

## History of oceanography through ancient book collection of Polar Research Institute of Marine Fisheries and Oceanography (PINRO) library

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**Abstract:** The Polar Research Institute of Marine Fisheries and Oceanography (PINRO) is the oldest fisheries institution in the North of Russia. The Institute celebrated its 85<sup>th</sup> anniversary a year ago. PINRO takes pride in its science library which contains a collection of books about fauna of northern and arctic seas, scientific reports and materials from polar expeditions and investigations of the Northern basin. The foundation of PINRO library was from book collections of Murmansk Biological Station which was organized in 1881. At present the library is not very large but holds a collection of these unique ancient books in different languages which reflect the history of oceanography and fishery investigations.

In period from 1487 until 1528, more than half the Earth surface was discovered. Therefore this period is called the epoch of great discoveries. The first cruising with science task was conducted by **James Cook** between 1768 and 1771. In search of a probable South Continent in the Pacific, he fulfilled three voyages. His final expedition resulted in the discovery of the east coasts of New Zealand and Australia, and new knowledge on geography and oceanography was gained. About all three expeditions James Cook wrote a book *“A voyage to the Pacific ocean: undertaken, by the command of his Majesty, for making discoveries in the Northern Hemisphere: to determine the position and extent of the west side of North America, its distance from Asia, and the practicability of a northern passage to Europe... in the years 1776, 1777, 1778, 1779, and 1780.”* Our library has a translation of this book from English into Russian printed in St. Petersburg in 1810. J. Cook's three voyages initiated marine research expeditions and the number of them increased to 75 by 1872 including 25 around-the-world voyages. Each one obtained new hydrographic data. The french author **Albert-Montémon** edited in 1857 in Paris the book *“Round-the-world and Oceania voyages by Bougainville–Cook–Laperouse–Marion–Baudin–Freycinea–Duperrey–Dumont D'Urville.”* (*Albert-Montémon, A. “Voyages auteurs du monde et en Océanie par Bougainville–Cook–Laperouse–Marion–Baudin–Freycinea–Duperrey–Dumont D'Urville.”*). This book gives biographies and personal diaries of these explorers.

By the end of the 16 century, knowledge about the Arctic increased and the first Arctic maps charted from explorations were created and as a result of which attempts to reach the North Pole increased in number. Among Polar explorers of 19<sup>th</sup> century, captain **Karl Koldewey** is famous. Following his first failed attempt in 1863, he led the second German Polar expedition in 1869 which was much better equipped. But as a result the main objective of the voyage – to reach the North Pole – had not been accomplished. Both German voyages demonstrated that the course they had followed did not reach “an open Polar Sea” and allow access to the North Pole. *“The second German Polar voyage under the command of captain K. Koldewey in 1869 and 1870”* (Leipzig, 1874) is recorded in two volumes. Volume 1 describes the voyage and later the shipwreck of the sailing vessel “Ganza” as a result of ice, the crew disembarking on an ice-floe. The severe icing up of the screw steamer “Germany” and its' movement North along east Greenland is depicted. In Volume 2 can be found analysis of the research results on botany, geology, meteorology, hydrography, and astronomy. Sea mammals, fishes, sea birds and invertebrates were investigated also.

Continuous exploration of single parts of the World's Oceans generated the need for organizing an around-the-world hydrographic voyage with the aim of studying bottom topography, grounds of the ocean bed as well as physical, chemical and biological characteristics of ocean water. Such an expedition was led on corvette "**Challenger**" by England in 1872-1876. For three and a half years the ship carried out 362 deep-water hydrological experiments across 3 oceans. In each experiment details were taken of the depth, ground, bottom and deep-sea water samples and temperature. It also catalogued fauna and flora from different depths, as well as surface current and hourly meteorological observations. "Challenger" work was a new epoch in the evolution of oceanography. The findings were so colossal that 70 scientists were involved to analyse the results which spanned a period of 20 years and recorded in 50 different volumes. Amongst those are 8 volumes of general description and hydrography, 2 vol. of botany, and 40 vol. of zoology. Our library is proud of having the "*Challenger*" *Voyage Reports issued in London in 1880-1895*. ("*The Voyage of H.M.S. Challenger. 1873-1876.*")

Following the "Challenger" voyage and its findings, different countries organized hydrographic investigations.

The experience of voyages to some Arctic Seas showed that in the summer period they are accessible to ships. This resulted in the defining of shipping routes along all of the north coast of Europe and Asia from the Atlantic to the Pacific. The famous Swedish polar researcher **Nordensheld** (Nordenskiöld) completed this navigation successfully. Nordensheld headed the expedition on the ship "Vega" between 1878 and 1879. The "Vega" was the pioneering vessel to work the North Sea route from Norway to the Bering Strait with wintering in Chukotka. During the voyage and especially wintering many-sided investigations were carried out. Particular attention was focused on meteorology and hydrology, sounding the depth of sea water, observations on ice cover, terrestrial magnetism and zoology. Nordensheld described this voyage in a book "*Around the Asia and Europe on "Vega"* (Leipzig, 1882). This two-volume Gothic type edition is in the Pinro library. Also held are 5 volumes of "*Vega expedition observations*" (Stockholm, 1882), where flora, fauna, meteorology conditions of Arctic are documented.

Following "Challenger" example, Norway began to explore the North Atlantic. Voyage on a vessel "Voringen" was led by **H. Mohn** between 1876-1878. The area between Iceland, Spitsbergen and Norway was investigated. Observational data were analysed under the direction of H. Mohn and contained in 18 volumes of "*The Norwegian North-Atlantic Expedition 1876-1878*" publishing in Christiania (now Oslo) from 1891 and for many years later. The survey of sea fauna and flora, the structure of sea water are explained. Mohn pioneered the studies on beginnings of sea current.

The experience of Arctic exploration by different countries generated a need of joint and coordinated work. The first Polar Conference elaborated the program of works in the Arctic. It was decided to organize once every 50 years the **International Polar Year**. The first was in 1882-1883. 12 countries took part, 15 Arctic stations were build. PINRO has in its library two volumes of Gothic type of "*The results of German Polar expeditions*" (Berlin, 1890-1891).

In history, Arctic investigations by the Norwegian expedition under command **Fritjof Nansen** went down as a victory for scientific foresight and providence. Nansen's new plan of reaching the Central Arctic was based upon using the sea stream going from east Siberia to Greenland across the Arctic Basin. It required a ship to be built which was of a very strong design capable of resisting the immense ice pressure. The ship was named "**Fram**" (it means "Forward"). Nansen's idea was to leave from Siberia proceeding north and bound for the Arctic. The expedition would stay between ices and freeze in, and after that to drift to high north latitudes. At

that time it was high-risk idea but which was completed successfully. “Fram” started his voyage in 1893 and returned after a period of some three years. The scientific results of this voyage were very considerable. Nansen discovered the Arctic Ocean and it was determined that central Part of Arctic Ocean was a deep-water zone. Sea water temperature observations showed a stream of warm Atlantic water and also the movement of ice cover in the central part of Arctic Ocean was discovered. Investigations revealed a diversity of organic life in high north latitudes. Nansen wrote the book about his voyage in “Fram” and his sleigh-road (*F.Nansen. “Fram over Pollhavet”. Kristiania, 1897*). This work is one of the best Polar popular scientific literature. The same time it was printed in others countries too. PINRO library has a German edition of this book “*In Nacht und Eis. Die Norwegische Polarexpedition 1893-1896.*” *Leipzig, 1897*. in two volumes. *Scientific results of “The Norwegian North Polar Expedition 1893-1896”* were published in six volumes in English language. (“*The Norwegian North Polar Expedition 1893-1896. Scientific results: in 6 vol.*”/ *Ed. F.Nansen. Christiania, London, New York, Bombay, Leipzig. 1990-1906*). This work is in our library collection also.

Denmark explored its own seas and took part in investigation in North Atlantic. It organized the scientific deep-sea expedition on board the vessel “**Ingolf**” in 1895 for exploration the Arctic seas around Iceland and Greenland. The collection of zoological data being the principal object of the expedition. Results of the expedition, which is contained in many volumes, was published from 1898 in English language. (“*The Danish Ingolf-expedition 1895-1896*”. *Copenhagen, 1898-1953*).

Following on from the English “Challenger” expedition which carried out hydrographic researches in Antarctica, a Belgian voyage on a ship “**Belgica**” was significant. The leader of voyage was Belgian **Andrien Gerlache de Gomery**. At the height of Antarctic summer season in 1897 in the area of South Shetland Islands the numerous staff of scientists fulfilled sampling, and meteorological and magnetic observations, topographical survey. After a violent storm the ship was blocked up with ice. Wintering was tragic. During the ice-drift with the vessel the scientists continued their investigations. Only in 1899 the ship could go back to open sea and the voyage was completed. *Results of “Belgica” voyage in 1897-1899 were edited as Scientific reports in 14 volumes.* (“*Resultats du voyage du S.I. “Belgica” en 1897-1898-1899. Rapports scientifiques.*” *Anvers, 1901-1909*)

In the Russian part of Arctic between Murman, Spitsbergen and New Land from 1898 and for the following 8 years, Russian fishery research expedition was carried out on a vessel “**Andrey Pervozvannyj**”. It was the first of it’s kind in the world, a dedicated marine scientific research vessel equipped with new devices. The vessel was designed and built under the direction of Russian scientist N.M. Knipovich, and was given the name of Saint apostle Andrey Pervozvannyj worshiped in Russia. Since 1902 the expedition was headed by L.L. Breitfus, and it worked till 1908 being the first scale complex expedition, the investigations of which have remained important until the present day. These Murman Fishery Research Expeditions had collected enormous data on hydrographic regime of Barents Sea, its bottom, underwater topography, fish and invertebrates species composition, as well as opening new fishing banks. N. Knipovich was a founder of fishery research in Russian North and initiator of new field - fisheries oceanography. And so Polar Research Institute bears the name of N. Knipovich. Certainly PINRO library has works of this scientist and annual “*Reports of Murman Fishery Research Expedition*”. Some repots have autograph of L. Breitfus.

We stop at this point because it can take some days to observe hydrography development by means of book collection of PINRO library. Now I could say PINRO library possesses enough complete national book collection on fisheries research.