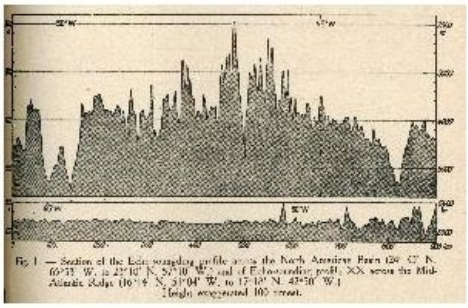
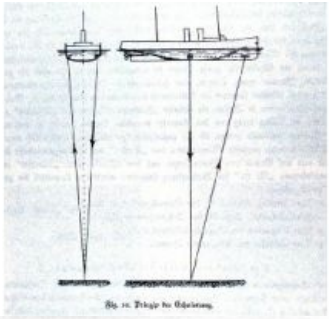
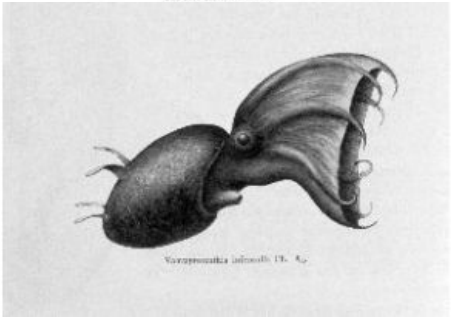
Some Early German Contributions to Oceanography







The names Augustus Petermann, Victor Hensen, Carl Chun, Fritz Spiess, Alfred Merz, and Gunter Dietrich are hardly household names. Even today their names are little known in the geographic, oceanographic, and hydrographic communities which they served so well. They were all part of a thriving German geographic and oceanographic community which made many advances in the three generations between the late 19th century and the advent of the Second World War. Their work is little known except to a few science historians and interested oceanographers, primarily as a result of the World Wars.

Collectively, their ships had such names as Germania, Gazelle, National, Valdivia, and Meteor. They went from the Arctic to the Antarctic and circumnavigated the Earth. The German impetus to exploration was initially fueled by the great geographer Augustus Petermann, who was also the publisher of Petermanns Geographische Mitteilungen. This journal was the premier geographic journal of the 19th century and provided up-to-date information concerning recent explorations and scientific expeditions. It also consistently produced many beautiful and original cartographic products. In 1866, Petermann wrote a pamphlet entitled Proclamation to the German Nation strongly urging German participation in the quest for the North Pole. Petermann was also instrumental in both reporting on and promoting ocean exploration as he produced many beautiful maps including the first bathymetric map of the Pacific Ocean, the first published map of the Congo submarine canyon, and many other notable bathymetric and hydrographic firsts.

In response to Petermann's urging, Germany mounted two expeditions: the first in 1868 which explored the region of northeast Greenland and the second in 1869. In 1869, the Germania sailed with the Hansa, a supply ship, and headed north into the Arctic Ocean. They reached approximately 75.5 north latitude before being forced back by the pack ice. This expedition nearly ended in disaster as the Hansa became separated from the Germania and was ultimately crushed in the ice. The crew of the Hansa constructed a shelter from coal dust briquettes and survived the winter drifting on the ice. Ultimately, they made their way to Greenland and were rescued by a Danish ship. Early Arctic surface water temperature maps, ice limit maps, and other scientific information resulted from these cruises.

Although the Arctic expeditions experienced modest success, the example set by these expeditions led to additional notable accomplishments. The Gazelle Expedition, contemporaneous with the Challenger Expedition, circumnavigated the Earth between 1874 and 1876. Efforts were made during this cruise to coordinate efforts with the Challenger such that maximum coverage of the oceans was effected. However, this expedition also had nationalistic overtones as the work of the Gazelle brought it to the shores of New Guinea and what is now known as the Bismarck Archipelago. Eight years after the expedition, Germany annexed this area and it became a German protectorate. The Gazelle was commemorated by its captain, Freiherr von Schleinitz, by the naming of the Gazelle Peninsula on New Britain Island. Incidentally, von Schleinitz became the first governor of the German New Guinea colony in 1886. However, the Gazelle also did much good oceanographic work dredging for the creatures of the deep sea, making numerous serial temperature observations throughout the world's oceans, and obtaining a number of abyssal depths to add to the hard-won growing store of oceanic data. It also made numerous ethnographic, botanic, and geologic observations during the course of the expedition.

Following the Gazelle Expedition, the next major German expedition was led by Victor Hensen on the ship National in 1889. This expedition is also known as the 'Plankton Expedition'. It had been a dream of Hensen's since at least 1867 to determine the primary productivity of the sea. Hensen is credited with being a founder of biological oceanography as he developed means to determine the aggregate amount of the microscopic life and biological detritus of the oceans which is the basis of both the oceanic food chain and the source of a significant amount of oxygen in the atmosphere. The old term for this material was 'auftrieb' which meant floating matter. Hensen in turn coined the term 'plankton', meaning drifter, to describe this material and defined it as follows: '... plankton is comprised of all particles and materials, which float in the water column, no matter whether they occur in the upper or deeper layers of the water column, or whether they are alive or dead.' Today we tend to think of Hensen's plankton only in terms of the living drifters of the sea.

Another decade would pass before Germany launched the Valdivia Expedition (1898-1899) to the Southern Ocean and then on to Sumatra before returning home via the Suez Canal. This expedition on the ship Valdivia was led by Carl Chun who produced a remarkably popular account of the expedition; Aus den Tiefen des Weltmeeres : Schilderungen von der Deutschen Tiefsee-expedition. (This book is available online at). Even if one cannot read German, the book is profusely illustrated and covers all aspects of the expedition which, in some respects, was a continuation of the plankton studies of Hensen. Chun's personality also shows through in this book as there are numerous caricatures of the ship's complement interspersed with many examples of beautiful artwork and photography encompassing shipboard operations, weather conditions, and the fauna and flora encountered. Chun, showing what could only be considered a sense of humor, discovered and named the 'vampire squid from hell', Vampyroteuthis infernalis .

More seriously, Chun studied the different types of plankton and how they fit into various ecological niches. He also discovered marine life at mid-water depths which put him at odds with the American oceanographer Alexander Agassiz. Agassiz believed that the upper levels of the ocean to 200 fathoms depth and the near-bottom had prolific life, but he believed that the mid-levels were the equivalent of a biological desert with little or no life. Ultimately Chun was proven right. In Agassiz's defence though, he was unlucky and subsequent investigators found little in the same areas that he sampled. The physical oceanographer of the expedition was Gerhard Schott who went on to publish numerous books on oceanography over the next forty years.

The last major expeditions of German oceanographers prior to the Second World War were those of the Meteor. The first Meteor Expedition (1925-1927) was literally launched to determine if gold could be economically extracted from sea water. To do this, the chief scientist, Alfred Merz, designed a series of predominantly east-west lines along which water samples, soundings, bottom samples, and even gravity cores would be obtained. Unfortunately Merz died early in the expedition and the scientific direction of the expedition was taken over by the Meteor's captain, Fritz Spiess. As it turned out, extraction of gold from seawater was not economical; but, from the standpoint of hydrographers and bathymetrists, the Meteor Expedition was a figurative gold mine. Approximately 67,000 acoustic soundings were made during the course of this expedition. These soundings revealed the ruggedness of the Mid-Atlantic Ridge, discovered the nature of the abyssal hills marching off from the axis of the Ridge, and hinted at the existence of a median valley. By 1938, subsequent expeditions by the Meteor led Gunter Dietrich to unequivocally identify the median valley of the Mid-Atlantic Ridge as well as surmise that the adjacent abyssal hills were roughly parallel to the ridge axis and each other.

World War II was approaching and oceanography in general turned towards defence-related research. Many great to almost great German scientists had greatly advanced the science of oceanography in the past seven decades. Much of this work was forgotten or preempted by others in the aftermath of the war. Perhaps this short essay will help kindle further interest in their research and accomplishments.

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