

OBITUARY

J. ARMAND BOMBARDIER, the Canadian engineer, died at Sherbrooke, Quebec, on 19 February 1964, aged 56. While operating a small garage in Valcourt, Quebec, between 1926 and 1937, he experimented with various designs of tracked vehicles for use in snow. In 1937 he started commercial production of passenger-carrying Snowmobiles, one of the earliest successful vehicles of this type. Bombardier became President and General Manager of Bombardier Snowmobile Ltd; or to give it its French name, L'Auto-neige Bombardier. The firm produced many thousands of snowmobiles with numerous improvements on the original designs. Production of a 12-passenger model was started in 1947, and later a 15-passenger model, followed by the Muskeg tractor and the Skedoo in 1959. The snowmobile revolutionized winter transport since it proved satisfactory in conditions where all other methods of passenger conveyance were impractical. With the adaptation of standard front wheels interchangeable with skis, the snowmobile could be used throughout the year, not only on snow but on marshy land or in mud.

PAUL GELTING, the Danish botanist, was born in Bornholm. He died in February 1964 at the age of 59. His long connection with Greenland began when he accompanied Lauge Koch's expedition to the north-east of that country in 1931–34 as botanist, returning to the same area in 1938 and again in 1939 with expeditions led by Count Eigil Knuth. After a period teaching at the university in København he returned to Greenland in 1946 as leader of the Arktisk Station at Godhavn, and remained there until 1954. Thereafter he taught at the gymnasium in Aurehøj and lectured at the University of Uppsala. Gelting published a large number of biological, botanical and geographical papers including "Studies on the vascular plants of east Greenland between Franz Joseph Fjord and Dove Bay (lat 73° 15' to 76° 20' N)" (*Meddelelser om Grønland*, Bd 101, Nr 2, 1934) and "Studies on the food of the east Greenland Ptarmigan..." (*Meddelelser om Grønland*, Bd 116, Nr 3, 1937). He was co-author of a volume in the series *Vilde planter i Norden* (*Wild plants in Nordic Countries*).

REGINALD WILLIAM JAMES, FRS, the distinguished British physicist, was born in London on 9 January 1891 and died in Cape Town on 7 July 1964.

He was educated at the Regent Street Polytechnic and St John's College, Cambridge, where he was a Foundation Scholar, graduating in 1912 with first-class honours in physics. After two years research studentship in the Cavendish Laboratory at Cambridge he joined Shackleton's *Endurance* expedition as physicist—he records that the only questions Shackleton asked him in a ten-minute interview were whether his health was good, if he suffered from varicose veins, if he had a good temper and if he was able to sing sufficiently well "to shout a bit with the boys". After the wreck of *Endurance* James played an important part in the saving of the expedition by determining the longitude of the floe on which they were drifting when the ship's chronometers had become unreliable.

On his return to England he was commissioned in the Royal Engineers and did pioneer work in the development of sound ranging as a method of discovering the position of enemy guns.

Between 1919 and 1937 James was on the staff of the Physics Department of Manchester University as Lecturer and later Recorder in Experimental Physics, making for himself a world-wide reputation as an X-ray crystallographer.

In 1937 he accepted the Chair of Physics at the University of Cape Town, retiring in

1957 when he was appointed Professor Emeritus. Perhaps the most significant of his many contributions to the University was the part he played in establishing research sections in his, and other, departments. Throughout his tenure, and particularly during 1956 and 1957 when he served as Vice-Chancellor and Acting Principal, his integrity, statesmanship and devotion to duty were of the greatest value to the University.

LAUGE KOCH, the Danish polar explorer and geologist, died in København on 7 June 1964, at the age of 71. His work in Arctic Greenland extended over a period of 46 years and was outstanding both in scope and effectiveness.

Koch was 20 when, in 1913, he had his first experience of Arctic field work in Disko, west Greenland. From 1916 to 1918 he was cartographer and geologist to Knud Rasmussen's Second Thule Expedition. He returned to the same area from 1920 to 1923 as leader of the Danish Bicentenary Jubilee Expedition. At any one time these expeditions consisted of no more than two or three Europeans assisted by Eskimos. Journeys were made using Eskimo equipment and travelling methods throughout, and depended largely on successful hunting. Game was so scarce after their return across the ice sheet in 1917, that Koch's companion, the botanist Dr Thorild Wulff, died of starvation and Koch himself was only saved by the arrival of Rasmussen's relief party. In spite of the recurrence of conditions of extreme physical hardship, Koch was able to achieve a considerable amount of cartographic work. Melville Bugt was mapped in outline in 1916, and the central part of the north-west coastline of Greenland, as far as De Long Fjord, in 1917. In 1921, he extended his reconnaissance survey round the coast of Peary Land and returned by way of Independence Fjord and the inland ice. His survey work finally substantiated the belief that no continuous "Peary Channel" existed separating Peary Land from the main Greenland land mass. The results of this topographical work have been published in many papers—perhaps most completely in the 18 sheets of the *Map of north Greenland*, 1:300 000, published by the Danish Geodetic Institute in 1932. Koch's geological observations were the first to be made in many of these areas and were published in a number of papers. He also brought home fossil collections which aroused great interest.

From 1926 to 1927, Koch led the first of his remarkable series of expeditions to central east Greenland. This was transitional in style. While he, accompanied by two Greenlanders, carried out a number of lengthy dog-sledge journeys northward along the coast, his two companions, the Danish geologist, A. Rosenkratz and the British palaeobotanist T. M. Harris, concentrated in the Disko region of west Greenland again. In the summer of 1929, he returned to central east Greenland with four geological parties and one botanical one. In 1930 he led another summer expedition of similar size and scope to the same area.

In 1929 Koch's PhD dissertation was published in København entitled the Stratigraphy of Greenland (*Meddelelser om Grønland*, Bd 73). This included a lexicon of stratigraphical units and also a general discussion of the state of knowledge about the structural history of Greenland. He clearly demonstrated the exceptional interest of the geology of the extensive ice-free areas north and east of the ice sheet to which he was to devote the rest of his life.

From 1931 onwards Koch was able to plan east Greenland field work on a rather longer-term basis. His Danish Three-Year Expedition, 1931–34, represented a new peak in the scale of his operations. Each summer, over 60 men were working in the field and in 1933 this number reached 109. Wintering parties, totalling about 15 men, operated each year from up to three bases. The Danish Two-Year Expedition, 1936–38, was only slightly smaller and was similar in general organization. The field parties were mainly geological and topographical but zoological, botanical and archaeological parties were in the field for part of the time. The scientists were from many countries and many of them already well established in their research fields. Expedition ships,



LAUGE KOCH

Photograph, Chr Vibe

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motor-boats and sledges were supported by seaplanes which also carried out important and widespread topographical work. The topographical work was incorporated in a number of sheets published by the Danish Geodetic Institute. Numerous geological papers, mainly in *Meddelelser om Grønland*, appeared and in 1950 a set of geological maps on a scale of 1:250 000 was produced.

Koch's *Geologie von Grønland* (Berlin, Bornträger), published in 1935, aroused strong published protest in Danish geological circles on grounds of inaccuracy and insufficient acknowledgement of the work of others. This personal antagonism was to overshadow Danish geology for many years.

After the Second World War, in 1947, Koch again started work in central east Greenland, and by the summer of 1949 he had an expedition of 97 men in the field. From 1950 onwards, his expedition members were transported to Greenland by aircraft rather than ship, and overwintering was abandoned as superfluous after 1952. Helicopters were used for the first time in 1954. His scientists were again drawn from many different countries, particularly Britain, Denmark, Germany, Sweden and Switzerland, and his remarkable field organization made it possible to attract senior and experienced men.

While this work was proceeding in central east Greenland, Koch also turned his attention to the highly inaccessible parts of north-east Greenland which he himself had visited as a young man. In 1937, his expedition ship was able to reach lat 79° N and flights were made as far as the south-east of Peary Land. The next year he organized an expedition which used a long-range Dornier flying boat, based in Kongsfjorden, Spitsbergen, to fly over north-east Greenland. This resulted in the preparation of new topographical maps and the collection of much new geological information. In 1952 and 1953 he used aircraft to establish and work from a base in lat 80° N. Ground parties were also in the field. Extensive geological reconnaissance was made from the air in 1958.

His last major expedition was in 1958. He planned to complete, by 1962, his field work farther south, in the Scoresby Sund region, but finances were not forthcoming. With the cessation of his field work, Koch turned his attention to a characteristically vigorous study of the literature of Pre-Cambrian geology. He travelled widely to discuss this work with other geologists and seek out the literature. He was taken ill in the United States during one of these journeys.

The full effectiveness of Lauge Koch's Greenland work can be judged from the quantity of important publications which has resulted from it. He placed great stress on publication of results, and the successful financing of this part of the work resulted in many lavish volumes of *Meddelelser om Grønland*, well over 20 000 pages of which can be directly attributed to his expeditions. Particularly in his earlier years, the rapidity of publication of general expedition reports and interim scientific papers was remarkable. Koch's life spanned a period of great change in methods of polar travel for which he was, to some extent, responsible. At the same time, his resources of physical and mental energy and his flare for innovation, planning and leadership were always the servants of his belief in science.

Two recent summaries of his work are:

J. W. Cowie. 1959. Lauge Koch's Expeditions to East Greenland, 1926 to 1958 *Polar Record*, Vol 9, No 63, p 547-52.

L. Koch. 1961. Journeys and expeditions in the years 1913-59: summary. *Geology of the Arctic* (ed G. O. Raasch). Vol 1, p 293-98. P. F. F.

JOHN AITO PIHLAINEN, the Canadian permafrost authority, was born in Finland in 1926 and died in Ottawa in January 1964. He emigrated to Canada with his parents in 1928 and graduated in engineering from McGill University in 1950, gaining his MSc at Purdue University two years later. He joined the Division of Building Research of

the National Research Council and pioneered the Division's investigations on permafrost and associated construction problems in northern Canada. In 1952 he established the Division's Northern Research Station at Norman Wells, and later took a leading part in the permafrost engineering studies associated with the building of the new town of Inuvik.

He left the National Research Council in 1960 and entered into private practice as an Arctic consulting engineer.