SEVENTY-FIVE YEARS

From the Hydrographischen Bureau of the Royal Prussian Navy Department to the Nautischen Abteilung of the Oberkommandos der Kriegsmarine. 1861-1936.

(Extracts from a German pamphlet entitled : 75 *Jahre vom Hydrographischen Bureau des Königlich Preussischen Marine-Ministeriums zur Nautischen Abteilung des Oberkommandos der Kriegsmarine* - Berlin 1936).

(Translated from the German).

PART I.

HISTORICAL DEVELOPMENT OF THE NAUTISCHEN ABTEILUNG

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The *Marineabteilung* (Naval Section) which from 1848 to 1854 constituted the Fourth Section of the War Department in the Royal Prussian War Ministry, was then lacking in the most rudimentary devices and equipment for the collation and elaboration of Hydrographic data, and was therefore entirely incapable of supplying even the most urgent nautical needs of the Navy.

When, by Royal Decree of 14th November 1853, the "Admiralty" was created as the central authority for naval affairs, Professor H. BERGHAUS took the occasion of this reorganization to address a petition to the newly-appointed Commander-in-Chief of the Navy, Prince Adalbert of Prussia, for the establishment of a Hydrographic Office.

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As a poor substitute for a Hydrographic Office there was established in 1854 at the naval dockyard in Danzig a navigation depot which, in addition to the compilation of all hydrographic data, was charged with the duty of supplying the ships placed in commission with charts, nautical tables, handbooks and nautical instruments.

In November 1854, Prussia took over the Jade district and was then obliged to undertake certain hydrographic surveys by the Royal Prussian Navy in this district. From 1855 the first surveys of the waters of the Jade were carried out under the direction of the renowned geodesist of the General Staff, Major-General BAEYER, who carried out the main triangulation between the North Sea Islands and the astronomical determination of the Island of Heligoland, then a British possession.

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THE HYDROGRAPHISCHES BUREAU OF THE ROYAL PRUSSIAN MINISTRY OF MARINE. 1861-1879.

In April 1861 the "Admiralty" was superseded by the Ministry of Marine and the Naval Staff. In this new Ministry the lack of a Hydrographic Office soon became apparent when the question arose as to the production of new nautical charts. By Royal Decree of 25th September, 1861, there was therefore established the *Hydrographisches Bureau* (Hydrographic Bureau) of the Navy Department. On 1st October 1861, the following duties were assigned to this Bureau, viz.—

a) The survey of the coasts, harbours, river mouths, etc. and the production, correction and distribution of charts;

b) Storage of the charts and charge of the correspondence connected therewith;

c) Test and distribution of nautical instruments.

Further, the collection of Notices to Mariners was one of the most important functions of the Bureau, since the charts and nautical books had to be kept constantly up to date

by means of these Notices. Soon considerable hydrographic activity was manifested on board ships both in home waters and on foreign station. The material thus obtained was subjected to the closest scrutiny and elaborated for use on new charts. Copies of the field sheets were then placed gratuitously at the disposal of the Hydrographic Services of other nations, and thus the way was opened which later developed into a regular exchange of documents between Hydrographic Offices. The sphere of activities of the Hydrographic Bureau soon became greatly enlarged. After the war of 1866, as a result of which the coasts of Schleswig-Holstein and Hanover fell to Prussia, the obligation to carry out further coastal surveys became more and more pressing.

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By Royal Decree of 30th November 1871, the Admiralty was founded as the sole Central Authority for the then Imperial Navy. In this new organization the importance of the Hydrographic Office soon won special recognition through its first Chief : Lieut.-General v. STOSCH. His keen mind readily perceived that there were no better means for increasing the prestige of the Navy than through scientific activities and the advancement of general maritime interests. Particularly significant was the fact that the first organization order of the new Chief of the Admiralty enumerating the duties of the Hydrographic Office, contained a first paragraph which read :— "The Hydrographic Bureau is charged with the duty of collecting and making available to all ships of the Navy and Merchant Marine all essential or useful information".

Further, paragraph 5 should be specially noted, which reads :— "The Hydrographic Bureau in its relations with outside agencies and for all scientific purposes is an independent organization which shall bear the designation :— *Kaiserliche Admiralität, Hydrographisches Bureau* (Imperial Admiralty, Hydrographic Bureau). For administrative purposes it is directly under the Chief of the Admiralty".

The Chief of the Admiralty thereupon put forward a very comprehensive and gigantic programme of work the aim of which was :— The surveying of all properly so-called maritime areas; the publication of charts and Sailing Directions for all seas; improvement of all nautical instruments and methods of calculation; nautical-scientific education and maritime scientific research in so far as necessary and useful for the requirements of navigation.

Primarily the most urgent question was the solution of the compass problem at that time of transition from wooden to iron ships and the armouring of warships.

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On July 1st 1872, Dr. Georg NEUMAYER was appointed Head of the Hydrographic Office by the Chief of the Admiralty. On his nomination as Hydrographer of the Admiralty, Neumayer expanded these multifarious activities to include the exploration of the earth's magnetic field; and determined the magnetic elements at various places on the coasts of the North Sea and the Baltic. Based on those results, the first magnetic chart of the Northwest German coasts was prepared for the year 1873. In 1875 there followed the first instruction regarding the determination of deviation of the compass aboard warships. Dr. Neumayer was also greatly occupied in the sphere of surveying, testing surveying instruments, the elaboration of tidal observations, the development of nautical and oceanographic instruments etc. Further, he was indefatigable in the preparation of special scientific instructions for warships bound for foreign stations, in which full information was given regarding all observations to be made in the realm of hydrography.

The Notices to Mariners (*Nachrichten für Seefahrer*), which had been appearing as a weekly publication since 1870 were supplemented in 1873 by the Hydrographic Notices (*Hydrographischen Nachrichten*) whose contents were designed to meet the practical needs of seafarers and which in 1875 was expanded into the *Annalen der Hydrographie und maritimen Meteorologie*. In the year 1874, systematic tests of chronometers were inaugurated. This led in 1874 to the establishment of the observatory at Wilhelmshaven and to the construction of another at Kiel in 1883.

The surveys also proceeded at an accelerated pace. In order that officers might be thoroughly trained for this service, a special course in surveying was instituted in the Hydrographic Office in 1875. A favourable opportunity for the independent co-operation of the Navy in the solution of scientific problems was offered in the year 1874 at the time of the passage of Venus across the sun's disk, which could only be observed in distant parts of the earth. The cruiser *Gazelle* was fitted out for this purpose and dispatched to the Kerguelen Islands. The results of this Expedition were published in five volumes entitled: *The Scientific Expedition of S.M.S. Gazelle* 1874-1876. (Die Forschungsreise S.M.S. Ga-

zelle 1874-1876). The success of this undertaking and the enthusiasm aroused amongst the populace for German exploration at sea led to the founding of the *Deutsche Seewarte* in Hamburg in 1875 as the Central Bureau for Maritime Meteorology. It was also charged with the task of supplying the nautical-scientific needs of the Merchant Marine. This took some of the burden of work from the Hydrographic Office and the latter was then able to devote its entire efforts to Hydrography. From that time on the strictly hydrographic activities of coastal surveying, production of nautical charts and documents took precedence in the work of the Hydrographic Bureau which, henceforth, should above all continue to supply all nautical scientific needs of the Navy. The first Director to be appointed to the newly founded *Deutsche Seewarte,* which was under the orders of the Admiralty, was Prof. Dr. NEUMAYER, who sowed the seed that bore fruit as the present *Deutsche Seewarte.*

In the following years the Hydrographic Service continued to expand. The surveying in home waters was completed during the years 1872 to 1890. Hand in hand with this went new editions of Sailing Directions for the North Sea and the Baltic, and new Tide Tables. In the Imperial Navy Yard chart depots were founded, and these were later expanded into instrument depots. In this manner the Hydrographic Service was again relieved of some of the pressure of work but, on the other hand, it was obliged to undertake further work in connection with the buoyage, pilotage and coastal lights — the importance of which had greatly increased when the Navy had been charged with the buoying of the channels of the military harbours and the training of special pilots for the Jade district. This rather extensive increase in the duties of the Hydrographic Bureau was given consideration in an Imperial Decree of 16th December 1893, and the

HYDROGRAPHISCHES AMT 1879-1893

was created.

Under the expert guidance of the former leader of the *Gazelle* expedition, Captain Baron v. SCHLEINITZ, the development of the new Office progressed step by step, erected solidly upon a firm foundation. On the other hand those duties which were purely administrative were gradually cast off, in order that all the energies might be devoted to the service of hydrography. In addition to the further development of the Service of Nautical Information, surveys and the production of nautical charts and documents were energetically prosecuted. Already in 1882 the most essential charts of the German waters had been produced, as well as a general chart of the English Channel. In the year 1885, annual revision surveys of German coastal waters were begun. Aboard the ships on foreign stations as well as those in home waters various kinds of oceanographic research were carried out. In the North Sea in particular systematic observations were made on the tides, the ocean currents, the salinity, density and temperature of the sea water, etc., the results of which were of the greatest importance to navigation and the high seas fisheries.

With the entrance of Germany into the circle of colonial powers, the Imperial Navy was faced with the problem of extending to the newly acquired colonies the hydrographic work which had formerly been confined to home waters. Here was an entirely new province for the work of surveying, description of coasts, tide and current observations and all other hydrographic activities, since in the German Protectorates in Africa and in the South Seas, the maritime areas were little known either geographically or hydrographically and had been only very superficially surveyed. In the year 1891, therefore, the regular surveys were begun in these areas, for which special surveying ships or detachments were provided.

When, in the year 1889 the *Reichs-Marine-Amt* superseded the *Admiraltät,* the *Hydrographisches Amt* was not at the time disturbed by this fundamental change in the organization.

In the year 1893, however, the Inspection of Maritime Buoyage was transferred from the Interior Department to the Navy Department, so that the *Hydrographisches Amt* thus acquired a new field of endeavour and its name was changed to the

NAUTISCHE ABTEILUNG DES REICHS-MARINE-AMTS.

This new designation expressed more clearly than the older, the sphere of activity of the new Division and the Ministry to which it was attached.

In order to carry out efficiently the inspection of buoyage, six coastal Naval Districts were created in April 1894: three for the Baltic and three for the North Sea. As organizations of the *Reichs-Marine-Amt,* these coastal district services provided the liaison between

the Naval Administration and the local Authorities in neighbouring maritime States. These services were administered by senior unattached naval officers who had previously been actively engaged in hydrographic work. At the same time they acted as Imperial Commissioners for Buoyage in all matters affecting the Imperial Navy. Further they were charged with the supervision of the local surveys within their own district.

With this transfer of the Inspection of Buoyage and Lighting, there devolved the responsibility for new installations of lighthouses and buoys. This involved technical approval for all lighthouses to be newly erected, for floating and fixed buoys and beacons, fog signals, etc.

In the year 1895, the regular surveys in the South Seas commenced with numerous astronomical determinations of position by the surveying ship *Möwe* (later *Planet*), which between that time and the outbreak of the World War were successfully prosecuted in spite of occasional great difficulties.

In 1897 the sphere of activity of the *Nautische Abteilung* was extended owing to the fact that it was assigned the duty of studying the general questions relating to the Merchant Marine, Navigation, routes of steamship companies, etc. The collaboration required for the solution of various nautical problems, aid required for training naval officers for special duties in navigation and surveying, as well as the preparation of a new text book on navigation greatly augmented the scientific work to be performed. Therefore, in 1898 the office of Astronomer was created in the Reichs-Marine-Amt to deal with questions of nautical astronomy, oceanography, coastal surveys and tidal data.

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In 1903, now unencumbered by the necessity for obtaining appropriations, the real development of the German nautical chart production began. Charts for the waters of Northern Europe and the sea routes to East Asia were projected and completed. At the same time the revision of Sailing Directions for foreign waters was actively advanced. Also, research and survey work in German overseas protectorates developed with ever greater intensity. New surveying ships equipped with the latest scientific and technical apparatus were built and dispatched on their missions. The relations between the Merchant Marine, training ships and other maritime organizations became constantly closer, and thus brought about profitable collaboration between the Navy and the Merchant Marine.

In 1901 new directives were laid down for the entire sphere of surveying since, above all in matters relating to the personnel, training requirements had not kept pace with the constantly increasing exigencies of the surveying service.

In the special courses on surveying which were held annually, the officers obtained both theoretical and practical training, which qualified them to deal with all problems connected with hydrographic surveying and to some extent with astronomical surveys. For the training of the enlisted personnel a branch surveying company was organized, which one year later was garrisoned at Friedrichsort (K9. I.M.D.) as an independent company for the Hydrographic Service. Here a definite number of recruits from both naval bases were thoroughly trained as special ratings for the Hydrographic Service and held available for service aboard the surveying ships.

The extraordinary increase in all hydrographic activities and the corresponding increase in administrative duties, made it desirable for various reasons to place the *Nautische Abteilung* on an equal footing with the other departments of the Reichs-Marine-Amt. Therefore, by Imperial Decree of 14th March 1908, the *Abteilung* was raised to the rank of

NAUTISCHES DEPARTMENT
DES REICHS-MARINE-AMTS.

with a Vice Admiral as Head of the Department.

The work which was now directed by the *Nautisches Department* progressed rapidly in all fields. In particular the surveys in the German Protectorates brought in a rich mass of material for the development of German cartography, until the outbreak of the World War brought all hydrographic work to a sudden standstill.

In the same way, surveying work in the home waters was at once interrupted. The majority of the personnel in the surveying service were transferred to submarine and mine services owing to their expert knowledge of navigation and their special training in seamanship. The length of the war, however, and demands for exact hydrographic inform-

ation in foreign waters (Flanders, Kurland, and Aland Island) led in the second year of the war to the establishment of surveying groups and to the commissioning of surveying ships which continued survey revision work uninterruptedly in the North Sea and the Baltic. Later, naval surveying units were active also in the Black Sea near Gallipoli and in Mesapotamia.

Basic changes had to be effected in the cartographic work, since the data from foreign sources needed to keep the charts up to date became ever scarcer with the lapse of time. But in spite of these difficulties it was possible to meet all the exigencies of the front and, in addition to the Admiralty charts, to publish some 500,000 military charts of all kinds.

The resultant reduction in the German Navy and its Administrative Centre, due to the unfortunate outcome of the war, imposed severe restrictions on hydrographic activities.

The *Nautischen Department* became the *Nautische Abteilung der Admiralität* and from 1920 onward it was designated as :

DIE NAUTISCHE ABTEILUNG DER MARINELEITUNG.

Owing to the loss of the colonies and the resulting impossibility of prosecuting hydrographic work in foreign waters the *Nautische Abteilung* was relieved of a part, insignificant, it is true, of its work. The transfer of matters pertaining to coastal signals, pilotage and buoyage to the newly created *Reichsverkehrsministerium* had a much more marked effect. Only questions of buoyage and pilotage pertaining to the Jade District remained under the jurisdiction of the Navy for military reasons. Particularly harmful was the transfer of the *Deutsche Seewarte* to the loyal hands of the *Reichsverkehrsministerium* as a result of a mistaken application of the provisions of the Versailles Treaty. As a result the German Navy lost its traditional and valuable influence on the Merchant Marine and therewith the possibiblity of making useful and effective provision, as heretofore, in the nautical-scientific field for the entire shipping of the State. An unavoidable consequence of this was the gradual decline in vitality of the hydrographic activities and a stagnation in various fields.

For the solution of the essential surveying problems in home waters a surveying ship and several sounding launches had, however, been available since 1919. In addition to the mine-sweeping divisions these were the only vessels in commission at the time. But in spite of the initial lack of trained personnel and the difficulties encountered later as a result of the monetary inflation, not only were the surveys in home waters carried on but hydrographic activities in general were soon being systematically carried out.

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After many political and financial difficulties the newly fitted-out surveying and research ship *Meteor,* equipped with modern apparatus, was ready for service towards the end of 1924. In the preceding years oceanographic work had been resumed in the home waters and in the North Sea extensive tidal observations had been carried out. Moreover, observations had been made on the dip of the horizon, determination of the magnetic elements at sea, etc., so that with the commissioning of the *Meteor,* a personnel trained in all respects for oceanographic research was available.

In accordance with the plans of the Director of the *Institut für Meereskunde,* Dr. MERZ, the great *Deutsche Atlantische Expedition* was carried out by the *Meteor* from 1925 to 1927 in co-operation with the *Notgemeinschaft der Deutschen Wissenschaft* (Society for the Aid of German Science), which had as its mission the exploration of the hydrological economy of the Atlantic Ocean. During more than two years of continuous exploration under the command of Captain S. SPIESS, a wealth of material was gathered from 14 sections which has since been published in the 20 volumes describing the *Meteor's* activities. The 67,000 echo soundings produced a completely new and detailed picture of the morphology of the South Atlantic Ocean.

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On the termination of the great Atlantic Expedition, the *Meteor* was retained in service as the sole surveying ship, to be used for revision surveys in the North Sea and Baltic together with a few surveying boats, while the surveying of the Jade was assigned to the Office of Buoyage and Pilotage in Wilhelmshaven. Only occasionally could hydrographical material be collated in foreign waters. For this purpose the training ships proceeding to foreign waters since the year 1924 have received adequate nautical-scientific work projects. Thus opportunity was given the *Emden* in 1928 to determine the greatest oceanic depth as yet sounded to the Eastward of the Island of Mindinao.

For the fishery patrol, which had been performed since the war by the former M-boat *Zieten* two special vessels, the *Elbe* and the *Weser* were placed in commission in 1932. Since the Fishery Patrol was fully occupied in the North Sea and therefore could not be made available for the Fishery Patrol to the Southward of Iceland, the surveying ship *Meteor* was assigned this additional duty during her annual foreign cruises from 1928 to 1935, for the protection of German fishing interests. Thus the *Meteor* not only collected a mass of hydrographic data which was of value to the German fishing fleet in enabling it to overcome navigational difficulties to the southward of Iceland, but carried out also extensive oceanographic activities in the vicinity of Iceland, Greenland and Jan Mayen which, in conjunction with the work of the great expedition, provided a comprehensive oceanographic survey of this maritime area.

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Since 1935 the *Nautische Abteilung* has been designated as :

NAUTISCHE ABTEILUNG DES OBERKOMMANDOS DER KRIEGSMARINE.

With the institution of the *Reichsluftfahrtministerium* (Air Ministry) the *Deutsche Seewarte* was transferred to this Ministry from the *Reichsverkehrsministerium*. With this change in the organization the influence of the German Navy on this institute, which was originally founded by the Navy, was to some extent re-established. Since the Spring of 1936 the Nautical Section of the *Deutsche Seewarte* has been placed directly under the authority of the German Navy, which again is organically in the position to work for the interest of all German shipping in the sphere of nautical science.

PART II.

SCIENTIFIC WORK

1. *Exploration cruises in Foreign Waters.*

With the strengthening of the naval arm, and the maritime prestige of the German Empire, the German Navy had as early as the Seventies of last century been placed at the service of oceanographic and nautical science. The first fruit of this concept of oceanographic exploration — as being the duty of every great civilized nation — was the cruise of the armoured corvette *Gazelle* in 1874-1876 which, although the first great scientific undertaking of the young Navy, was accompanied by revolutionary results for the equally young science of oceanographic exploration. The incentive to this cruise was given by the Hydrographer of the Imperial Admiralty Prof. Dr. NEUMAYER, in connection with the employment of the German Navy for the observation of the passage of Venus across the sun's disk in 1874. This was the man who, later, as Director of the *Deutsche Seewarte* for so many years, earned the gratitude of the entire German shipping industry and the competent scientific sections. Both the observations on the passage of Venus and the scientific research aboard the *Gazelle* were carried out by German naval officers.

The data collated on the cruise of the *Gazelle* proved of value to the oceanographic, meteorological, astro-physical, magnetic, geographic, hydrographic, ethnographic, geological, zoological, botanical, chemical and mineralogical sciences. The expedition was under the command of Captain Baron von SCHLEINITZ. The track of the voyage is plotted on the accompanying chart. * The scientific results of the cruise were published by the *Hydrographischen Amt* in the five-volume report entitled : *Die Forschungsreise der Gazelle in den Jahren* 1874 *bis* 1876, Berlin 1889.

The second great scientific undertaking was accomplished with the opening of the 20th century, when the new surveying ship *Planet* was dispatched to the German South Sea areas from 1906 to 1907. The vessel was especially constructed for surveying in the tropics and was equipped with the latest instruments for deep sea soundings, plankton investigations, biological, chemical, aerological and stereophotogrammetrical work. It is noteworthy that from that time the exploration of the upper strata of air has been taken into consideration in connection with the maritime meteorological projects for aerial navigation. Numerous oceanographic, zoological and biological observations obtained underway led to new discoveries such, for instance, as the Sunda Deep which gave the greatest depth sounded up to that time, namely, 9,788 metres. The Commanding Officer of the *Planet* was Lieut. Comdr.

(*) *Chart cannot be reproduced.*

LEBAHN. Analyses of the results were carried out in the *Nautischen Department* and appeared as a five-volume work entitled : *Forschungsreise S.M.S. Planet,* 1906 *bis* 1907, Berlin 1909.

In a similar manner the voyage of the second surveying vessel, S.M.S. *Möwe* in the year 1911 to the African colonies served the purposes of hydrographic research in the widest sense. Here also aerological investigations took their place alongside oceanographic and biological research work.

In our colonies also, for the purpose of aiding the cadastral and coastal surveys, running astronomical determinations of latitude and longitude were carried out by the surveying vessels as well as by especially detailed observers.

The latest of the great German exploration cruises at sea — that of the German Atlantic expedition on board the research ship *Meteor* — joins up with the S.M.S. *Gazelle* expedition as regards the general task and its execution. The surveying ship of the German Navy, the *Meteor,* was finally placed in the exclusive service of research, after very careful and thorough preparation which terminated in a three weeks' trial voyage in the Atlantic Ocean. The ship was provided with every conceivable device in order to bring her thoroughly up to date and to make her serviceable for a long expedition on the high seas. In particular, among other things provision was made for a laboratory fitted out with every possible technical device down to the smallest detail; the ship had also a deep sea anchoring device which permitted the vessel to anchor in any depth to 5,000 metres. A large number of special devices and methods were developed and constructed especially for the expedition.

Although in former expeditions the greater part of the burden of research activities had fallen to the ship's officers, on the *Meteor* a scientific staff comprising 4 oceanographers, 2 meteorologists, 1 biologist, 1 geologist and 1 chemist was provided. To the ship's officers fell the duty of carrying out the numerous nautical investigations, the topographical surveys, the study of the earth's magnetism as well as other scientific investigations, and the echo-soundings. The Commanding Officer of the Surveying Ship was Commander F. SPIESS, while the scientific leader, up to the time of his illness, after the work on the first section, was Prof. A. MERZ, Director of the *Institut für Meereskunde.* (He died in Buenos Aires). Afterwards the Commanding Officer took over this duty.

The basic aim of the project was the intensive exploration of what might be regarded as a comprehensive closed oceanic area whereas, up to that time, the principal aim of similar exploration had been the collection of the greatest possible mass of material in order to develop our special knowledge of the oceans by this means.

After a trial voyage to Teneriffe and the Madeira Islands to test the instruments and devices as well as to afford preliminary training to the scientific personnel on board, the surveying ship *Meteor* proceeded on 16th April 1925 on its first expedition, with Buenos Aires as her first port of call. The programme of the expedition envisaged a comprehensive treatment of the Atlantic Ocean from latitude 20° N. to the Antarctic ice limits covering a distance of 69,000 nautical miles over 14 sections across the Atlantic Ocean with about 360 stations, at which observations should be made of the temperature and salinity in all layers from the surface down to ocean bottom, comprising some 7,000 measurements, this in view of the principal mission set for the expedition, which was the study and determination of the circulation. In conjunction with this was the solution of the problem of the liquid strata and of the Atlantic Ocean bottom from the physical, chemical, biological and geological standpoints. In addition to this the vessel was required to obtain bottom samples from each station and to determine the exact profile of the ocean floor by means of echo soundings throughout the sections covered on the runs in each direction. Furthermore the programme envisaged the exploration of aerological conditions and the other meteorological phenomena from the surface of the ocean into the upper atmosphere.

This very comprehensive programme was carried through without omissions during a voyage of exploration of about 2 1/4 years, interrupted only by short periods in port. With regard to the programme of work and the execution of the plan the *Notgemeinschaft der Deutschen Wissenschaft* (Society for the aid of German Science) and the *Institut für Meereskunde* co-operated with the German Navy Department. The material gathered on this voyage and the knowledge derived therefrom proved of the utmost value in all fields. In some respects the work followed new paths and in method, planning and organization, other States have in similar expeditions followed these directives, with fruitful results.

The results of the *Meteor* expedition have enabled a concept to triumph and completely upset the theory previously held, in spite of certain individual pioneers (such as, for instance, W. BRENNECKE and CASTENS, both of the *Deutsche Seewarte*), which presupposed a symmetrical circulation of the liquid masses in the oceans about the Equator. This upset

was so tremendous and revolutionary that a new incentive has been given the science of oceanography.

The employment of acoustic sounding methods, which had been used previously on occasion but never before in such a systematic and large-scale manner, has had a revolutionary influence upon oceanographic exploration. Now for the first time have we been enabled to obtain a view of the morphological structure of the ocean bottom, which, contrary to former concepts, shows in general a very broken relief, which does not bear any definite relation to conditions on the mainland. As a result of her 67,000 echo soundings the *Meteor* has demonstrated the richly varied morphology of the South Atlantic Ocean with its occasional very steep slopes. Now for the first time it will be possible to propound the problem of a systematic oceanographic exploration on a large scale from the physical and biological standpoint, since we are now in a position to determine the shape of the container with sufficient accuracy.

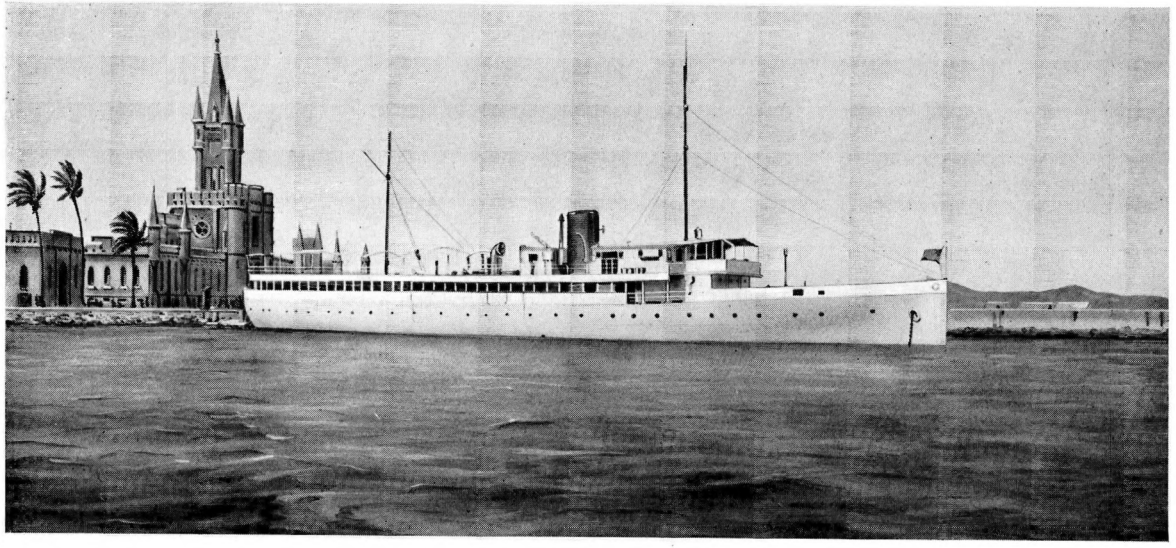
Aside from these three important voyages of exploration the Navy has carried out profitable oceanographic investigations both in home waters and abroad under the direction of the *Hydrographisches Bureau* of the *Nautisches Department,* the *Nautischen Abteilung des Marineleitung* and of the *Oberkommandos.* The Navy lent assistance and advice on the occasion of other voyages of exploration of the State, such as the German Deep Sea Expedition 1898/99 on the *Valdavia* and the South Pole Expedition 1901/03 on the *Gauss,* and, further, placed officers at the disposal of such expeditions for the computation of the oceanographic, maritime-meteorological and magnetic data (SCHOTT from the *Deutsche Seewarte* and BIDLINGMEIER from the Naval Observatory). During the German Antarctic Expedition on the *Deutschland* the oceanographic research work was in the hands of W. BRENNECKE of the *Deutsche Seewarte.* Further, other independent explorations were carried out, generally without scientific assistance, primarily by the surveying vessels engaged in hydrographic work in the colonies and the cruisers on station. The officers and men who were charged with carrying out this work were usually given special instruction for some time, especially at the *Deutsche Seewarte* and the Naval Observatory, in the astronomical determination of latitude and longitude, observations on the earth's magnetic field, and in aerology and meteorology. Judging these pre-war activities from their quantity output, one must not forget that the soundings had to be taken with the old deep sea lead and the meteorological data with kites, etc. The spacial representation of the ocean floor obtained in this manner must be considered as a remarkable achievement in view of the means available. For instance, the discovery of the Bougainville-Neu-Pommern Trough, with a depth of 9140 metres, may be cited.

In the post-war period it was only after a certain amount of change and re-organization, as well as preparatory work, that training-ships bound for foreign waters could again take up scientific activities. Primarily, stress has been laid upon echo-soundings, which could be taken both outward and home-ward bound, and which have subsequently been published. Particularly renowned, aside from the work of the *Meteor,* was the success of the cruiser Emden which discovered the *Emden Deep* with 10,790 metres (in the Philippine Trough), the greatest known depth yet sounded.

A short time after her return from the great exploration voyage, the surveying ship *Meteor* was employed by the Navy Department for exploration of the waters around Greenland and Iceland; in which areas the vessel had been assigned to the annual fisheries patrol from 1929/30. The expedition was directed by the Commanding Officers, Commanders BENDER, KURZE and EYSSEN. The investigations necessitated the physico-chemical exploration of the North Sea, the Eastern Greenland and Iceland current and the bottom configuration of the ridge between Iceland and Greenland and the Reikjanes Ridge. The scientitc elaboration and collation of data was accomplished either by the *Institut für Meereskunde* or the *Deutsche Seewarte.* Two other problems had to be solved, one was the question of the origin of the North Atlantic deep water and the other was the bordering area between the Labrador Current and the Gulf Stream and the configuration of the ocean bottom there. The *Institut* will shortly publish these results.

Meteorological investigations by the Naval Observatory and aerological soundings on board complemented the work programme. In 1932/33 the *Meteor* participated in the International Polar Year in Icelandic waters.

Brief mention only can be accorded the numerous plankton investigations and observations made by the biologists on board for the requirements of the fisheries.



The Brazilian Surveying Vessel "JACEGUAY".

Le Navire Hydrographe Brésilien "JACEGUAY".