in Antarctica, for example Mount Erebus in the Ross Sea and Deception Island off the Antarctic Peninsula, no volcanic or geothermal activity has been reported from Dronning Maud Land (Tingey 1991). Those who follow Herrmann's geothermal theory (for example Friedrich

1979; Stevens 1979, 2003; Farrell, 2005) are therefore misguided

Friedrich (1979: 71), later copied by Robert (2005b), supposed that Herrmann's line of volcanic weakness was associated with a deep sub-sea trench that would make an excellent deep-sea route for U-boats to enter Antarctica. As this volcanic line does not run through Dronning Maud Land, the trench cannot do either. Nevertheless, there are likely to be channels cut into the seabed under the ice shelves by glaciers or melt waters when sea level was lower at the peak of the last ice age around 20,000 years ago. Such channels are well mapped in the Ross Sea and Weddell Sea, but less well mapped elsewhere because of the difficulty of making soundings beneath ice shelves (Anderson 1991, 1999; Bentley 1991). As mentioned above, the ice shelves are seaward extensions of the ice sheet. They are quite thick: the one beneath the NBSA Expedition's Maudheim base is around 200m thick (Giaever 1954; Giaever and Schytt 1963; Swithinbank 1999). And they thicken landward, while, beneath them, the seabed rises towards the coast. Eventually the rising seabed and the deepening ice shelf meet near the coast at the so-called 'grounding line'. The channels in the seabed become filled with ice where they extend beyond the grounding line into the continent so do not provide routes for submarines. In any case, U-boats could not have penetrated under the ice shelves to reach the submerged coast of Dronning Maud Land, because the grounding line is commonly between 300 and 1000 m deep, beyond the 250 m depth range of World War II U-boats. Besides, such a descent would be foolhardy in the extreme, in the absence of maps of the shape of the seabed and of the under-side of the ice shelf. Not only is there no way in for a U-boat, it also seems highly unlikely (given everything we know about the preferential locations of U-boat pens along the European coast) that the Germans would have wished to go to the enormous trouble of taking their U-boats into lakes in the mountains some 200 km inland from the sea.

There are indeed lakes beneath the ice sheet, but they do not occur in caves. They are pools of water in depressions in the rock beneath piles of ice more than two kilometres thick. There they form at the boundary between rock and ice by the combination of slow heating from the Earth below, and the pressure of the mass of ice above (Hansom and Gordon 1998; Stonehouse 2002; Bell and others 2006). There is no air space above these lakes; one could not live down there.

Without vast caverns containing underground lakes and geothermal sources, for all of which there is no evidence, Robert's SAS man's story appears purely fictional. Under the circumstances it would appear that Szabo's statements about a possible base were pure invention, a shaky foundation that others have built on like a house of cards.

Finally, it is worth reflecting on the fact that Dronning Maud Land has been extensively visited by well over 1000 scientists, none of whom has reported finding any sign of

a wartime German base. The NBSA Expedition of 1949–1952 was followed by the IGY of 1957–1958, during which Norway and Belgium had bases in Dronning Maud Land. Since then the number of bases there has quadrupled (Fig. 1). There is considerable air traffic and the whole region has been mapped by Landsat (Brink 1987). While some might argue that by now the supposed base would be buried by snow, it should be remembered that the interior of Antarctica is practically a desert. Precipitation is highest near the coast, not in the mountains where the wind prevents accumulation and where the base is supposed to have been located (for example see Ohta 1999).

### Operation Tabarin

Robert (2005c) states that: ‘The existence of a Nazi Antarctic base hidden in vast caverns was considered feasible enough for the British to set up bases in many parts of Antarctica during the war in response to the threat.’ The British forces were part of Operation Tabarin (Robert 2005a), and ‘The known British bases were mainly on the Antarctic Peninsula. . .and on the islands surrounding the peninsula. . .though some were set up on the continent.’ Robert (2005c) argues that one of these bases, of which there is no record, ‘concentrated on investigating Queen Maud Land.’ This is the base that we refer to as ‘Maudheim-1’ (see above). Robert (2005a) claims that the Germans attacked what we call ‘Maudheim-1’ in July 1945, and that the SAS came to the rescue, spending ‘Christmas of World War II. . .in 1945, fighting the. . .Nazis.’ The reader should note that by Christmas 1945 the war with Germany had been over for seven and a half months.

We can check Robert’s suggestions against what is published about Operation Tabarin (for example see James 1949; Fuchs 1982: 22–54; Headland 1989, *In press*; Squires 1992; Stonehouse 2002; Mills 2003). Although Tabarin was secret at the time, these subsequent publications have made its activities plain. The expedition members left London in November 1943 bound for the Falklands. From there, they sailed for Antarctica on 29 January 1944, heading for Deception Island, in the South Shetland Islands, to set up Base B. They reached the island on 3 February. Having established a shore party, they then sailed for Hope Bay at the tip of the Antarctic Peninsula to establish Base D. Foul weather ruined that plan. Instead they established Base A, on Goudier Island in Port Lockroy, an embayment on the south coast of Wiencke Island, in the Palmer Archipelago west of the Antarctic Peninsula. The expedition’s two ships left Port Lockroy on 17 February 1944, and one returned in March with fresh stores. Base D was established at Hope Bay between 12 and 28 February 1945.

These bases were tiny. There were 5 people on Deception Island in 1944, 4 in 1945, and 4 in 1946; there were 9 at Port Lockroy in 1944, 4 in 1945, and 4 in 1946; there were 13 at Hope Bay in 1945, and 8 in 1946 (Fuchs 1982: 347). Each had a crew of naval observers,

wireless operators, and scientists, the government seeing this as an opportunity to continue scientific studies similar to those of the British Graham Land Expedition of 1934–1937. The main activities were scientific and were thought essential to support Britain’s territorial claims.

After the war, in July 1945, Operation Tabarin became a civilian activity, the Falkland Islands Dependencies Survey (FIDS) (Fuchs 1982: 55). The programme of scientific work continued unabated, as did the regular visits to bases to supply them with fuel and food and to exchange personnel. New bases were created, notably Bases C (Cape Geddes) in January 1946, E (Stonington Island) in February 1946, F (Argentine Islands) in January 1947, G (Admiralty Bay) in January 1947 and H (Signy Island) in March 1947 (Fuchs 1982: 55–91). The pattern of establishing and revisiting bases, which began in 1944, and which Robert (2005a, 2005c) regarded as deeply significant and mysterious, is merely that required for the operation of bases in the region.

There is no hard evidence to support Robert’s (2005a, 2005b, 2005c) assertion that Operation Tabarin established any base on the coast of Dronning Maud Land. Indeed, it is highly unlikely that the British would consider a base there, because it was under a Norwegian claim and well outside the boundary of the UK’s Falkland Island Dependencies. Our analysis also confirms that Robert (2005c) was wrong to claim that: ‘Britain sent no missions [to Antarctica] from the commencement of Highjump [late summer 1946] until 1948, during which time the US had Antarctica all to itself.’ In fact, in 1947, when Operation Highjump was active in the Ross Sea area (see below), there were five civilian British bases operating in West Antarctica (Fuchs 1982).

What is the evidence for any SAS involvement in the region? Were SAS men in the Falkland Islands in October 1945 as Robert (2005a, 2005b, 2005c) claims? A biography of the former Commander of 1st SAS Regiment, Lt. Col. B. Mayne, suggests (wrongly) that he arrived in the Falklands in September 1945 (Dillon and Bradford 1987). More careful subsequent research by Ross (2003) based on Mayne’s diary and the Mayne family papers, shows that Mayne did not arrive in the Falkland Islands until January 1946. He was accompanied by Majors J. Tonkin and M. Sadler, both from the SAS. These three men had been demobilised from the Army when the SAS Regiment was disbanded in early October 1945. Sensing a challenge in working in Antarctica, they had signed civilian contracts for 2 years with the newly formed FIDS. Mayne arrived in Montevideo *en route* to the Falklands on 8 December 1945, Sadler and Tonkin a little later. Mayne was to be second in command of the expedition that would relieve the existing Antarctic bases and set up new ones. The expedition left Montevideo for the Falklands in three groups: on 21 December, 26 December (with Sadler) and 30 December (with Mayne and Tonkin). Mayne and Tonkin arrived in Port Stanley on 3 January 1946. They sailed from there on 9 January and relieved Deception Island on 13 January and Port

Lockroy on 17 January before returning to Port Stanley on 23 January. Suffering from intense back pain from an old injury, Mayne was hospitalised in Port Stanley. Being unable to continue the work, he left for the UK, arriving home in March 1946 (Ross 2003).

Tonkin and Sadler helped to set up a new scientific base on Stonington Island, in Marguerite Bay, on the west coast of the Antarctic Peninsula, in February 1946. Sadler was still there in the southern summer of 1947 (Fuchs 1982: 347).

If Robert believed Dillon and Bradford's (1987) tale, he might have assumed that SAS men could have been training on the Falklands in October 1945 for an Antarctic mission. It would seem highly unlikely that there was another set of SAS personnel on the Falklands at about the same time as the Mayne group. Indeed, if there had been, it would have been highly unlikely that Mayne would have omitted to mention it in his diary or that it would not have been noted by his biographer.

Robert's (2005a) unsubstantiated anecdote that SAS soldiers were active in the region in October 1945 through the Christmas period, and that following their Christmas 1945 mission, 'the British survivors were de-mobbed from the forces' does not fit the facts. SAS activity of any kind in the region is not feasible given that the SAS Regiment was disbanded in October 1945, and was not reconstituted until 1948.

In summary, the authors believe that Robert is wrong on all counts. The British were not doing anything mysterious in Antarctica during or immediately after World War II. They did not establish a wartime base in Dronning Maud Land, nor did they send the SAS to it from the Falkland Islands at the end of 1945. In any case, such an operation could not have been part of Operation Tabarin, which had been passed from the navy to the civil sector (Colonial Office) in July 1945. Nor could it have been an SAS operation, the SAS having been disbanded in October 1945.

#### Did *U-530* and *U-977* visit Antarctica?

It was Szabo (1947) who invented the story that these two submarines had shepherded a convoy that took Hitler to Antarctica. He did so to explain why it had taken the two submarines so long to reach Mar del Plata. His tale has been widely repeated, for example by Robert (2005a), among others.

The interrogation reports, and observations of *U-530* by the interrogators, tell us that *U-530* was a Type IX-C U-boat (Fig. 6, NARA 1985; Blair 1998). The correct denomination is Type IXC/40. These boats could reach 19 knots surfaced and 7.3 knots underwater, had a range of 22,150 km at 10 knots, and of 100 km submerged at 4 knots, and were depth rated to 230 m (Blair 1996, 1998; Wynn 1998; Sharpe 1997).

There is no hard evidence to support the proposition by Szabo (1947: 28–29) that *U-530* was not the 'real' *U-530* but a much faster larger boat. Buechner and Bernhardt (1989: 180), Stevens (1997: 27), and



Fig. 6. *U-530* in the harbour at Mar del Plata, Argentina. (Photo Courtesy of Daniel Mesa through Carlos Mey).

Farrell (2005), embellished that supposition, claiming that *U-530* was a fast modern Type XXI boat capable of 30 knots underwater (equivalent to 55 km/hour). In fact Type XXI U-boats could only reach a submerged speed of 32 km/hour, equivalent to 17.2 knots. In any case, only one Type XXI U-boat ever saw combat (Blair 1996, 1998; Wynn 1998; Sharpe 1997).

From the interrogation records, the captain of *U-530* was Lieutenant Otto Wermuth (NARA 1985; Blair 1998: 688). Szabo (1947: 25, 29) referred to him as Wermouth, but suggested, because the captain had disposed of the ship's papers before entering port, that this name could be a pseudonym, an idea copied by Mattern and Friedrich (1975: 70–71). Independent confirmation that the name was Wermuth arises from Schaeffer (1952). This was the captain of *U-977*, who records meeting the captain of *U-530* in Washington later in the year. There is no evidence to suggest that the captain of *U-530* was a Wilhelm Bernhard, as claimed by Robert (2005a). The name Wilhelm Bernhard or anything like it does not appear in the *U-530* crew list provided by the Argentine Navy in 1945 (Szabo 1947: 13–14). Indeed, Stevens (1997: 27) and Farrell (2005) suggest that Bernhard(t) was a 'pen-name' of a crewmember of *U-530*. This is the Bernhart of Buechner and Bernhart (1989) (see above).

According to the interrogation reports (NARA 1985; see also Szabo 1947), which were based on interviews as the ship's papers had been destroyed, *U-530* sailed from Kristiansand in Norway on 3 March 1945, spent 10 days at Horton in Oslo Fjord, then headed for the open sea on 13 March. Mattern and Friedrich (1975: 72) and Buechner and Bernhart (1989: 184–185) have *U-530* leaving harbour on 2 May; Robert (2005a) says that the departure date was 13 April. None of these authors offer any evidence in support of their claims, but having *U-530* leave on the same day as *U-977* (2 May, see below) is convenient for the notion that both boats were parts of a secret submarine convoy (Szabo 1947; Buechner and Bernhart 1989). Interrogation records have *U-530* operating off New York from 4 to 7 May. When Wermuth learned that Germany had capitulated on 8 May,



Fig. 7. *U-977* in the harbour at Mar del Plata, Argentina. (Photo Courtesy of Daniel Mesa through Carlos Mey).

he decided to flee to Argentina, which he thought would be friendly to Germans, leaving the New York area on the 10 May and arriving in Argentina on 10 July (Blair 1998; NARA 1985). The interrogators found no evidence to suggest that *U-530* had deposited treasure or passengers in Antarctica or anywhere else *en route* to Mar del Plata, nor that it had been part of a large submarine convoy on a secret mission.

Interrogators were told that the vessel had crossed the equator on 17 June (NARA 1985). Wermuth reported that they sailed submerged at first, then at 7.5 knots (13.9 km/hr) at the surface at night, and at 2 knots (3.7 km/hr) submerged during the day, as far as 20°S. There they surfaced and increased speed to just 9 knots, because faster speeds would have used too much of their fuel reserve.

Accepting these speeds and assuming that *U-530* had steamed for 6 hours on the surface at night and for 18 hours submerged during the day, then it would have taken 57 days to cover the 8500 km between New York and 20°S. The final 3300 km would have taken around 8 days, making a total voyage of around 65 days, which is approximately correct as the actual trip took 61 days.

According to NARA (1985), *U-977* was a type VII-C U-boat (Fig. 7). Its numbering makes it likely to have been a Type VIIC/41. These boats were capable of 17.7 knots surfaced and 7.6 knots underwater, had a range of 14,500 km at 10 knots (18.5 km/hr), and of 125 km submerged at 4 knots (7.4 km/hr), and were depth rated to 250 m (Blair 1996, 1998; Wynn 1998; Sharpe 1997). These details agree with information provided by the *U-977*'s captain (Schaeffer, 1952) and by Blair (1998).

*U-977* sailed from Kristiansand on 2 May 1945. With the end of hostilities on 8 May, Schaeffer, like Wermuth, decided to attempt to reach Argentina rather than be captured. Sixteen of his men opted to go ashore near Bergen, Norway on the night of 10 May. On the morning of 11 May, the boat with its crew reduced to 32 dived to skirt the UK, using a snorkel to secure air. A record 66 days later, when they were safely past the British naval base on Gibraltar, they surfaced. As they had little fuel, having been allocated only 80 tons in Oslo, they had to travel very slowly. From North Africa, they steamed south

on one of their two diesel engines while on the surface at night. During the day they ran on electric motors while submerged (Schaeffer 1952). They crossed the equator on 23 July, and surrendered in Mar del Plata, Argentina, on 17 August, with all of the ship's papers intact (NARA 1985).

*U-977* took 25 days to cross 5200 km of ocean between the equator on 23 July and Mar del Plata on 17 August. That requires an average speed of 4.7 knots, or 8.7 km/hr, which seems reasonable given the circumstances.

Crew lists for both vessels were provided by the Argentine Navy and reprinted by Szabo (1947: 13–14, 36) and by Mattern and Friedrich (1975: 70–72). Szabo (1947: 20, 40) was incorrect to assume that both submarines should have had crews of just 18–27 men, an assumption on his part that has been frequently repeated (for example by Buechner and Bernhart (1989: 184). The typical crew for a Type IXC U-boat (*U-530*) was around 54 men, and for a Type VIIC (*U-977*) it was 44 to 52 men (Blair 1996, 1998; Wynn 1998; Sharpe 1997). These numbers are consistent with the numbers seen (remembering that 16 men from *U-977* had been put ashore in Norway).

Apart from Wermuth having destroyed his ship's papers and military equipment, the only unusual thing about *U-530* was that it seemed to carry rather more cigarettes than might have been expected. According to Szabo (1947: 24) there were 540 'colis' of cigarettes ('colis' is French for parcel; the authors take it to mean cartons containing (say) 200 or so cigarettes in packets of 20). The volume of these cigarettes has grown with the telling. By the time we arrive at Friedrich (1979: 69), Szabo's 'colis' have grown to '540 large tin cans or barrels', and the text is accompanied by a photo of a submarine with oil drums on its deck, the implication being that these are drums full of cigarettes. Based on Friedrich's record of forging captions for photos of seaplanes (discussed above), this photo could, of course, be of any submarine.

The myth surrounding *U-530* and *U-977* is retold by Goodrick-Clarke (2002) in his comprehensive analysis of Nazi mythology. It is a pity that Goodrick-Clarke's otherwise careful analysis perpetuates the notions that both submarine left Kiel together on the 2 May (they did not), that there were far too many crewmen (the numbers were normal); and that *U-530* carried 500 large drums of cigarettes (it did not).

Consideration of dates, times and speeds suggests that neither *U-530* nor *U-977* had time to visit Antarctica. But, sailors can lie, and ship's logs can be forged. The question we ask here is: was such a visit physically possible under the conditions prevailing at the time?

All previous considerations have omitted to note that June, July and August are mid-winter months in the southern hemisphere. Could a submarine reach the coast of Dronning Maud Land, surface, and unload onto the ice shelf in mid-winter? The first obstacle would be the notorious Southern Ocean itself. The second obstacle would be the pack ice 1–2 m thick that surrounds

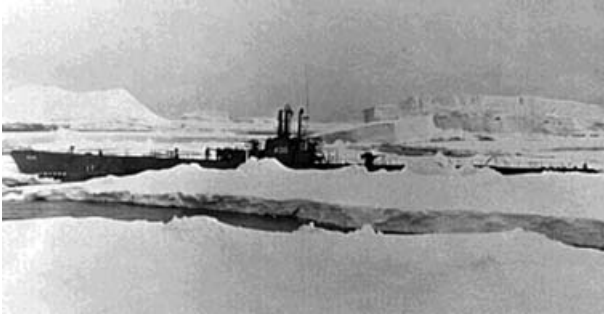


Fig. 8. USS *Sennet* in the ice during Operation Highjump. (Photo at <http://www.south-pole.com/sennet.htm>).

Antarctica during the winter. Satellite data collected by NASA (Gloersen and others 1992), and by India (Vyas and others 2004) show that off Dronning Maud Land the pack ice extends around 500 km out from the coast in late May and June, and 1665 km from the coast in July, August and September. To reach the coast and to return *en route* to Argentina, *U-530* would have had to travel about 1000 km under ice, and *U-977* would have had to travel about 3300 km under ice.

Is that feasible? U-boats did hide under sea ice to escape detection after attacking ships on the Russian coast during World War II. They also attacked ships from under the ice in the Gulf of St. Lawrence (Leary 1999). However, they did not go far under the ice. Under ice the main problem for *U-977* or *U-530* would have been access to fresh air, as was the case for Captain Nemo's *Nautilus* caught beneath the Antarctic ice in Jules Verne's *Twenty thousand leagues under the sea*. Without an independent air-producing capacity, diesel submarines are inappropriate for under-ice operations (Gimblett 2004). The snorkel of *U-977* would have been useless under ice. To secure fresh air, the boat would have had to force its way up through the ice to the surface at least every 2 days, because these boats lacked CO<sub>2</sub> scrubbers to clean their air. Once it had enough air it might theoretically have been able to submerge and continue its journey. Taking air stops into consideration, its average speed could not have been more than about 3–5 knots under the ice (J. Mason, personal communication, March 2006).

Could U-boats surface through 1–2 m of pack ice? Because of their low freeboard, World War II submarines could easily be damaged by pack ice. In the southern summer of 1947–1948, during Operation Highjump, the low-decked submarine USS *Sennet* was damaged by the movement of the summer pack ice (Fig. 8), and had to be helped to open water by the ice-breaker *Northwind* (Byrd 1947: 458; US Navy 1947; Sullivan 1957; Rose 1980). That was in a southern summer. Conditions would be far worse in an Antarctic winter, when fierce winds cause sea-ice floes to collide forming huge pressure ridges. Pressure between winter ice floes was the cause of the sinking of Shackleton's ship *Endurance* in the Weddell Sea in 1915 (Shackleton 1919). Furthermore, it would have been

difficult for any U-boat to punch up through ice, because such boats were typically not ice-strengthened (J. Mason, personal communication, 2006).

Navigation would also have been practically impossible. Even if *U-530* or *U-977* had surfaced through the ice, obtaining sun or star sights would have been difficult because of cloud. In winter at the NBSA Expedition's Maudheim base on the Dronning Maud Land coast the sun just rose to the horizon at around noon in May, and did not rise above the horizon throughout June and July (Hisdal 1960; Ohta 1999). The 24-hour darkness and the cloud cover would vastly increase the danger in navigating in ice close to a poorly mapped coast. Even seeing the 'coast' would have been difficult, because it comprises the 10–30 m high ice cliff at the edge of the ice shelf, which would be more or less invisible in the dark from the low deck of a submarine, not forgetting that the icy seas would be strewn with icebergs.

Supposing that *U-977* had reached the coast, what circumstances would have met the crew? The average winter temperature at the NBSA Expedition's Maudheim base was around  $-26^{\circ}\text{C}$  (Hisdal 1960). The average wind speed was 15 knots (Hisdal 1956) or about 28 km/hour. The wind chill induced by that wind speed combined with an average temperature of  $-26^{\circ}\text{C}$ , would have lowered the effective temperatures to  $-40^{\circ}\text{C}$ , not forgetting that there might be blizzards. Under these cold, dark conditions, the men at Maudheim in the southern winters of 1950 and 1951 sensibly stayed indoors for the whole of June, July, August and most of September (Gjaever 1954). Anyone landing from a submarine would have faced the most extraordinary difficulties in trekking 250 km across ice penetrated by hidden crevasses, in the dark and without navigational aids to a lair in the mountains where the temperatures would have been lower, down to  $-50^{\circ}\text{C}$  (Ohta 1999) and the weather worse.

The authors suggest that the 24 hour darkness, combined with the wide and dangerous belt of winter sea-ice, means that it would have been physically impossible for *U-530* or *U-977* to have gone anywhere near the coast of Antarctica in June, July or August 1945.

These same conditions, extensive sea-ice, permanent darkness, extensive cloud cover, and extreme cold would also have militated against Bernhart being able to retrieve Hitler's ashes from an ice cave in the Mühlig-Hofmann Mountains by air, in June 1979, as claimed by Buechner and Bernhart (1989: 233). Maps based on NASA satellite data clearly show that in June 1979 sea ice extended solidly from the Dronning Maud Land coast north to  $60^{\circ}\text{S}$ , and west right across the Weddell Sea (Gloersen and others 1992). That means that Bernhart's supposed sea-plane would not have been able to land in the Weddell Sea to re-fuel, or to land beside a supposed Dutch fishing boat off the Dronning Maud Land coast. Their tale is pure invention.

There is no hard published evidence from any reliable original source to show that *U-530* or *U-977* were part of a submarine convoy, nor that they (or any other part of

the alleged convoy) could have reached Dronning Maud Land in the southern winter of 1945.

### Operation Highjump

Several authors claim, with no supporting evidence, that the USA sent Operation Highjump to Antarctica in 1946–1947 to eradicate the secret German base in Dronning Maud Land (for example Szabo 1947: 200, 201; Mattern and Friedrich 1975: 96; Buechner and Bernhart 1989; Stevens 1997, 2003). For example, Buechner and Bernhart (1989: 229, 231) suggest that the interrogation of the crews of *U-530* and *U-977* in 1945 had disclosed that the Germans had built massive underground complexes in Antarctica for the manufacture of advanced aircraft and other weapons. The US had then organised Highjump to locate and destroy this secret operation. Mattern and Friedrich (1975: 96) claim that Admiral Byrd said that Highjump's objective was 'to break the last desperate resistance of Adolf Hitler, in case we find him in his Neuberchtesgaden inside New Schwabenland in the Queen Maud Land region, or to destroy him.' No source is given for the quote. Referring to Stevens (1997: 52), Farrell (2005) tells us 'Outfitted for a stay of eight months, the expedition encircled the German-claimed territory of Neuschwabenland, Admiral Byrd stationing the naval vessels off the coast, and then advanced the ground troops and aerial reconnaissance from the pole toward the German territory. Allegedly the German "base" was quickly found, overflowed, and either an American flag, or a bomb, depending on the version of the story, was dropped on the position.'

The problem with all of these tales is that they link the interrogations of German submariners in mid to late 1945 to the apparently sudden interest of the USA in Antarctica in mid 1946, without considering other possible reasons for that US interest, or the long standing Antarctic interests of well-known US polar explorer Rear-Admiral Richard Byrd.

Operation Highjump was the largest ever expedition to Antarctica, comprising just over 4700 men, with 33 aircraft, on 13 ships including the coastguard ice-breaker *Northwind*, an aircraft carrier (USS *Philippine Sea*) and a submarine (USS *Sennet*) (Byrd 1947; US Navy 1947; Sullivan 1957; Bertrand 1967, 1971; Rose 1980; Mills 2003). Authorised on 26 August 1946 by Admiral Chester Nimitz, it was a US Naval operation that took place in the southern summer of 1946–1947 under the command of Rear-Admiral Richard H. Cruzen, with Rear-Admiral Byrd (retired) acting as Officer-in-Charge of the Project (US Navy 1947). Highjump's objectives (US Navy 1947) were:

- (a) training personnel and testing equipment in frigid conditions;
- (b) consolidating and extending United States sovereignty over the largest practicable area of the Antarctic continent (This was publicly denied as a goal even before the expedition ended);

- (c) determining the feasibility of establishing, maintaining and utilising bases in the Antarctic and investigating possible base sites;
- (d) developing techniques for establishing, maintaining and utilising air bases on ice, with particular attention to later applicability of such techniques to operations in interior Greenland, where conditions are comparable to those in the Antarctic;
- (e) amplifying existing stores of knowledge of hydrographic, geographic, geological, meteorological and electro-magnetic propagation conditions in the area;
- (f) supplementary objectives of the Nanook expedition. (The Nanook operation was a smaller equivalent conducted off eastern Greenland.)

Highjump was primarily a military operation, and not a scientific expedition. It was one of a series of military operations designed to train the navy in polar operations. Polar training was regarded as a strategic imperative by US military planners who saw the Soviet Union as a threat, and an Arctic war as likely. The overall strategic goal is confirmed in books by Sullivan (1957) and Rose (1980) and in articles by Bertrand (1967, 1971). Rose (1980: 34) states that from the US perspective in 1946: 'the ripening cold war with the former soviet ally was evident'; 'soviet aggressiveness seemed to dominate all events, to define all developments.' It is no coincidence that on 12 March 1947, while the Highjump task force was still at sea, President Truman proclaimed what came to be known as the Truman Doctrine, to help prevent the spread of communism. Evidently, Operation Highjump was an early exercise of the coming Cold War, designed to raise the navy's level of polar fighting capability. It followed Operation Frostbite in Davis Strait in the northern autumn and winter of 1945–46 (Rose 1980), and Operation Nanook in July–September 1946 (Sullivan 1957; Rose 1980). Frostbite and Nanook were relatively small exercises. When it was decided that a full scale polar naval training exercise was required, it was decided to hold it in Antarctica, where conditions would be similar to those in Greenland and other parts of the Arctic, in order to avoid a diplomatic incident by having a full scale naval exercise in areas relatively close to the USSR. Highjump was followed by another Antarctic exercise, Operation Windmill, with two ships, in the southern summer of 1947–1948 (US Navy, 1948).

Highjump's strategic military objectives were widely publicised at the time. In an article reprinted in prominent newspapers (*New York Times* 9 February 1947; *Montreal Daily Star* 8 February 1947), Cruzen noted that Highjump showed that the Navy was capable of providing 'water-borne supplies' to troops operating 'under the most stringent polar conditions' from 'far-flung Arctic bases'. He went on: 'If the defense of America hinges on the Poles – as it may well do in the future – a unit of informed and experienced air and sea power presents a formidable defense combination. The foundation for such large-scale

unity in either Pole has been laid here' (*New York Times* 2 March 1947).

Highjump was not a secret operation as was Tabarin. There were 11 journalists aboard the Highjump ships. Among them were the distinguished US war correspondent Lee Van Atta (who was not, as claimed by Goodrick-Clarke (2002), Chilean), and the science writer of the *New York Times*, Walter Sullivan. Between 2 December 1946, and 22 March 1947, the 11 journalists transmitted 2011 messages totalling 478,338 words to Radio Washington, for onward transmission to their employers (US Navy 1947). Some of the people on the expedition wrote books about their experiences (Byrd 1947; Sullivan 1957). Given the tremendous degree of press coverage, it was misleading for Choron (date unknown) to state: 'little other information was released to the media about the mission, although most journalists were suspicious of its true purpose given the huge amount of military hardware involved.'

The official report of the operation (US Navy 1947) was published in three volumes comprising the narrative and 24 extensive annexes on operational matters such as Aviation, Ship Operations, Communications, Navigation, Cargo Handling, Rations, and Personnel. Mostly it concerns the minutiae of day-to-day operations in the ice. Perhaps it was because its initial classification was Confidential, and it was, therefore, not available to the general public, that some writers thought that the US government had something to conceal. The report was never classified Secret or Top Secret.

Comparing the Navy report with Byrd's 1947 paper in *National Geographic Magazine* (Byrd 1947), it is clear that the report contains nothing of any substance that was not published in that magazine, or later by Bertrand (1967, 1971). No evidence for suppression of information appears on comparing the Byrd paper, the reports by the US services, the many journalists' reports, and the books and articles by Sullivan, Rose, and Bertrand referred to above. We conclude that there is no evidence for any concealment. Nowhere in these articles is there any consideration of a possible threat of any kind whatsoever emanating from alleged remnants of the Third Reich. The only threat mentioned was Soviet.

If the supposed German base had been the target of Operation Highjump it should have focussed on Dronning Maud Land, but instead it was centred on Byrd's Little America IV base on the Ross Ice Shelf on the opposite side of the continent. From there his aircraft explored the region between the Ross Sea and the South Pole, and naval task forces equipped with amphibious aircraft set out to explore the coasts to the east, through the Pacific Ocean sector, and to the west, through the Indian Ocean sector (US Navy 1947; Byrd 1947; Bertrand 1967, 1971; Rose 1980). Both the eastern and western task forces were expected to reach Dronning Maud Land before returning home. Neither of them was supposed to land on the continent. Knowing that the Highjump ships headed first for the Ross Sea, it is astonishing that

Buechner and Bernhart (1989: 230) claim (referring to the operation) that 'This formidable group anchored near the German-claimed territory of "Neuschwabenland"... and then divided into three separate task forces.'

A map published by Byrd (1947), Sullivan, (1957: 199), and Bertrand (1967: 8) shows where the aircraft flew, and the US Navy report (1947) shows where the ships went, and when. It is clear that the US Navy flew over almost none of the territory mapped by the Germans in 1938–1939. Because the ships of the eastern and western task forces were short of time (for reasons explained below), they could only undertake a cursory survey of Dronning Maud Land, which was at the far end of their range. Ships of the western group approached Dronning Maud Land from the east. On 22 February 1947, in perfect weather, one of its aircraft flew over easternmost Dronning Maud Land. It 'mapped the coast from 34°E to 15°E.' and 'discovered a 13,000 foot mountain range, with the ice cap piled up behind it, and glaciers spilling out to seawards through its passes.' (US Navy 1947). These were the same mountains discovered by the Norwegians in 1937 (Christensen 1939). At its westernmost end, this flight just reached the easternmost edge of the Wohlthat Massif, discovered by the Germans (see Fig. 1). The ships of the eastern group approached the western coast of Dronning Maud Land from the west. On 1 March 1947 their aircraft approached the coast between the Greenwich meridian (0°) and 5°E (Byrd 1947) but 'Weather was extremely bad over the continent with clouds extending from the surface to 15,000 feet, which prevented any exploration over land' (US Navy 1947). Given the lack of survey opportunities and the pressure of time the ships of the eastern group sailed for home on 3 March without flying over Dronning Maud Land (US Navy 1947).

Based on the mistaken assumption that Operation Highjump planned to work in the Antarctic for six months, Mattern and Friedrich (1975), Buechner and Bernhart (1989), Stevens (2003), Farrell (2003) and Robert (2005c) considered that the expedition was terminated 'early', and that the Americans were hiding the reasons. But there was never a plan to spend 6 months in Antarctica. Because of the work needed to prepare the ships for sea in the short time available after Operation Nanook, the ships did not leave the USA until 2 December 1946 (US Navy 1947; Byrd 1947), which was already rather late in the southern summer season. One of their two ice-breakers, the USS *Burton Island*, was not ready and did not join them until much later. Approaching Antarctica they were delayed unexpectedly by meeting a 1000 km (600 mile) wide belt of pack ice (Sullivan 1957). Without *Burton Island*, there was only one ice-breaker, *Northwind*, and progress was much slower than planned. Although the eastern group was in position and began flying aircraft over the continent in late December 1946, the central group was unable to reach the Ross Ice Shelf to unload stores and equipment until 15 January 1947. They did not stay long. With the rapid approach of winter, they had to leave earlier than anticipated, on 23 February 1947,

in order to avoid damage to the steel-hulled ships, which were not ice-strengthened (US Navy 1947; Byrd 1947; Sullivan 1957; Bertrand 1967; Rose 1980). *Burton Island* arrived in time to assist the departure.

The delay in leaving the USA, the absence of the second ice-breaker, the wider than expected extent of the pack ice, and the rapid approach of winter meant that the amount of time Highjump spent in Antarctica was not much longer than that spent by the German Antarctic Expedition in 1938–1939. Under the circumstances, much less science was accomplished than might have been wished (Byrd, 1947). Nevertheless, most of the military objectives of the expedition were met, despite one aircraft from the eastern group crashing into the ice sheet during a white-out on 30 December 1946, with the loss of several crewmen (Byrd 1947, US Navy 1947). This crash was on the other side of the continent from Dronning Maud Land.

The idea that the expedition was planned to attack a supposed German base in Dronning Maud Land is wholly without foundation. Quotations attributed to Byrd suggesting anything to the contrary have been invented. The Americans showed no particular interest in Dronning Maud Land. They made no effort, nor had any plans, to land on it. They made no special effort to survey it from the air. They would have spent more time flying over it had the weather been better and had time allowed. But with winter approaching, and other calls on their time, they showed no reluctance in turning away from this supposed prize area, as even Szabo (1947: 208) appreciated.

Even though the Americans showed no interest in the supposed German base, they were interested in German activities in Dronning Maud Land, but for an entirely different reason, the process of claiming territory. The German expedition of 1938–1939, and its intention to claim territory (Neuschwabenland), stimulated the US government to undertake its own expeditions to Antarctica for the first time in 100 years, in support of possible eventual US claims to territory (Dewing and Kelsey 1955; Sullivan 1957: 137–170; Bertrand 1971; Rose 1980; also see Mills 2003: 121–122). On 25 November 1939, it established the US Antarctic Service to maintain permanent or semi-permanent stations on the Antarctic continent, and to fulfil the requirements of discovery and settlement that would be needed to support possible territorial claims. The service's first expedition docked in the Bay of Whales on 12 January 1940 to build their Little America III base on the Ross Ice Shelf. This was also known as West Base, in contrast to East Base, which was set up on Stonington Island on the west coast of the Antarctic Peninsula. Both bases carried out an extensive programme of land and aerial survey, and scientific research. West Base was closed on 1 February 1941, and East Base on 22 March 1941. The expedition did not visit Dronning Maud Land, nor did it plan to do so, suggesting that the USA had no interest in hypothetical German activities in Dronning Maud Land. It should be noted that this is before Szabo started the story about the German base.

Similarly, no interest was displayed in Dronning Maud Land by the USA's Operation Windmill (1947–48), the two ships of which landed survey parties by helicopter to provide ground control data for the location of the aerial photographs taken by Highjump the year before (US Navy 1948; Bertrand 1971; Mills 2003). The only time the USA landed in Dronning Maud Land was in February 1955, when the ice-breaker USS *Atka* landed shore parties to reconnoitre for terrain suitable for a landing strip for aircraft that might get into difficulties en route from the USA to the South Pole during the operations planned for the IGY (Sullivan 1957, 1961). The parties landed twice, for a day each, close to the NBSA Expedition's Maudheim base, and stayed near the seaward edge of the ice shelf. The fleeting nature of the visit confirms that they had no interest in investigating any hypothetical German base in Queen Maud Land.

### Admiral Byrd and UFOs

Mattern and Friedrich (1975: 98) and Farrell (2005) suggest, without offering any evidence in support, that Byrd flew over the German base during Operation Highjump, and that in retaliation four of his aircraft were shot down by German secret weapons. According to a map of Mattern and Friedrich (1975: 92) the planes were 'lost' at around 73°S and 23°E, which is far to the east of the Mühlig-Hoffman Mountains. 'This single event' Farrell states 'throws the whole Highjump exercise into a curious light, for it somehow changed the whole character of the Byrd expedition. Within 48 hours Admiral Byrd had given orders which cancelled the expedition and made preparations to leave Antarctica. The mission had lasted closer to eight weeks than to eight months. No official reason was given for the sudden withdrawal' (Farrell 2005). According to Buechner and Bernhart (1989: 231) the claim that many of Byrd's men were 'lost' and that at least four of his aircraft had 'disappeared' in mysterious circumstances involving strange 'enemy' aircraft, was made in May 1948 in a European periodical called *Brisant*, which they were unable to trace. Another of their sources for the claim is a 1980 novel *Genesis* by W.A. Harbison (Harbison 1980).

Mattern and Friedrich (1975: 100) and Choron (date unknown) claim that the German base was defended by powerful secret weapons including 'flying saucers'. Goodrick-Clarke provides the context:

'As early as the 1950s, rumours began to circulate among certain German nationalist circles that the post-war flying saucers were in fact German super-weapons that had been under development and tested during the Third Reich. At the time of Germany's surrender in May 1945, this technology was supposedly shipped to safety in the Arctic, South America and Antarctica. The abundance of UFO sightings was thus attributed to a hidden Nazi presence in remote and inaccessible regions of the world. By the late 1970s, neo-Nazi writers were claiming that the 'Last Battalion', a massive Nazi military force of highly advanced UFOs,



was in possession of a vast tract of Antarctica.' (Goodrick-Clarke 2002)

The documentary evidence (US Navy 1947; Byrd 1947; Sullivan 1957; Rose 1980), shows that Byrd confined his personal flying to the Ross Sea region and the South Pole, some 2000 km away from Dronning Maud Land; that there was no landing of US armed forces anywhere near Dronning Maud Land; and that the only aircraft lost during Highjump crashed at 71°22'S, 99°20'W, on the opposite side of Antarctica from Dronning Maud Land.

The flying saucer story has been given some credence in UFO circles by something Byrd is claimed to have said in a newspaper article. The article, by Lee Van Atta, one of the US reporters on Highjump, appears in the 5 March 1947 issue of *El Mercurio*, from Santiago, Chile (*El Mercurio* 5 March 1947: 23). Mattern and Friedrich (1975: 99) claim that Byrd said in this article that 'in case of a new war the continental United States would be attacked by flying objects which could fly from pole to pole at incredible speeds.' Others, like Robert (2005a 2005c), Choron (date unknown), and Farrell (2005 citing Stevens 1997: 53), have repeated that statement without examining the source. Indeed, Farrell (2005) incorporates in Chapter 14 of his book a copy of the Spanish text alongside the English mistranslation.

The Spanish text from *El Mercurio* translates as follows:

'Admiral Richard E. Byrd warned today that the United States should adopt measures of protection against the possibility of an invasion of the country by hostile planes coming from the polar regions. The Admiral explained that he was not trying to scare anyone, but the cruel reality is that in case of a new war, the United States could be attacked by planes flying over one or both poles. This statement was made as part of a recapitulation of his own polar experience, in an exclusive interview with International News Service. Talking about the recently completed expedition, Byrd said that the most important result of his observations and discoveries is the potential effect that they have in relation to the security of the United States. The fantastic speed with which the world is shrinking – recalled the Admiral – is one of the most important lessons learned during his recent Antarctic exploration. I have to warn my compatriots that the time has ended when we were able to take refuge in our isolation and rely on the certainty that the distances, the oceans, and the poles were a guarantee of safety.'

Comparing this text with the phrase from Mattern and Friedrich (1975) and others ('flying objects that could fly from pole to pole at incredible speeds'), it is clear that their phrase is, at best, a bad translation of the Spanish original, or, at worst, a deliberate mistranslation. In this context it is necessary to note, as pointed out earlier in this paper, that Mattern and Friedrich (1975) faked evidence for a flying boat landing in the Schirmacher Oasis.

That begs the question, when did someone first make an association between flying saucers and Operation Highjump? It would seem unlikely that it was before 14 June 1947, when the flying saucer craze began in the USA following the crash near the town of Roswell, New Mexico, of what some believe was a flying saucer and what others think were the instruments from a weather-balloon (Sturrock 1999; Park 2001). According to Goodrick-Clarke (2002), the first connection between post-war flying saucers and Nazi fugitives in the southern hemisphere was made by M. X. Barton (1960, 1968), who suggested that the Germans were assembling these discs in underground factories in South America, South Africa, and possibly Antarctica (though Barton focuses mostly on Patagonia). However, the first really clear link comes from Mattern and Friedrich in 1975. The reader may note that the books by Friedrich (1979) and Mattern and Friedrich (1975) were written by Ernst Zündel, whose middle names are Christof Friedrich. With regard to the flying saucer story, Goodrick-Clarke (2002) notes that: 'During the 1970s, Wilhelm Landig and Ernst Zündel, both neo-Nazi publishers and authors, blended these stories, hints and suggestions into a powerful and elaborate myth of Nazi resurgence.'

The authors conclude that the idea that the Germans defended themselves with flying saucers from a secret base in Dronning Maud Land at the time of Operation Highjump is pure fantasy.

#### **Were atomic bombs detonated over Antarctica?**

According to Stevens (2003: 247), citing Landig (1991), the secret German base 'was in operation until the late 1950s, when it became the subject of an American nuclear test in which three bombs were detonated under cover of the International Geophysical Year 1957–58'. Robert (2005c) and Farrell (2005) both accept the claim of Stevens (1997: 55, 57) that on 27 and 30 August and 6 September 1958, three nuclear bombs were detonated over Antarctica.

There were indeed three secret nuclear explosions in the atmosphere in the southern hemisphere in 1958, but they were not over Antarctica, and they did not remain secret. They were conducted by the USA as part of Operation Argus during the IGY. The story is described in detail by Sullivan (1961), and was confirmed by a representative of the Comprehensive Test Ban Treaty Organisation, in Vienna, (L. E. de Geer, personal communication, 24 January 2006). According to these sources, Operation Argus was the only clandestine test series in the 17-year history of atmospheric testing. It took place 1760 km (1100 miles) southwest of Cape Town, South Africa, and consisted of three very high altitude test shots of the W-25 warhead to investigate the effects of nuclear explosions outside the atmosphere, in particular how the charged particles and radioactive isotopes released would interact with the Earth's magnetic field, which could potentially interfere with radar tracking, communications, and the electronics of satellites and ballistic missiles. The tests

were at heights of 160 km (100 miles) on 27 August (38°S, 12°W), 290 km (182 miles) on 30 August (50°S, 8°W), and 750 km (466 miles) on 6 September (50°S, 10°W) (Sullivan 1961: Chapter 8). The first was 3500 km north of the Dronning Maud Land coast, near Tristan da Cunha, the second was 2280 km north, and the third 2390 km north.

Independent confirmation that there were no nuclear tests in the atmosphere over Antarctica comes from the British Antarctic Survey. The Director (C. Rapley, personal communication, 17 January 2006) stated that: 'such explosions (depending on the type of weapon) should have given a clear and strong fallout of radioactive material that would manifest as a peak in beta radioactivity. . . in cores. We already see a rise in beta-radioactivity across Antarctica from 1954 onwards due to US tests in the 1950s and especially Soviet ones in the 1960s. . . so if someone wants to see a peak in 1958 they probably can. However, with any likely weapon exploded just a few hundred km away I would expect to see a really outstanding peak.' In support of his statement, he provided a copy of a graph published by Wolff and others (1999) showing the changes in beta ray radioactivity with uncompacted snow depth (known as 'firn' depth) from a pit in Coats Land, which lies just to the southwest of Dronning Maud Land, at the eastern edge of the Weddell Sea. The graph shows peaks in the late 1950s, with slightly higher peaks in the early 1960s, then a significant decline. The peaks represent deposition, in the snow, of the tail end of the high altitude plume of radioactive materials that entered the upper atmosphere with each Russian and American bomb test, mainly in the northern hemisphere or the tropical Pacific Ocean, and then spread around the world. An explosion over Antarctica of the kind Stevens (1997) and Robert (2005c) describe would have given rise to a massive peak in radiation in the core analysed by Wolff and others (1999). The lack of it tells a clear story, confirmed independently by de Geer, and by Sullivan (1961).

It is in any case inconceivable that there would have been any atmospheric nuclear test over Dronning Maud Land in 1958, because Norwegian, Belgian, British and Japanese scientists were living in the area in IGY research stations.

### Conclusions

Using the knowledge of Antarctica that has developed since the late 1930s, and reading the abundant reports of expeditions from the 1930s, 1940s and 1950s, it can be stated with confidence that the unsubstantiated claims made by Szabo (1947), Mattern and Friedrich (1975), Friedrich (1979), Stevens (1997, 2003), Farrell (2005) and Choron (date unknown) about a supposed secret German base in Antarctica, or about its re-supply by U-boats, are entirely fallacious. That applies also to the vast bulk of what Robert (2005a, 2005b, 2005c) writes on the subject of Britain's supposed secret war in Antarctica.

Critical and comprehensive examination of all the available evidence in the light of what we know today

about Antarctica and its science and history indicates the following:

- 1 The Germans did not construct a secret base in Dronning Maud Land before, during or immediately after World War II.
- 2 During, and immediately after World War II, British activities in Antarctica took place far to the west of Dronning Maud Land, on and to the west of the Antarctic Peninsula; the British did not construct a secret base in Dronning Maud Land from which to observe hypothetical German activities; nor did the British undertake military activity of any kind against a secret German base in Dronning Maud Land.
- 3 Neither during Operation Highjump in the southern summer of 1946–1947, nor during the US Antarctic Expedition of 1940–1941 did the Americans manifest any special interest in Dronning Maud Land or in the possibility that there might be or have been a German base there.
- 4 When the Americans did land in Dronning Maud Land, in February 1955, it was to reconnoitre for a suitable place for an airstrip; they manifested no interest in the possibility of German bases being there;
- 5 Three secret nuclear explosions were made in the atmosphere south of Cape Town in 1958; they took place not over Dronning Maud Land, but in the upper atmosphere at heights of between 160 and 750 km above sea level, and between 2280 and 3500 km north of Dronning Maud Land. Radiation data from the ice sheet show that there could not have been any nuclear explosions in the atmosphere above Dronning Maud Land in 1958;
- 6 The vast extent of the southern winter pack ice would have prevented German U-boats from reaching the shores of Dronning Maud Land from May to August 1945. In addition there is no channel through which U-boats could have penetrated the mountains of Dronning Maud Land to moor in some hypothetical underground cavern where they could have been serviced;
- 7 The words of Byrd in the *El Mercurio* article of 5 March 1947 have been mistranslated in a way that suggests that he was talking about the dangers of flying saucers. What he did refer to was the threat to US security of Soviet planes that could attack the USA across the polar regions, and of the dangers inherent in a world that was rapidly shrinking.
- 8 The Americans on Operation Highjump were not attacked by flying saucers, they did not lose four planes as a result of enemy opposition, and they did not leave Antarctica unexpectedly early because of such action, but because of the early onset of winter.

Using the analogy of Park (2001) our analysis suggests that the stories of Szabo (1947); Mattern and Friedrich

(1977); Friedrich (1979); Landig (1980, 1991); Stevens (1997, 2003); Choron (date unknown); Farrell (2005) and Robert (2005a, 2005b, 2005c), have drawn together unrelated accounts of polar expeditions, U-boat landings, plane crashes, and high-altitude nuclear experiments. Fragments of these accounts have been stitched together to create the myth of secret wars that were covered up by one or more governments. Information that did not fit has been left out. Gaps have been filled by speculation. The later writers have fed upon the earlier ones' material, embellishing it here and there. Buechner and Bernhardt (1989) relied on Harbison's novel (1980) as a source; Stevens (1979) relied on Landig's novels as a source. The reader is reminded that Buechner and Bernhart (1989: 240, 242) invented the supposed (but impossible) landing of a flying boat in what would have been an ice-covered ocean off Dronning Maud Land in mid southern winter in 1979, and Mattern and Friedrich (1975) and Friedrich (1979) invented the supposed landing of a flying boat from the German Antarctic Expedition of 1938–1939 on a lake in the Schirmacher Oasis, and the discovery by the crew of caverns and tunnels. It is unfortunate that others have followed unwittingly in the footsteps of those authors, repeating their words as the truth. Given what we have been able to discover, perhaps fewer will do so in future. In the case of Robert (2005a, 2005b, 2005c) we are invited to believe in a tale told to him by someone who, according to him, must remain nameless (and is therefore impossible to check), and for which there is absolutely no other evidence.

One might wonder how these fantasies came to be published. Zündel (alias Friedrich) published the work of Mattern and Friedrich (1975) and Friedrich (1979). Landig also published his own material (Landig 1980, 1991), as did Stevens (1997) and Buechner and Bernhart (1989). Robert (2005a, 2005b, 2005c) published in a journal that did not use a peer-review process.

Our analysis of the abundant scientific literature describing conditions in Antarctica and the abundant historical literature describing the various expeditions suggests that in the writings of Szabo, Buechner, Bernhart, Mattern, Friedrich, Stevens, Farrell, Choron and Robert fantasy has ruled and a travesty of history has occurred. To those who would like to investigate further, we point out that the relevant archives are now open to the public (for example see Rae 1995).

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#### References

- Amundsen, R. 1912. *The south pole*. London: John Murray.
- Amundsen, R. 1927. *My life as an explorer*. London: Heinemann.
- Anderson, J.B. 1991. The Antarctic continental shelf: results from marine geological and geophysical investigations. In: Tingey, R.J. (editor). *The geology of Antarctica*. Oxford: Clarendon Press (Oxford Monographs on Geology and Geophysics 17): 284–334.
- Anderson, J.B. 1999. *Antarctic marine geology*. Cambridge: Cambridge University Press.
- Barton, M.X. 1960. *We want you: is Hitler alive?* Los Angeles: Futura Press.
- Barton, M.X. 1968. *The German saucer story*. Los Angeles: Futura Press.
- Bayliss, E.P. 1939. Antarctica. 1:10,000,000 map. Canberra: Property and Survey Branch, Department of the Interior.
- Bayliss, E.P., and J.S. Cumpston. 1939. Map of Antarctica: handbook and index. Canberra: Department of External Affairs.
- Bell, R.E., M. Studinger, M.A. Fahnestock, and C.A. Shuman. 2006. Tectonically controlled subglacial lakes on the flanks of the Gamburtsev subglacial mountains, East Antarctica. *Geophysical Research Letters* 33: L02504 doi: 10.1029/2005GL025207.
- Bentley, C.R. 1991 Configuration and structure of the subglacial crust. In Tingey, R.J. (editor). *The geology of Antarctica*. Oxford: Clarendon Press (Oxford Monographs on Geology and Geophysics 17): 335–364.
- Bertrand, K.J. 1967. A look at Operation Highjump twenty years later. *Antarctic Journal of the United States* 2(1): 5–12.
- Bertrand, K.J. 1971. *Americans in Antarctica 1775–1948*. New York: American Geographical Society (Special Publication 39).
- Blair, C. 1996. *Hitler's U-boat war: the hunters, 1939–1942*. New York: Random House.
- Blair, C. 1998. *Hitler's U-boat war: the hunted, 1942–1945*. New York: Random House.

- Borman, P., and D. Fritzsche (editors). 1995. *The Schirmacher Oasis, Queen Maud Land, east Antarctica, and its surroundings*. Gotha: Justus Perthes Verlag.
- Brunk, K. 1986. *Kartographische Arbeiten und deutsche Namengebung in Neuschwabenland, Antarktis. Bisherige Arbeiten, Rekonstruktion der Flugwege der Deutschen Antarktischen Expedition 1938/39 und Neubearbeitung des deutschen Namensgutes in Neuschwabenland*. Frankfurt-am-Main: Institut für Angewandte Geodäsie (Geodätischen Kommission der Bayerischen Akademie der Wissenschaften, Reihe E, Heft Nr. 24, Teil I, II).
- Brunk, K. 1987. Die Rekonstruktion der Bildflüge und die Neubearbeitung des Namensgutes der Deutschen Antarktischen Expedition 1938/39 in Neuschwabenland, Antarktis. *Polarforschung* 57(3): 191–197.
- Buechner, H.A., and W. Bernhard. 1989. *Hitler's ashes*. Metairie, Louisiana: Thunderbird Press.
- Byrd, R.E. 1947. Our navy explores Antarctica. *National Geographic Magazine* (4): 429–522.
- Choron, E.J. (date unknown), How high can you jump? Operation Highjump and the 'UFO' connection. URL: <http://www.rense.com/general35/op.htm>.
- Christensen, L. 1935. *Such is the Antarctic*. London: Hodder and Stoughton.
- Christensen, L. 1939. Recent reconnaissance flights in the Antarctic. *Geographical Journal* XCIV: 192–203.
- Deutsche Seewarte. 1939. Vorbericht über die Deutsche Antarktische Expedition 1938/39. *Annalen der Hydrographie und Maritimen Meteorologie* VIII: Beiheft.
- Dewing, C.E., and L.E. Kelsey. 1955. *Preliminary inventory of the records of the United States Antarctic Service*. Washington: National Archives and Records Service.
- Dillon, M., and R. Bradford. 1987. *Rogue warrior of the SAS: the Blair Mayne legend*. London: Mainstream Publishing.
- Farrell, J.P. 2005. *Reich of the black sun*. Kempton, Illinois: Adventures Unlimited Press.
- Friedrich, C. 1979. *Germany's Antarctic claim: secret Nazi polar expeditions*. Toronto: Samisdat Publishers.
- Fuchs, V. 1982. *Of ice and men: the story of the British Antarctic Survey 1943–73*. Oswestry: Anthony Nelson.
- German, C.R., L.M. Parson, and R.A. Mills. 1996. Mid-ocean ridges and hydrothermal activity. In: Summerhayes, C.P., and S.A. Thorpe (editors). *Oceanography: an illustrated guide*. London: Manson Publishing: 152–164.
- Giaever, J. 1954. *The white desert. The official account of the Norwegian-British-Swedish Antarctic expedition*. London: Chatto and Windus.
- Giaever, J., and V. Schytt. 1963. *General report of the expedition. Norwegian-British-Swedish Antarctic expedition, 1949–52*. Oslo: Oslo University Press (Scientific results 6(3)).
- Gernandt, H. 1984. *Erlebnis Antarktis*. Berlin: Transpress.
- Gimblett, R.H. 2004. Canada's submarines in context. *SITREP* 64(5): 13–15 (Royal Canadian Military Institute, Ottawa).
- Gloersen, P., W.J. Campbell, D.J. Cavalieri, J.C. Comiso, C.L. Parkinson, and H.J. Zwally. 1992. *Arctic and Antarctic sea ice 1978–1987: satellite passive microwave observations and analysis*. Washington: NASA (SP-511).
- Goodrick-Clarke, N. 2002. *Black sun: aryan cults, esoteric Nazism and the politics of identity*. New York: New York University Press.
- Hansom, J.D., and J. E. Gordon. 1998. *Antarctic environment and resources: a geographical perspective*. Harlow and New York: Longman Press.
- Headland, R.K. 1989. *Chronological list of Antarctic expeditions and related historical events*. Cambridge: Cambridge University Press.
- Headland, R.K. In press. *A chronology of Antarctic exploration*.
- Herrmann, E. 1942. *Deutsche Forscher im Südpolarmeer*. Berlin: Safari Verlag.
- Hisdal, V. 1956. *Wind. Norwegian-British-Swedish Antarctic expedition 1949–52*. Oslo: Oslo University Press (Scientific Results 1(2B)): 67–121.
- Hisdal, V. 1960. *Temperature. Norwegian-British-Swedish Antarctic expedition 1949–52*. Oslo: Oslo University Press (Scientific Results 1(2C)): 125–182.
- James, D. 1949. *That frozen land: the story of a year in the Antarctic*. London: Falcon Press.
- Kraul, O. 1939. *Käpt'n Kraul Erzählt*. Berlin: F.A. Herbig.
- Kraul, O. 1942. Die Eisverhältnisse in Antarktischen Gewässern. In: Ritscher, A. (editor). *Wissenschaftliche und fliegerische Ergebnisse der Deutschen Antarktischen Expedition 1938/39*. Leipzig: Koehler und Ameland (Auftrag der Deutschen Forschungsgemeinschaft): 273–281.
- Landig, W. 1980. *Wolfszeit um Thule*. Vienna: Volkstum-Verlag.
- Landig, W. 1991. *Rebellen fuer Thule das Erbe von Atlantis*. Vienna: Volkstum-Verlag.
- Leary, W.M. 1999. *Under ice*. College Station: Texas A & M University Press.
- Lüdecke, C. 2004. In *Geheimer Mission zur Antarktis: Die Dritte Deutsche Antarktische Expedition 1938/39 und der Plan einer territorialen Festsetzung zur Sicherung des Walfangs*. Hamburg: Convent Verlag GmbH (Deutsches Schifffahrtsmuseum 26): 75–100.
- Mattern, W. 1974. *UFO's Unbekanntes Flugobjekt. Letzte Geheimwaffe des Dritten Reiches?* Toronto: Samisdat Press.
- Mattern, W. and C. Friedrich. 1975. *UFO's: Nazi secret weapon?* Toronto: Samisdat Pubs. Ltd.
- Meding, H. 1992. *Flucht vor Nürnberg? Deutsche and österreichische Einwanderung in Argentinien, 1945–1955*. Köln, Weimar, Wien: Bohlau Verlag.
- Mills, W.J. 2003. *Polar frontiers: a historical encyclopedia*. 2 vols. Oxford: ABC-CLIO.
- NARA. 1985. Records relating to U-boat warfare, 1939–1945. Washington: National Archives and Records Administration (Guides to the Microfilmed Records of the German Navy, 1850–1945 (2)).
- Newton, R.C. 1998. Submarinos Alemanos en Argentina. *Historia y Arqueologica Maritima*. URL: <http://www.histarmar.com.ar/InfHistorica/BusquedasUBoats/5-InformeCeanaCastellano.htm>
- Ohta, Y. 1999. Natural environment map, Gjelsvikfjella and western Mühlig-Hoffmanfjella, Dronning Maud Land, East Antarctica, 1:1,000,000. Tromsø: Norwegian Polar Institute (Temakart No. 24)
- Park, R.L. 2001. *Voodoo science: the road from foolishness to fraud*. Oxford: Oxford University Press.
- Park, R.L. 2003. The seven warning signs of bogus science. *The Chronicle Review* 49(21) (31 January 2003, B20).
- Rae, J. 1995. Operation Tabarin; the archives of a British Antarctic expedition in wartime. In Walton, D., W. J. Mills, and C.M. Phillips (editors). *Bipolar information*

- initiatives: the needs of polar research*. Bluntisham: Bluntisham Books (Proceedings 15th Polar Libraries Colloquium): 174–175.
- Ritscher, A. 1942. *Wissenschaftliche und fliegerische Ergebnisse der Deutschen Antarktischen Expedition 1938/39*. Leipzig: Koehler und Ameland (Auftrag der Deutschen Forschungsgemeinschaft): 273–281.
- Ritscher, A. 1946. Oasen in Antarktika. *Polarforschung* 16(1/2) erschienen 1948: 70–71.
- Ritscher, A. 1948. Vor 10 Jahren. *Polarforschung* 18(1/2) erschienen 1950: 30–32.
- Ritscher, A. 1958. Deutsche Antarktische Expedition 1938/39. Wissenschaftliche und fliegerische Ergebnisse. Bd. 2. Hamburg: Helmut Striedieck (Geographisch-Kartographische Anstalt *Mundus*).
- Robert, J. 2005a. Britain's secret war in Antarctica, Part 1. *Nexus Magazine* 12(5). URL: <http://www.nexusmagazine.com/articles/SecretWar1.html>
- Robert, J. 2005b. Britain's secret war in Antarctica, Part 2. *Nexus Magazine* 12(6). URL: <http://www.nexusmagazine.com/articles/SecretWar2.html>
- Robert, J. 2005c. Britain's secret war in Antarctica, Part 3. *Nexus Magazine* 13(1). URL: <http://www.nexusmagazine.com/articles/SecretWar3.html>
- Rose, L.A. 1980. *Assault on eternity: Richard E. Byrd and the exploration of Antarctica 1946–47*. Annapolis: Naval Institute Press.
- Ross, H. 2003. *Paddy Mayne: Lt. Col. Blair 'Paddy' Mayne, 1 SAS Regiment*. Stroud: Sutton Publishing.
- Royal Geographical Society. 1939. The course of Antarctic exploration between longitudes 20W and 110E. *Geographical Journal* 94: 204–208 and map following page 272.
- Sagan, C. 1996. *The demon-haunted world: science as a candle in the dark*. New York: Ballantine Books.
- Schaeffer, H. 1952. *U-boat 977*. New York: W. W. Norton & Co.
- Schön, H. 2004. *Mythos Neu-Schwabenland für Hitler am Sudpol: die Deutsche Antarktis-Expedition 1938/39*. Selent: Bonus-Verlag.
- Shackleton, E. 1919. *South*. London: William Heinemann.
- Sharpe, P. 1997. *U-boat fact file*. Leicester: Midland Publishing.
- Solomon, S. 2001. *The coldest march: Scott's fatal Antarctic expedition*. London: Heinemann.
- Squires, H. 1992. *SS eagle: the secret mission 1944–45*. St. Johns: Jespersen Press.
- Stevens, H. 1997. *The last battalion and German Arctic, Antarctic and Andean bases*. Gorman, California: The German Research Project.
- Stevens, H. 2003. *Hitler's flying saucers*. Kempton, Illinois: Adventures Unlimited Press.
- Stonehouse, B. 2002. *Encyclopaedia of Antarctica and the southern oceans*. Chichester: John Wiley and Sons.
- Sturrock, P.A. 1999. *The UFO enigma: a new review of the physical evidence*. New York: Warner Books.
- Sullivan, W. 1957. *Quest for a continent*. New York: McGraw-Hill.
- Sullivan, W. 1961. *Assault on the unknown: the International Geophysical Year*. New York: McGraw-Hill.
- Swithinbank, C. 1999. *Foothold on Antarctica*. Lewes: The Book Guild.
- Szabo, L. 1947 *Hitler est vivant*. Paris: SFELT.
- Times Atlas. 2000. *The Times atlas of the world – comprehensive edition*. London: Times Books.
- Tingey, R.J. 1991. The regional geology of Archaean and Proterozoic rocks in Antarctica. In Tingey, R.J. (editor). *The geology of Antarctica*. Oxford: Clarendon Press (Oxford Monographs on Geology and Geophysics 17): 1–73.
- US Hydrographic Office. 1943. Chart No. 2562, 1:11,250,000. Washington: US Government Printing Office.
- US Navy. 1947. Report of Operation Highjump; U.S. Navy Antarctic Development Project 1947. Washington DC., U.S.Navy Antarctic Development Project.
- US Navy. 1948. Report of Operations, Second Antarctic Development Project (1947–48) (Operation Windmill). Washington: US Navy Antarctic Development Project.
- Vyas, H.K., S.M. Bhandari, M.K. Dash, P.C. Pandey, N. Khare, A. Khanolkar, and N. Sharma. 2004. *An atlas of Antarctic sea ice; from OCEANSAT-1 MSMR*. Ahmedabad: Space Applications Centre (ISRO) and Goa: National Centre of Antarctic and Ocean Research.
- Wohlthat, H. 1939. Die Deutsche Antarktische expedition 1938/39. *Der Vierjahresplan* 3(9): 613–617.
- Wolff, E.W., E.D. Suttie, and D.A. Peel. 1999. Antarctic snow record of cadmium, copper, and zinc content during the twentieth century. *Atmospheric Environment* 33(10): 1535–1541.
- Wynn, K. 1998. *U-boat operations of the Second World War*. Vol. 2. Annapolis: US Naval Institute.