
Chronicle

Henryk Arctowski and Antoni Dobrowolski in the hundreth anniversary of ‘Belgica’ expedition to Antarctica

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On 16 August 1997 one hundred years will have passed since the ‘Belgica’ sailed out to Antarctica. Two members of the expedition, led by Adrian de Gerlache de Gomery, were the Polish scientists Henryk Arctowski and Antoni Dobrowolski.

Henryk Arctowski was born on 15 July 1871 in Warsaw. He graduated from high school in Liege, Belgium, where he subsequently took up the study of mathematics and physics. Later he studied chemistry and geology at the Sorbonne. After having become acquainted with Adrian de Gerlache, he undertook to prepare and conduct the researches during the expedition. He studied glaciology under Prof. Hein in Zrich, Switzerland. Following this, he went to England, where he trained to do oceanological research under J. Murray, Buchanan and H. Robert Mill. His final period of study was at Uccle, Belgium, where he learned how to perform meteorological observations at the Institut Royal Meteorologique. These comprehensive preparations thus enabled him to conduct the research in Antarctica (Kosiba, 1959; Kosiba and Zych, 1959; Morozowska, 1996).

The other Polish member of the expedition was Antoni Dobrowolski. After graduating from high school in Warsaw, he was imprisoned for political reasons and sent into exile to the Caucasus, from where, however, he managed to escape to Switzerland. He had intended to study there, but went instead to Liege, where he studied biology. In 1897, after he had met Arctowski, Dobrowolski went aboard the ‘Belgica’. On the ship he performed the meteorological observations, did research into optical phenomena in the atmosphere, and studied the physics of ice and snow (Dobrowolski, 1914; *Great Universal Encyclopedia*, 1962; Ślabczyński and Ślabczyński, 1992).

The route of the voyage took the ‘Belgica’ past Madeira, the Canary Islands and the Cape Verde Islands, then across the Atlantic and along the shores of South America. In February 1898 the ‘Belgica’ reached Victoria Land in eastern Antarctica. She then sailed westwards into the

Bellingshausen Sea, and reached lat. $71^{\circ} 31' \text{S}$. It was March 1898. There the 'Belgica' froze in an icefield and drifted with it. In March 1899 the 'Belgica', at last free of the ice, set out for Belgium, and finally arrived back in her home country on 18 November 1899 (Słabczyński and Słabczyński, 1992). Arctowski and Dobrowolski had returned to Belgium earlier by a faster ship.

The collected materials and observations were now worked up, and from 1902–1908 ten volumes of studies and reports on the expedition were published under the title *Expedition Antarctique Belge – Résultats du Voyage du s/v 'Belgica' en 1897 – 1898 – 1899 sous Commandant de A. de Gerlache de Gomery – Rapports Scientifiques Publiés aux Frais du Gouvernement Belge sous la Direction de la Commission de la 'Belgica'*.

Arctowski was the principal author of volumes 3 and 4, which dealt with meteorology, optical phenomena and the southern lights. These included the observations collected by Dobrowolski under Arctowski's supervision, which were done every hour for a whole day. Clouds and ice crystals were observed. Another aspect studied was the wave-shift of depressions around Antarctica, and Arctowski put forward a theory to explain the phenomenon. The meteorological observations indicated that Antarctica was colder than it was thought to be at that time. The observations of ice and snow led Dobrowolski to establish the foundations of the physics of ice and snow (Kosiba, 1959; Dobrowolski, 1923). Much was learnt about the movement of the upper air layers from the movement and configurations of clouds. The structure of snow-flakes and hoarfrost was examined. The Earth's magnetic field was also studied (Dobrowolski, 1914).

Observations on optical phenomena in the atmosphere were conducted; Dobrowolski described these as 'rainbows, crowns of circles, arcs, stains and columns of light, unusually colourful dusks and dawns of a wonderful light'. On 20 August 1898 Arctowski noticed a halo in the shape of an arc consisting of two partially symmetrical arcs. In the German Literature this phenomenon is known as an *Arctowskische Bogen* – Arctowski's arcs. Mirages were also seen (Słabczyński and Słabczyński, 1992).

Arctowski was also the main author of volume 5, which covered oceanology, geology and glaciology. A barimetric map of the ocean was made on the basis of measurements taken while the ship was drifting. These measurements enabled Arctowski to state that the continental glacier of Antarctica lies some 400 metres deeper than the shelves of other continents; this is due to the pressure of the continental glacier itself. During the voyage, samples of water and sediments were taken. The temperature and salinity of the water taken from different depths were determined. Marine fauna and flora from different depths were examined and a collection of them was

made. Arctowski put forward a hypothesis of geological coherence between the Andes and the hills of Graham Land and its neighbouring islands.

The 'Belgica' expedition was of a pioneering nature and produced a vast set of observations on Antarctica. The research done by Arctowski and Dobrowolski were the beginnings of further meteorological, geological and oceanographical researches in Antarctica. Their findings were published in a number of foreign journals. Arctowski continued his work at the Institute of Geophysics and Meteorology at the Jan Kazimierz University in Lwow. Dobrowolski continued his research in Sweden and later in Warsaw. He also wrote a treatise on the natural history of ice (Kosiba and Zych, 1959; Kosiba, 1959; Ślabczyński and Ślabczyński, 1992; Morozowska, 1996).

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