

Obituaries

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Willi Dansgaard, a great pioneer of climate research, died on 8 January 2011 at the age of 88. He was born on 30 August 1922 and grew up in the centre of Copenhagen where his parents had an engraving shop. He finished his university degree in physics, mathematics and astronomy in 1947 with a gold medal award for a thesis on X-ray dosimetry at the Biophysics Laboratory of the University of Copenhagen. From 1947 to 1951 he was employed by the Danish Meteorological Institute where he worked in geomagnetism and meteorology. In 1947–1948 he spent a year at the geomagnetic observatory in Qeqertarsuaq, Greenland, and this led to a life long affection for that country.

In 1951, Dansgaard was given the opportunity to return to the Biophysics Laboratory when a position opened for the operation of a new mass spectrometer. There were very few tasks for the mass spectrometer however, so he began to search out opportunities for himself and rebuilt the mass spectrometer for the analysis of water isotopes. In June 1952, Dansgaard made a discovery that came to influence the rest of his scientific career. He discovered that it was possible to determine the temperature of the precipitating clouds by analysing the stable isotopic composition of rain water. In the following 12 years, he systematically collected water samples from all over the world in collaboration with the Danish East Asia Company, contacts in Greenland, a French expedition under Paul Emile Victor and later the International Atomic Energy Agency and World Meteorological Organization. He obtained his doctorate for this work, and in 1964, he published the paper: ‘Stable isotopes in precipitation’ in *Tellus*. This was a ground breaking paper in geophysics and geology.

During his collection of water samples in Greenland, Dansgaard visited the American base, Camp Century in 1964. Camp Century was a base set up during the cold war under the surface of the Greenland ice sheet some 200km east of Thule Air Base. Here he learned about a continuing activity by the U.S. Cold Regions Research and Engineering Laboratory (CRREL), Hanover, New Hampshire of drilling through the ice sheet. In 1967 he entered a collaboration with Dr. Chester Langway, and his group soon began systematic analysis of stable isotopes along the Camp Century ice core, and a few years later along the U.S. Byrd ice core from Antarctica. This work demonstrated that not only did the ice cores contain a detailed archive on past climate changes but also that past climate underwent many large and abrupt changes. Together with Langway and Professor Hans Oeschger, University of Berne, Dansgaard led the very first climate research motivated ice core drilling through the Greenland ice sheet at Dye-3 in south Greenland in 1979–1981. Dansgaard is therefore recognised by many as the founder of modern ice core climate research.

In 1972 Dansgaard became leader of the Geophysical Isotope Laboratory at the University of Copenhagen. He assembled

a strong group of 6–7 researchers and here the scientific work on ice cores intensified and the foundation stone was laid for a continuous strong Danish presence in the forefront of international ice core research.

During the 1980s the results from the Dye-3 ice core were published and they confirmed the Camp Century findings. Dansgaard was particularly interested in the discovery of a sequence of abrupt climate changes during the last ice age. Results showed that past climate had been unstable and that most of the climate changes had been very abrupt indeed. Internationally, the abrupt changes are now known as Dansgaard/Oeschger events.

His last great efforts were made from 1985 to his retirement in 1992. To his great disappointment it became politically impossible to continue the collaboration with the U.S., so he established a European collaboration which led to the GRIP ice core drilling in 1989–1992. GRIP became a project that generated results with a large impact, and the seeds were sown for the large European ice drilling projects in Antarctica, EPICA Dome C and EPICA Dronning Maud Land and the Greenland project NGRIP (now with U.S. participation). These four projects were completed with drilling technology developed by his group in Copenhagen.

The scientific results and political effects of these projects have been significant. The climate curves and the greenhouse gases from the ice cores have been central to the scientific contribution to the political discussions on global climate change.

After retirement in 1992, he kept up his working relationship with the group until age and fragile health forced him to slow down. The group has continued, and is today a centre of excellence for Ice and Climate at the Niels Bohr Institute funded by the Danish National Research Foundation.

As teacher and ‘boss’ Willi Dansgaard was never dull. Whole generations of students within medicine, geology, geography and physics have felt his sharp tongue when he experienced ‘sluggishness and sloppiness’ in his physics classes. However nobody doubted his competence. His style of leadership in the group was marked by his hot temper, his very short patience with ‘details’ and his strong focus on the scientific goals. He was very good at including everybody, senior as well as very junior, in important decisions and this created a very strong team spirit. Apart from his scientific productions, Dansgaard also wrote several books and popular articles on his work and he authored comprehensive teaching material which is still in use.

Willi Dansgaard received the Hans Egede Medal from the Royal Danish Geographical Society, the Vega Medal from the Royal Swedish Society of Geography and Anthropology, the Tyler Prize from University of Southern California, the Seligman Crystal from the International Glaciological Society and the Crafoord Prize, which he shared with Professor Nicholas Shackleton. He was member of the Royal Danish Academy of Science and Letters, of the Royal Swedish Science Academy and the Icelandic Science Academy.

Willi Dansgaard will be sorely missed by the researchers at the Centre of Ice and Climate; but he lives on in our research. He leaves behind three children and 6

grand children. (Jørgen Peder Steffensen, Centre for Ice and Climate, Niels Bohr Institute, University of Copenhagen, Denmark)

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John Bryan Heaney, who died in November 2010 aged 79, was an outstanding field surveyor who made a major contribution to the mapping of South Georgia and created the first accurate map of Gough Island.

Born in Burma on 26 February 1931, Heaney was the eldest child of Brigadier G. F. ('Tim') Heaney, the last British Surveyor-General of India. His early years in the sub-continent fostered an adventurous spirit and a deep love of the outdoors, especially among mountains. It also trained the young Heaney to climb, ski, swim and camp: and made him at home among diverse cultures.

Given his parentage, it was perhaps natural that John Heaney should be chosen for training as a surveyor during his national service in the Army in 1949–1951. This training in turn opened the way to his first expedition – for when his army instructor had to decline an invitation to join Duncan Carse's first South Georgia survey he suggested Heaney in his place. The party duly arrived at King Edward Point on 1 November 1951 in the Salvesen vessel *Southern Opal* and were based in the vacant gaol! From Grytviken they explored the mountain spine of the island, discovering the break between the Allardyce and Salvesen ranges west of Royal Bay. The general structure of the island became clear and nearly 40% of it was mapped by Heaney and his fellow surveyor Gordon Smillie before the party left in April 1952. Working particularly closely with the late Kevin Walton (who became a lifelong friend), Heaney covered the southern part of the area, including the glacier that now bears his name.

After South Georgia, John Heaney went to Christ's College, Cambridge, in October 1952 to read Mechanical Sciences. He also applied for a job as an engineer with Shell Petroleum. But before joining the world of work he wanted to lead his own expedition and this brought him to the Scott Polar Research Institute where his obvious competence, enthusiasm and determination impressed Dr Brian Roberts. Heaney had been planning to take a party to Edge Øya in Svalbard, but Roberts thought otherwise. Perhaps it was his part-time role as Head of the Polar Regions section in the Foreign Office that made him sensitive to the need to know more about Gough Island, a British possession 230 miles south southeast of Tristan da Cunha in the middle of the South Atlantic. He told John Heaney that it was 'a plum for an Expedition', and Heaney threw himself into organising the Gough Island Scientific Survey, aided by the fact that he had passed the examinations for his degree and secured his place with Shell by the start of his final year.

Heaney's plan was straightforward. He recruited a team of scientists who could, between them, document all the major features of the island. He himself would do the mapping assisted by Robert Chambers, a skilled Cambridge mountaineer. Botany was the preserve of the sole Oxford representative, Nigel Wace, who had been at school with Heaney in Kashmir. Michael Swales, an experienced ornithologist was to cover the birds and seals, Martin Holdgate, the senior scientist in the party, to collect invertebrate animals, Roger LeMaitre to deal with the rocks

and Philip Mullock to act as radio operator and assistant weather man. Thanks to the good offices of Brian Roberts' friend Allan Crawford, Port Meteorological Officer in Cape Town, the South African Weather Bureau agreed to second Johannes van der Merwe as senior meteorologist. The budding world of television showed interest and although David Attenborough reluctantly declined a place because Heaney was in no position to pay a salary, a contract with a television company allowed James Hall to be recruited to film the expedition and the island's wildlife. Supported by the Scott Polar Research Institute and the Royal Geographical Society, the Gough Island Scientific Survey secured the equipment, transport and funding it needed and left for the South Atlantic in August 1955.

But they left without the expedition's leader! Heaney had been diagnosed with tuberculosis by the Shell doctors in the course of a routine medical check, and while he responded well to treatment they would not give him the all clear. Chambers took over as leader and surveyor, and encouraged the party to make the best of six weeks on Tristan da Cunha, but he in turn was incapacitated with a slipped disc during the landing on Gough Island on 13 November 1955 and had to be evacuated. The baton passed to Holdgate, who had no training or experience as a surveyor. The map, a key aim of the expedition, was in jeopardy. And even though Heaney's health was clearly improving, he had just married his fiancée, Catherine Haller, and seemed out of the picture. But the new Mrs Heaney was made of stern stuff. 'You'd better go and sort them out!' she said. Accompanied by two young Tristan islanders, Harold Green and Ernest Repetto, both skilled boatmen, Heaney arrived on Gough Island on 4 February 1956. He took over the mapping, working with Holdgate (who had already made extensive collections of invertebrate animals). The result was a detailed plan of the island, whose geographical position was adjusted several kilometres as a result of star sights. The map was published by the Royal Geographical Society on a scale of 1: 40,000 in 1957.

The Gough Island Scientific Survey was in many ways a model of how a well-planned private expedition could achieve valuable scientific results with modest resources. Numerous publications flowed from it, and several of its members subsequently followed academic careers for which their work on Gough provided a foundation. It even ended in financial surplus, thanks to selling its hut and remaining stores to the South African Weather Bureau which has kept the weather station running, albeit at a different site, to this day. And this financial surplus, augmented by profits from film and book contracts, allowed the expedition to create a Gough Island Fund at the Royal Geographical Society. All this is testimony to John Heaney's vision and skill in planning and in choosing a party that worked well together and achieved results. The Gough Island Scientific Survey put the island on the world's scientific map, and also drew new attention to the other Tristan da Cunha islands. Gough and Inaccessible Islands are now World Heritage sites, recognised as probably the most important seabird islands in the southern temperate zone. Heaney had reason to be proud of his contributions to our knowledge of the subantarctic and southern temperate region.