Memorial to Hans W. Ahlmann 1889-1974

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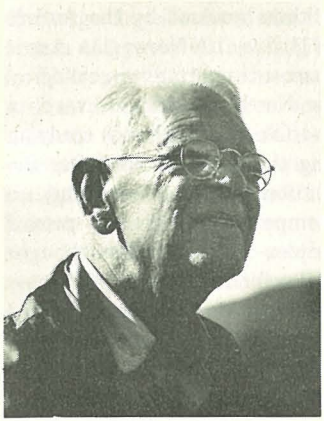

The Grand Old Man of international glaciology and geography, Hans W:son (for Wilhelmsson) Ahlmann, died in Stockholm March 10, 1974, at the age of 84.

As a young student, Hans Ahlmann joined the group around Gerard De Geer, the great Swedish Quaternary geologist, who at this time was in the midst of building up his "varved clay chronology," later known as the "Swedish time scale." As De Geer's assistant during a Spitsbergen excursion in 1910 (arranged for the International Geological Congress in Stockholm), Ahlmann had his first opportunity to study glacial landforms *in statu nascendi*. However, it was not during this summer that his interest became focused on present-day glaciers—that came later. Then it was morphology and the physical processes governing the development of landforms that fascinated him. The rapid changes in the arctic environment impressed him: the high silt content in the glacial rivers, the great amounts of moraine carried by the fast-moving glaciers, and the intense frost weathering above the beautiful talus cones—all were contributing to forming the landscape at that very moment.

Even though one can trace the influence from De Geer in Ahlmann's earliest publications (those concerned with the "Middle Swedish End Moraines," that is, from Younger Dryas period), one can also notice that when De Geer and his varved clay team moved farther north and closer to the final ice divide, Ahlmann separated partly from the group. He worked in the same area but with other problems—the geomorphological development rather than the geochronological analysis of varved sediments.

During World War I, travel in foreign countries was quite restricted, and Ahlmann spent most summers on field work in Norway, leading up to his most significant geomorphological thesis, "Geomorphological Studies in Norway." He considered the large valleys and deep fiords to be carved out mainly by fluvial action and the glaciers responsible only for the U-shape and overdeepened bottoms. As a supporter of William Morris Davis, he distinguished several stages with the "strandflat" as the latest stage in this development. This opinion was contradictory to that of the great Fridtjof Nansen, who maintained that a strandflat must be formed under arctic or glacial conditions by frost shattering in close connection with the so-called ice-foot, that is, along the actual shoreline. This scientific controversy between Nansen and Ahlmann was never really settled. According to present opinion, the strandflat is a result of several denudation processes, where rivers, sea waves, frost shattering, and glaciers all work together.

Because of his field work in Jotunheimen, the high massif in south central Norway, Hans Ahlmann gradually became a glaciologist. He was an artist at heart. From 1913 to 1914 he even tried his luck as an active artist in Paris and, according to his own words, it was the beauty of the glaciers that made him devote more and more of his scientific production to glaciology. In the 1920s his glacier studies were rather conventional, but

his attention gradually became focused on the relationship between the climate and the glacier's life conditions.

In 1930 a Norwegian expedition found the remains of the Andrée expedition on Hvitöya in the northeasternmost part of the Svalbard (Spitsbergen) archipelago. Andrée with two companions had tried to reach the North Pole by balloon in 1897 and had perished on Hvitöya after months of unbelievable hardship in the pack ice. The diaries were well kept and of great interest, the film could be developed after 33 years, and the narrative of the expedition (published in 1931) became an international best seller. Hans Ahlmann was the chief editor. The interest in polar expeditions aroused by the Andrée finds helped Ahlmann to get government funds for the 1931 Swedish-Norwegian Arctic Expedition. With this expedition Ahlmann initiated his most important glaciological project—the study of the present-day glaciation around the North Atlantic. He made a long sledge journey over the large ice caps of Nordaustlandet (North-East Land) studying the snow stratification in a great number of pits dug along the route. It was after the 1931 expedition that Ahlmann proposed a glacier classification based on snow and ice temperatures. This classification in polar, subpolar, and temperate glaciers has proved extremely useful, and even if the conditions are more complex than Ahlmann thought in 1931, his terminology is still used and is quite satisfactory for most descriptive purposes. His morphological classification, introduced in Geografiska Annaler in 1933, also had great influence on glacier research, and his attempt to quantify this classification by plotting area-distribution curves particularly stimulated the mass-balance studies to follow. The 1931 expedition was Ahlmann's first and only polar expedition in its old sense. The geological structure of Nordaustlandet was mapped by Oskar Kulling; P. F. Scholander studied the flora. The expedition ship was used for large-scale hydrographic studies, and the existing maps were greatly improved by the survey.

The next expedition, the Norwegian-Swedish Spitsbergen Expedition in 1934, marked the transition from more general polar research to a research program with very well defined geophysical problems. Coleader of this expedition was H. U. Sverdrup, who two years later became director of Scripps Institution of Oceanography at La Jolla, California. The integrated glaciological and meteorological research carried out at the base camp on Isachsen's Plateau set a pattern for all research in glacial meteorology for several decades to follow.

Ahlmann had increasingly directed his attention toward the climatological aspects of glaciology. The climatic improvement, which reached its peak in the 1930s and 1940s, had caused a rapid glacier retreat in most temperate areas, and the problems concerned with the causes of large glaciations and persisting ice ages were of immediate interest to many Earth scientists—just as they still are.

During the Svalbard expeditions, it had been difficult to identify annual strata in the accumulation areas, and this had made reliable mass-balance calculations impossible. But where, on a large ice sheet, could one expect to find a well-developed annual stratification, or at least a datable reference layer? In March and April 1934, the volcano at Grimsvötn near the center of Vatnajökull, Iceland, erupted, spreading a thick ash layer over the whole firn area. This ash layer would be easy to locate in pits and boreholes; thus Iceland and Vatnajökull were selected for the 1936 expedition. They did succeed in finding the 1934 surface wherever they dug or drilled deep enough; furthermore, the 1935 summer also was represented by a dirty layer. With the continued studies in 1937 and 1938 led by Ahlmann's pupil Sigurdur Thorarinsson, then a young student, they were able to describe quite accurately the regional distribution of accumulation on Vatnajökull, as well as annual variations, topographic influences, and also the

extreme importance of the atmospheric circulation for the abundant snowfall on the southern slopes of the ice cap. With more than 300 cm of water equivalent, the accumulation in the southeast makes the glaciers in this area more active than those in any other part of Europe.

The Vatnajökull expedition covered a wide range of glaciological and related studies. In particular, Thorarinsson devoted a great deal of attention to the hydrologic conditions of the ice cap and its surroundings. The meltwater streams carry great quantities of silt, and on the basis of Thorarinsson's analyses of water samples and measurements of river discharge, he calculated the mean denudation of the Hoffellsjökull drainage area to be 1 m in 180 yr—a fast-moving glacier over easily eroded tuffs and lavas.

While working up the material collected on Vatnajökull, it became apparent to Ahlmann that there was a need for a comparative study in a more continental area—on a glacier with an accumulation as small as it was large on Vatnajökull. Still keeping his studies within the North Atlantic area, Ahlmann selected a glacier, Fröyabreen, on Claveringöya, northeast Greenland. The accumulation and ablation as measured during the balance year 1939–1940 amounted to only about 15 percent of the corresponding values from Iceland. The arctic-continental environment of Fröyabreen also made the conditions quite different from the conditions at Isachsen's Plateau in 1934, with its more northerly position but with a distinctly maritime climate.

With the 1939 expedition, Ahlmann had closed the circle of his mass-balance studies around the North Atlantic, and even though his pupil C. C. Wallén made a thorough study of glacial-meteorologic conditions on Kårsajökeln in northern Swedish Lapland (a very good complement to Ahlmann's series of expeditions), Hans Ahlmann himself was not actually engaged in active field work after the war. Instead he found that it was time for him to sum up his results, and he did so particularly in his paper "Glaciological Research on the North Atlantic Coasts."

One, and in fact the most important, purpose of Ahlmann's glacier studies was to determine the relation between glaciers and climate. He had noticed that nearly all glaciers in temperate regions were retreating rapidly during the 1930s, and he stressed the importance of glaciology to climatological research. Since the glaciers in their size variations integrate both precipitation and temperature conditions over a period of at least several years, Ahlmann encouraged the international scientific world to initiate glacier studies also in remote areas, where there was a lack of long-term climatological data. His efforts were successful, which is well documented by the number of mass-balance studies conducted today.

His studies of what he called "the present climatic fluctuation" became a true multidisciplinary project. In his Bowman Memorial Lecture of 1952, "Glacier Variations and Climatic Fluctuations," he brought together material collected by glaciologists, climatologists, meteorologists, oceanographers, Quaternary geologists, geomorphologists, botanists, zoologists, historians, and others. This book was for many years one of the really useful reference books in its field.

A glaciologist can record climatic changes in glacierized areas, but other geophysicists will have to take over when it comes to explaining the causes of the changes. However, one question the glaciologist can ask, and perhaps even answer, concerns the global extent of climatic fluctuations. The causes may be totally different if the climatic changes are limited to certain climatic belts or if the change can be shown to extend from the North Pole to the South Pole.

In one of the reports from the Vatnajökull expedition, Thorarinsson had compiled all available information on glacier retreat, and he had found that the observed glacier

deficit agreed quite well with the observed rise of sea level. The obvious conclusion was that the large ice sheets had not changed at all. But were the observations good enough? Was the large Antarctic ice sheet in such perfect equilibrium?

Hans Ahlmann saw the great scientific value of a well-organized Antarctic expedition with an emphasis on glaciology and meteorology. Immediately after World War II he took the initiative on a joint operation with Sweden, Norway, and Great Britain. He was most anxious to get the international scientific cooperation started again as soon as possible; his close ties with Norwegian and British polar scientists and his deep affection for these two countries gave him the enthusiasm needed for overcoming all the practical and financial difficulties so common during those years. In 1945 he proposed a Norwegian-British-Swedish Antarctic expedition in a lecture to the Royal Geographical Society. In 1948 the funds were obtained and in November 1949 the expedition sailed. This international expedition differed in many respects from previous Antarctic expeditions. It had a well-defined scientific program centered on meteorology, glaciology, and geology; it went to the Antarctic for two years of systematic geophysical studies rather than for finding new land. In many of the reports from International Geophysical Year expeditions in Antarctica, it is stressed that the NBS expedition, "the Maudheim expedition," set the scientific pattern for the tremendously expanded activity during the IGY.

Hans Ahlmann had planned to visit the expedition base, Maudheim, in the summer of 1950–1951, but his government wanted otherwise. In the spring of 1950 he was asked to become the Swedish ambassador to Norway. It was a difficult decision to make. He had been a geography professor since 1929 and probably had closer ties to his department and his students than any teacher at his university—and he was in the midst of the Antarctic venture. However, Norway was his second home country. His wife, Lillemor, was Norwegian, and he had made several of his closest friends there. Above all, he realized that deep knowledge about the Norwegian people (their economy, their natural resources, and not least their sentiments) was far more important for a Swedish ambassador after the strenuous occupation years than any conventional diplomatic training. Thus, he left his department in 1950, but after his retirement in 1956 he returned as a very active professor emeritus.

Hans Ahlmann was not only an ambassador, appointed by his government—he was a fine diplomat, by birth or perhaps through a gradual, deeply human development. He was a great geographer, geologist, and glaciologist, but still, he may have been even greater as a scientist without any classification. His strictly human qualifications helped him to inspire not only his students but also people on the international scene; his deeply founded democratic conviction was questioned by no one. Few geographers from the West had better cooperation with their colleagues in the East than Hans Ahlmann. He accepted the challenge to open up all channels for a free scientific communication. As president of the International Geographical Union from 1956 to 1960, he had ample opportunity to use his great skill and wide experience.

During his last fifteen years, his interests were no longer mainly devoted to glaciology but rather to geography in its old sense, to man's relation to his environment, and to the sheer survival of mankind in an overpopulated world. What better could an old geographer in his seventies do to help but to disseminate knowledge about the critical conditions in developing countries? Until the very end, he wrote articles and edited books dealing with this overwhelming problem. His last reprint reached several of his friends on the day after his death.

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