

Obituary

William J. Campbell, one of the world's best known figures in sea-ice physics and remote sensing, died suddenly of a heart attack at his home in Gig Harbor, Washington, on 20 November 1992. He was 62. Campbell's warm, emotional nature and stature as a scientist helped him to play a role in virtually every modern collaborative effort involving the Arctic Ocean, and to leave something of himself with almost every person with whom he came into contact. Yet he had to overcome serious obstacles to achieve his ambitions.

Bill Campbell was born on 1 May 1930 in Brooklyn, New York, and grew up in a tough area. He had many stories of childhood involvement in hair-raising activities, including joy-riding on a city garbage truck. He graduated from Brooklyn Technical High School in 1949 and took to the road, ending up in Fairbanks, Alaska, with no money. He spent his last quarter on a ride in a bus whose destination was 'College.' The suburb of College was the home of the University of Alaska, then a backwoods place rising rapidly to prominence in science through the inspiring presence of Sydney Chapman, the world-famous geomagnetician. Campbell was taken on as a student, working his way by labouring in the college kitchens and elsewhere. He received a BS in physics in 1955, having developed a passionate desire to study the polar environment.

He moved to the University of Washington at a time when it was becoming the centre for Arctic Ocean research activities in the USA. As a graduate student he spent 15 months on ice island T-3 studying ice physics and was a member of the first research team to dive under the Arctic pack ice. In 1960–1961 he was awarded a Fulbright Scholarship at Cambridge University, where he worked at the Scott Polar Research Institute.

From 1962 to 1964 Bill took part in two long Antarctic surface traverses, during which he survived an air crash at the South Pole in 1963. An Antarctic mountain was later named after him. He was awarded a PhD degree in Atmospheric Physics and Oceanography by the University of Washington in 1964. His thesis, 'On the steady-state flow of sea ice,' was a landmark in that it was the first serious attempt to produce a numerical model of ice dynamics and thermodynamics for the Arctic Basin, inspiring a line of development that has been highly productive up to the present day.

After his PhD, Campbell joined the United States Geological Survey (USGS) group that was based at the University of Puget Sound, Tacoma; this later became known as the Ice and Climate Project. He continued to work with USGS until his death, by which time he was Chief of the Project as well as being a Professor in the Physics Department of the University. He began by working on a variety of research projects in mesoscale

meteorology, glacier dynamics, sea-ice dynamics, remote sensing, and glacial limnology, but established ice dynamics and the remote sensing of sea ice as the continuing major theme of his scientific career. In 1969 he was appointed project chief of the Ice Dynamics Research Project at USGS.

Throughout the 1970s he was closely identified with the rapid development and application of airborne and spaceborne remote sensing techniques to the study of sea ice. This involved working a great deal with NASA, especially its laboratories in Pasadena (Jet Propulsion Laboratory) and Greenbelt (Goddard Space Flight Center). From 1970 to 1976 he directed NASA's role in the Arctic Ice Dynamics Joint Experiment (AIDJEX), the biggest effort ever to study the dynamics and properties of the drifting pack in the Arctic Basin. During the same period he was principal investigator for the Skylab Lake and Sea Ice Experiment, which involved a collaboration between remote sensing aircraft, surface truth teams, and satellite overpasses, a pattern that was to become characteristic of ice remote sensing research during the 1970s and 1980s. He took part in BESEX (Bering Sea Experiment, 1973), a pioneering example of US–Soviet collaborative research on ice–ocean processes in the Bering Sea. Through these projects he became deeply involved in the development of passive microwave remote sensing of sea ice, which he saw as the most effective way to monitor the distribution of ice extent and ice type over the polar oceans. He was a tireless advocate of the virtues of this type of sensor, and was involved with the Goddard team in the authorship of two atlases of ESMR (electrically scanning microwave radiometer) images of Antarctic (1983) and Arctic (1987) sea ice. At the time of his death he was in the final stages of helping the team to produce a much bigger atlas of sea ice using SMMR (scanning multichannel microwave radiometer) data, which yield ice type as well as concentration. This atlas is now to be dedicated to his memory.

The 1980s brought Campbell new responsibilities in satellite work, as principal investigator in projects involving GEOSAT and ERS-1, and membership of the program teams for the Poseidon mission and NASA Airborne Science. From 1980 onwards he was a member of the steering committee for the MIZEX project (Marginal Ice Zone Experiment), an effort to study this part of the Arctic ice cover on a scale approaching AIDJEX. He helped write the MIZEX Science Plan, and was involved in all stages of MIZEX (1983–1987) as well as its successor SIZEX (Seasonal Ice Zone Experiment), which involved much co-operation with Norway.

Campbell authored or co-authored more than 130 papers. Many were seminal in their field: an example was his 1973 paper with Willy Weeks on the use of icebergs, which

aroused enormous interest and started a widespread research and development effort on icebergs as a water source. He received many honours, including the US Antarctic Medal (1965), the USSR Arctic Medal (1974), the Department of the Interior Meritorious Service Award (1985); and the William T. Pecora Award for Remote Sensing of the Environment (1988). In 1991 he was the recipient of the first Nansen Polar Bear Award presented by the Nansen Environmental and Remote Sensing Centre, Bergen, and in 1992 he was awarded an honorary Doctor of Science degree by the University of Puget Sound.

Campbell leaves a widow, Nelly Mognard Campbell, and two children, Christopher and Nicolas. Nelly is herself a well-known remote sensing physicist, who was working on the study of ocean waves by satellite altimetry at CNES when she met Campbell.

I first met Campbell at the International Sea Ice Conference at Reykjavik in May 1971. He was already famous and was one of the stars of that conference, which was one of the first to cover the still young and small field of sea-ice research. I was a first-year graduate student, experiencing the normal difficulties of making progress with my thesis and feeling quite disillusioned. After the conference we went to stay at a climbing hostel in south Iceland run by a homespun English couple, from where we roamed over hills immortalised in *Njal's saga*. He poured out his philosophy of life and his love of science, and convinced me that the ice in the ocean was the most important and exciting topic that a scientist concerned with the global environment could ever wish to study. He did not need to take the time and trouble to put the career of such a junior person back on the tracks, but he did so, and many other people have similar memories of his generous way of giving of himself. He was also generous in other ways — at the end of our stay I saw him leaving a large, surreptitious donation to the couple who had asked only a miniscule amount for our keep.

Campbell's fields of research always involved extensive collaboration among different groups. He had a knack of being able to mediate the inevitable disagreements, both scientific and otherwise, to a point where a reasonable resolution was obtained. Whenever a scientific meeting was in danger of descending into acrimony, he could restore sanity by reminding everyone that 'we are human beings first and scientists second.' Yet he was also devoted to science in a way that made it, for him, a vocation and an almost holy quest rather than just a career. The key to his attitude towards science and life is, I think, found in the poem that he used as a dedication to his PhD thesis. It was by Titus Lucretius Carus:

Oh Science, lift aloud thy voice that stills
The pulse of fear, and through the conscience thrills —
Thrills through the conscience the news of peace —
How beautiful thy feet are on the hills!

That was Bill Campbell. He was courageous, generous, passionate, and optimistic; he inspired students, friends, and colleagues all over the world.

Peter Wadhams

Eric Hatfield Back, medical officer on the naval Antarctic Operation 'Tabarin,' 1943–1945, and of the Falkland Islands Dependencies Survey, 1945–1946, died on 21 December 1992 at the age of 72. He was born in Rochester on 30 January 1920, the son of Captain G.R. Back, RN, who went down with his ship off Crete in 1941, and a collateral descendent of Admiral Sir George Back, of nineteenth-century Canadian Arctic fame. He was educated at Marlborough and Clare College, Cambridge, and qualified in medicine from the London Hospital in 1943; he was elected FRCP in 1968.

I first met Lieutenant Back in October 1943 in a room in the Park Lane Hotel, which Lieutenant Commander James Marr had appropriated as an organizational office for his Naval Party 475, the original code name for members of Operation 'Tabarin.' 'Doc' Back was a tall, slender, alert young man with a most remarkable sense of humour and a high sense of duty. He and I were members of the nine-man party that, in February 1944, established Base A at Port Lockroy on Goudier Island, off Danco Coast, Graham Land. We had shipped out of Port Stanley aboard the little SS *Fitzroy*, escorted by HMS *William Scoresby*, to set up a base at Hope Bay, Trinity Peninsula, but ice conditions prevented this, and we continued south to the old whaling station at Port Lockroy, where our most immediate need was to erect a shelter. The construction was in charge of the ship's carpenter, 'Chippy' Ashton. Some of the men had little or no experience at this work, and Back was particularly inept at hammering nails into the wooden components of the building. The square, black iron nails we were using had been purloined from the leavings of whalers at Deception Island in the early part of the century. If struck a glancing blow, they bent easily; if struck a second blow, they bent again, frequently forming a hook. This happened most often with 'Doc,' who would instantly bellow, 'Coathanger!' Such events added little to the progress of construction, and we attributed them to the warped sense of humour of the medical profession.

After graduating from Cambridge, Back's further medical training had taken place in London from 1940–1943, during the blitz. In comparison with that hectic time, his practice in Antarctica was rather light, and he had little or nothing to do in the medical line. However, this was but part of his duties at Port Lockroy and later at Hope Bay in 1945–1946, for he was also the meteorological observer. The Stevenson screen containing his meteorological instruments was erected about 20 m from our hut, and readings were taken every four hours night and day. It is safe to say that Back missed very few of these, and we were frequently aware of his sense of duty in the early hours of the morning.

Besides having the distinction by devolution of being the British Antarctic Survey's first medical officer, Back took a 'dip' in the Southern Ocean at Port Lockroy. Normally he was a cheerful person, and I can recall only one occasion when he was disconsolate to the point of tears. According to our desires, we had put in an order from

Port Lockroy to Port Stanley for cigars, beer, chocolates, and other things. Back ordered two dozen bottles of Guinness, which were among the items delivered to us by the old Newfoundland whaler *Eagle* at Hope Bay in 1945. Most recipients of these goodies consumed them without delay, but not Back. He spent months describing how he would enjoy his Guinness on Midwinter's Day. When that day arrived, he pulled the case out from under his bunk only to discover a mass of broken glass!

We had moved from Port Lockroy and had established Base D at Hope Bay in February 1945. As at Port Lockroy, Back's duties kept him mainly at the base, but late in that summer he took part in a dog-sledge journey to the southern end of Prince Gustav Channel, accompanied by 'Taff'

Davies, 'Freddy' Marshall, and 'Jock' Matheson.

Back was admired and respected by all members of Operation 'Tabarin.' His service was rewarded with the Polar Medal (Antarctic clasp 1944–1945), and he was later promoted to Surgeon Lieutenant Commander. After the war, he specialized in paediatric medicine, and his last appointment was as a Consultant Paediatrician to the Norwich, Yarmouth, and Lowestoft group of hospitals. As president of the Antarctic Club, 1992–1993, he would have presided at the annual dinner in April 1993, celebrating the fiftieth anniversary of the launching of Operation 'Tabarin.' He will be greatly missed, not least by his six surviving Antarctic companions.

Andrew Taylor

In Brief

AUSTRALIAN ANTARCTIC DRILL REACHES 1200 METRES. The first deep-drilling effort by Australian scientists on the Antarctic ice cap was completed recently when the drill hole reached silty ice adjacent to bedrock 1200 m below the surface. The team, led by Vin Morgan, used an Australian-made, computer-controlled mechanical drill on Law Dome, a coastal ice cap 120 km from Casey Station. The depth of the hole has been exceeded only by Americans at Byrd station and by Russians at Vostok. Mr Morgan said that the high precipitation and well-developed annual layers in the ice at Law Dome allowed very high resolution of events in the last 15,000 years, and that the ice at the bottom of the hole might be as old as 30,000 years. The ice cores will be analyzed at the University of Tasmania's Antarctic Cooperative Research Centre for evidence of changes in air temperature, the amount of precipitation, and atmospheric composition.

BRITAIN'S SOUTHERNMOST HALF-MARATHON. The first British half-marathon in Antarctica has been announced by the British Antarctic Survey. Although at the time of publication the date of the run had not yet been determined — it will by necessity have to be a relatively fine day — some 25 competitors had already entered the run around the airstrip at Rothera station. The runners, who will be wearing only regular running kit, will be raising money for the Fuchs Foundation, a charitable organization that provides adventure holidays for underprivileged children.

ERRATA. It has come to our attention that a few copies of *Polar Record* 29 (168), January 1993, included blank pages in the text. If any subscriber received such a copy, please contact Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU, and the copy will be replaced.

In the recent obituary of Sir Edwin Porter Arrowsmith (*Polar Record* 29 (168): 77), it was stated that in 1962 Sir Edwin was named governor and commander-in-chief of

the Falkland Islands and Dependencies and high commissioner of the British Antarctic Territory. In actuality, Sir Edwin served as governor and commander-in-chief of the Falkland Islands 1957–1964, and as high commissioner of the British Antarctic Territory 1962–1964.

In a recent note (*Polar Record* 29 (168): 59), the author indicated that Dominica was an adherent to the Spitsbergen Treaty. In actuality, the Dominican Republic, rather than the Commonwealth of Dominica, is the adherent to the Spitsbergen Treaty.

PUBLICATION OF THE BAS WASTE MANAGEMENT HANDBOOK. The Protocol on Environmental Protection to the Antarctic Treaty includes an Annex regulating waste disposal and management in Antarctica. *The British Antarctic Survey waste management handbook* has been produced to ensure the practical implementation of the Waste Disposal Annex, and to provide expert guidance and advice to BAS personnel in the Antarctic. The first edition of the *Handbook* was tested in the Antarctic during the 1991/92 season. The operational experience of using the *Handbook* has led to a second edition that has been comprehensively revised and updated. Further editions will be released as progress and improvements in BAS waste-management procedures continue. The *Handbook* covers all aspects of the BAS operations in the Antarctic, including the research stations, ships, and field camps.

The first edition of the *Handbook* generated considerable interest from other national Antarctic operators who, like BAS, are faced with new and difficult waste-disposal problems. In addition, there was interest from non-governmental organisations visiting Antarctica, such as university research groups, private expeditions, tourist companies, and environmental groups. BAS has, therefore, decided to publish and make generally available the second edition. Copies can be obtained from the Information Office, British Antarctic Survey, High Cross, Madingley Road, Cambridge CB3 0ET. A charge of £30 per copy will be made to cover costs.