

ITALY'S CONTRIBUTION TO WORLD HYDROGRAPHY : 1300-1950s

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This article was written as a chapter of a forthcoming book on historical developments in European hydrography. It seems appropriate to include it in the present issue of the I.H. Review in view of the recent celebration in Genoa of the centenary of the "Istituto Idrografico della Marina".

At the time of the First Crusade (1096) Pisa, Genoa and Venice were substantial maritime states and through their ports the riches of the East were beginning to pass into Europe. All three had their commercial contacts in the Eastern Mediterranean, and they saw participation in the Crusades as a means of furthering such interests. Pisa sent her Archbishop with 120 ships, whilst Genoa gave practical shipping support to the Norman Prince Bohemond of Taranto, resulting in Pisa and Genoa establishing trading colonies at Jaffa and Antioch respectively. Venice's footholds in the Eastern Mediterranean were already substantial, but by taking part in the Fourth Crusade (1200), and by diverting the armies at sea towards Constantinople, she managed to be in on the successful storming of that city. This gave Venice a trading base there to which she added other stations on the islands of the Greek Archipelago.

Whether the countless ships carrying the Crusaders to the East used charts is by no means clear; however the first known reference to the use of a chart onboard ship is given by the chronicler Guillaume de Nangis sailing with the French King St. Louis on the Eighth and final Crusade in 1270.

If charts were in use in French vessels towards the end of the 13th century seems certain that charts would have been provided for their trading vessels by the three great Italian maritime states much earlier. The earliest seachart of the portulan type drawn on a sheepskin is the "Carta Pisana", preserved in the Bibliothèque Nationale in Paris; thought to have been drawn in Pisa about 1300, the oblong of the Mediterranean is divided into two halves, a circle covering each and touching off the toe of Italy. From the centre of the circles sixteen rhumb lines are shown using different coloured inks to make their identification easier. From each of the points where these rays meet the circumference a quarter of the rose was drawn so as to run across to the opposite side of the circle giving a close network of rhumb lines all over the sea area.

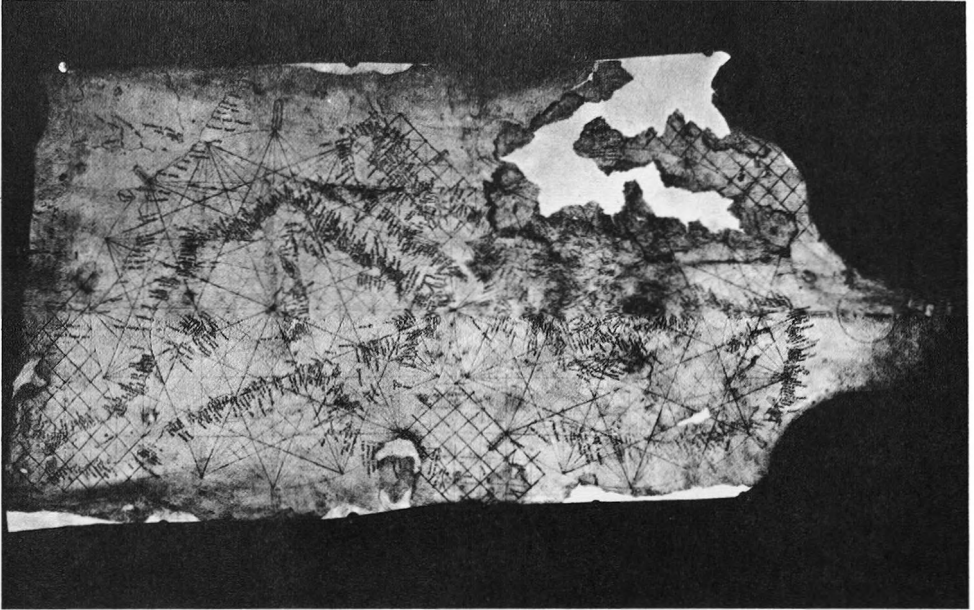


FIG. 1. — "Carta Pisana" drawn on a sheepskin and dating from about 1300. (Photograph reproduced by kind permission of the Bibliothèque Nationale, Paris)

Subdivided horizontal and vertical scales of 200 miles are included on this chart so that the assumption must be that these early Italian navigators carried onboard a pair of dividers and a straight edge for pricking off courses from the appropriate rhumb line, and for transferring distances from the scales to the body of the chart.

The next portulan chart of which we have details was unfortunately destroyed in Florence during World War II. It was drawn by Giovanni di Carignano in Genoa about 1307 and shows not only the Mediterranean, but also the Atlantic coast of Europe as far as Flanders where Genoese vessels may have already been trading

There are existing to-day a series of five portulan charts drawn in Venice between 1311 and 1319 ascribed to Pietro Vesconte a Genoese cartographer, whilst a son or relative Perrino Vesconte was making portulan charts in Venice until 1327.

Both Paolino Minonta and Marino Sanudo of Venice were making portulan charts and "mappa-mundi" (general maps of the known world) contemporaneously with Vesconte in Venice; whilst a portulan chart which appears to be dated 1325 may be seen in the Biblioteca del Principe Corsini in Florence providing evidence of continuing activity in Genoa.

These cartographers, and others whose works perished at sea or in other ways failed to survive, may be regarded as forming the early Italian "school", in the broadest sense of the word, and also probably as the founders of European marine cartography.

Although Ptolemy saw Italy as a geographical entity, surrounded on three sides by the sea and to the north by formidable mountains, yet since

the fall of the Roman Empire until the *Risorgimento*, which led to complete Italian unity in 1870, the country remained fragmented politically with many foreign masters occupying territory at different times. Our concern here is the decline of the three great maritime states which led to the discontinuance of portulan chartmaking in Italy.

At the end of the 13th century Italy was a densely populated country and the maritime states were fortunate in being able to import food, and wood for shipbuilding, as these commodities became scarcer in the hinterland.

On the overworked economy the Great Plague, which was virulent throughout Italy, had a devastating effect, decimating the population of both town and country. This led to a widespread abandonment of the land, and, in the vicinity of Pisa, to a breakdown of drainage systems and to frequent floods of the River Arno which, carrying down an ever increasing quantity of silt eventually closed the once great port.

Genoa and Venice, rivals always for overseas footholds to facilitate Eastern Mediterranean trading, fought each other extensively during the 13th and 14th centuries and were gradually weakened thereby. Venice, however, had unity among her ruling classes and a Great Council presided over by an elected Doge, a system which escaped the Genoese where individual business families struggled with each other thus leading to their more rapid decline.

Trading to the East was already decreasing when, in 1453, Constantinople fell to the Turks. This dealt a final shattering blow to Genoa, cutting her off from her Black Sea colonies. Venice survived longer, despite the loss of her colony in Constantinople, but as her seaborne trade declined she turned her eyes inland and became involved in the continual struggle for supremacy among Italian states backed in turn by differing European powers. By the end of the 15th century Lisbon, Seville and even Antwerp were ready to take over as centres of European seaborne trade, and with it the making of charts for their mariners which the sailors of Venice and Genoa no longer required.

Although the rediscovery of the works of Ptolemy had done much to facilitate the mapping of the globe in the 15th century yet his erroneous figure for the longitude difference between the Straits of Gibraltar and Iskanderun provided problems for those who were trying to lay down the shores of the Mediterranean and the true shape of Italy. First the Arabs, then Mercator and Ortelius, followed by Robert Dudley, the Englishman, gradually succeeded in shortening the length of the Mediterranean until finally De Chazelles, a French scholar of Cassini, fixed the position of several places in the Levant in 1793-1794 by observing the occultations of the satellites of Jupiter, with reference to the longitude of the Paris Observatory established so accurately by his teacher. The final figure of about 42° for the length of the Mediterranean in longitude is twenty degrees shorter than that of Ptolemy and Italy gradually assumed her rightful shape and place in a sea which had once been her "Mare Nostrum".

Napoleon Bonaparte's final conquest of Italy began in 1800 resulting in the dethronement of a number of dynasties and replacement by regional

kings of Napoleon's choice. The last to succumb was the Bourbon dynasty of Naples, but in 1806 King Ferdinand and Queen Carolina fled to Palermo and, with British assistance, retained the island of Sicily under their control.

In Naples Joseph Bonaparte was first set on the throne by Napoleon, later to be succeeded by Joachim Murat, a boastful but handsome cavalry general. As elsewhere in Italy, these representatives of France brought with them an efficient administration and a desire to eradicate feudalism.

Lord Bentinck, who represented Britain in Sicily, imposed a constitutional regime on the English model on King Ferdinand with the general support of the Sicilian barons. Thus he fought a political battle against Joachim Murat in addition to imposing a naval blockade on Naples with a naval squadron under Sir Robert Hall.

After the Hundred Days Murat was forced to leave Naples to which the Bourbons returned with British help in 1815, and later that year Murat was captured and shot on King Ferdinand's orders.

At this time a young lieutenant named Smyth in Sir Robert Hall's flotilla was able, with the cessation of hostilities, to use his Sicilian gunboats for survey work and he completed in the next two years a series of charts of the coastline and ports of Sicily, the ports of Naples and Villafranca and much of the western coastline of Italy.

Smyth was assisted by the officers of the Istituto Cartografico Napolitano where the fine cartographic traditions of the Padovan geographer Rizzi Zannoni were still maintained. He had been summoned by King Ferdinand IV to found the institute in 1780.

At the Congress of Vienna in 1815 the victorious European powers restored all the dethroned dynasties in Italy, including the House of Savoy in Piedmont and the Bourbons in Naples, but the former great maritime republics, decayed as they had become, were incorporated in larger kingdoms. Genoa became a part of the Kingdom of Sardinia whilst Venice was combined with Lombardy ruled over by a viceroy from Vienna as part of the Habsburg Empire.

In 1817 Smyth was promoted to Commander, appointed to the British sloop *Aid* and sent to the Adriatic to complete surveys commenced by the French surveyor Beautemps-Beaupré who had been employed there by Napoleon. Smyth brought with him a number of Neapolitan officers whom he had instructed in sea surveying, and was assisted by Austrian officers and men in the Imperial sloop of war *Velox*. This work was complete in two years, and together with his Sicilian surveys and the west coast of Italy provided the earliest modern charts of Italian waters.

Subsequently Smyth in *Adventure*, using five chronometers, connected the longitudes of Falmouth, Gibraltar, Palermo, Malta and a chain of points along the coasts of Spain, Corsica, France and Italy so that his charts were accurately placed within the Mediterranean framework.

The Istituto Cartografico Napolitano was the first Italian institute to prepare charts, probably encouraged by Smyth, and in 1825 this institute published coastal charts from the River Tronto to Santa Maria di Leuca. Then the Scuola di Cartografia, Milan, which had been developed by

Austria in the Napoleonic period, published between 1822 and 1825 the great "Chart of the Adriatic Sea". It was compiled from older surveys made by engineers, by Beautemps-Beaupré, by Italian officers in the Austrian Navy and Smyth. Based on Austrian, Italian and French triangulation, the work was in three extensive cartographic parts containing general, coastal and large-scale charts all beautifully engraved on copper together with four volumes of sailing directions prepared by Captain Giacomo Marieni of Milan "under the direction of the Military Geographic Institute of the Italian Royal General Staff" and printed by the Italian Royal Printing Works.

Meanwhile the heavy shadow of Austria lay across the kingdoms of a divided Italy, but beneath that shadow began to grow the desire for independence and unity; the writings of the exiled revolutionary Giuseppe Mazzini were discussed at countless secret meetings of the "carbonari". Despite the crushing of state revolutions by Austrian armies, the steady surge of enlightenment and a desire for freedom by the Italian people gathered momentum in what became known as the "Risorgimento". Slowly the kingdom of Piedmont under Victor Emmanuel II, with Cavour as chief minister, emerged as the leading state in the struggle. In 1859, with French assistance, Victor Emmanuel defeated the Austrians at the battle of Magenta and although the peace which Napoleon III made independently with the Austrians ceded Nice and Savoy to France and left Venice under Austrian rule, yet all of central Italy was freed and voted for union under Victor Emmanuel II. Next developed the great pincer movement whereby Garibaldi with his "Thousand" landed in Sicily and overcoming the Bourbon troops crossed to Calabria and marched successfully into Naples; whilst Victor Emmanuel came south, avoiding Rome but capturing Umbria and the Marches from the Papal States. In deference to the Great Powers, more especially France, Rome was not taken over for another ten years. Meanwhile Florence became the capital of the newly united Italy from where the Royal Navy was established in 1865.

In 1865 the "Ufficio Centrale Scientifico" was established at nearby Leghorn where two years later was incorporated the "Commissione Idrografica" under Captain Antonio Imbert. Surveys were begun in the Adriatic in the paddle corvette *Monzambano* with a very small number of naval officers; whilst in Venetian waters it was still necessary to cooperate with the Imperial Austro-Hungarian Navy for survey work.

French troops were sent to Rome where they stiffened the resistance of the Papal troops for some years and it seemed as if Rome could never be united with Italy but in 1870 the Franco-Prussian war broke out and Napoleon had to withdraw his troops from Rome. This was the time to act and the forces of Victor Emmanuel successfully stormed the Imperial city on 20th September 1870 and Rome became the capital of a united Italy the following year.

The Central Scientific Office was removed from Leghorn in December 1872 and the Hydrographic Commission was moved from there to the old fort of St. Giorgio in Genoa where by Royal Decree it became a part of a new "Ufficio Centrale Idrografico della R. Marina" and the whole placed under the direction of Capitano di Fregata G.B. Magnaghi, a broad

shouldered bearded officer with an inventive mind and a gift for organisation.



FIG. 2. — The Italian Hydrographic Institute in Genoa, formerly the old fort of St. Giorgio, a building it has occupied since its creation.

The Risorgimento had been a romantic and exciting period and with the welding together finally of the nine states there developed a proud nationalistic feeling which was reflected in the rapid establishment of hydrography, no less than in other more important fields. It was the desire to navigate on Italian rather than British Admiralty or French charts, and to rely upon the work of their own Royal Navy officers, that gave the spur to Magnaghi and his staff in Genoa.

1873 was spent in transferring the Notices to Mariners and other services from the disbanded Scientific Office in Leghorn, in setting up an Astronomic Observatory with a Meridian Circle and a workshop for the repair and construction of nautical instruments. The following year saw the establishment of a workshop for engraving charts on copper, and the commencement of recruitment and training of engravers who began operations in 1877. On a memorable day in 1875 mid-day was announced for the first time by a cannon shot at Forte Castellaccio fired electrically from the Hydrographic Office.

For sixteen years Magnaghi worked on building up the office, after which in 1888 he was promoted to assume the title of Admiral Director General of the Hydrographic Service which he held for a further four years. At an early stage the steamer *Washington* was fitted out as a floating

school for surveyors, and soon afterwards the first two Royal ships *Eridano* and *Scilla* were provided as surveying vessels with Commandantes Imbert and Rossi in command. The first comprehensive surveys of the entire Italian coastline were begun.

In order to gauge the progress made between 1870 and the end of the 19th century we must take a look at a paper by Capitano di Vascello Pasquale Leonardi Cattolica, Director of the Royal Hydrographic Institute, presented at the 5th Italian Geographic Congress in Naples on 9th April 1904, later published in the "Hydrographic Annals". This dapper and precise naval officer gave what he described as a balance sheet of the activity of the Institute and listed in detail the past and present charting and survey work: "The cartographic work carried out by the Royal Italian Navy consists of a complete hydrography of our coasts, which for richness and generosity compares with those of more advanced maritime nations. It can be affirmed with legitimate satisfaction that our country which had descended very low in nautical cartography, has recovered in a relatively short period of time to reach a position agreeing with its great traditions and its new ideals. It is an historical fact that the progress of cartographic studies is one of the indications of the civil and economic prosperity of nations.

"The time is finally gone when Italian ships sailed Italian seas with the help of foreign charts. The demand for the publications of the Institute has increased rapidly each year as is proved by the number of sales which in five years 1891-1895 were annually 600 charts and 500 Light Lists of the Mediterranean, while in the last three years sales have been 4 450 charts and 700 Light Lists each year. But what demonstrates even more the consideration that our surveys receive is the fact that the Imperial Austro-Hungarian Navy is supplied with Italian charts and the English Admiralty uses our surveys to compile the charts of our seas to supply its ships."

He states that the chart of Taormina just published replaces the last non-Italian chart of home waters; whilst only the early charts from Imbert's surveys are not connected to the national triangulation of the Military Geographic Institute.

However, Cattolica goes on to say that "the work of emancipation will not be complete if we continue to navigate in home waters using the 'Mediterranean Sea Pilot' (British Admiralty). It is therefore with great pleasure that I announce that we will possess an Italian Portolano of which the parts dealing with the Alto Tirreno, from the west border to Monte Circeo, and with Sardegna are ready".

Like all good Hydrographers, Cattolica realised that he must not give the impression that all was complete, particularly as he had first shown his paper to the Minister of Marine. Those of us who have held similar posts have echoed his words in public, and particularly in the presence of our respective Ministers of Marine, the geese who lay the golden eggs. "It would be unfortunate if, in order to measure the interest which the persons gathered here give to the progress of our work, I have to face a statement by someone who, in addition to having as his mandate the obligation of speaking with knowledge maintains that, as the surveys of

our coasts have been completed there is nothing more to do and has suggested the cancellation of hydrographic surveys in order to realise a reasonable economy in the balance sheet of the Navy: the charts are not artistic objects, to be handed down to posterity, our only concern being to preserve them from moths. The hydrography must represent the present state of shores and seas, unsettled in planimetric and altimetric configuration, because of the incessant action of physical agents and the work of man". A formidable list of future hydrographic tasks was then set out.

It was Cattolica who in 1898 had arranged a Royal Decree renaming the office as the "Istituto Idrografico della R. Marina".

As early as 1870 a private Italian shipping company had purchased a base in the Bay of Assab, which was placed under Italian sovereignty in 1882. Largely as a result of the actions of Francesco Crispi, when twice Prime Minister, the colonial possessions in East Africa grew; hydrographic survey work began at Massawa in 1886 and continued in the Red Sea into the 20th century.

Colonial surveying of virgin coastlines has traditionally formed a fine school for sea surveyors, remote as they find themselves from home comforts and thrust upon their own resources, not only for the sea surveying work itself, but also in carrying out the shore triangulation and fixing its position on the earth's surface without which no sounding can be usefully progressed to seaward. The vessel *Staffetta* was adapted for this work in 1903 and spent much time in the Red Sea until Italy went to war against Austria in 1915. In 1911 Tripolitania and Cyrenaica were added to Italy's colonial possessions and provided further virgin fields for sea surveying, but the war delayed their exploitation.

In 1918 the surveying service was re-organised and provided with the *Ammiraglio Magnaghi* a vessel of 2050 tons, carrying four steam launches, and one motor launch and manned with a complement of 174 officers and men. Four ex-British and Japanese drifters of 330 tons were also fitted as survey ships.

All young Italian naval officers began to undergo instruction in hydrographic surveying, and those showing an aptitude for the work were given a further eighteen month course, including six months in a survey ship and six months in the hydrographic office. Those completing this latter course satisfactorily became hydrographic specialists, but only periodically were they appointed to surveying ships or as heads of sections in the office. From this corps of officers the Head of the Hydrographic Institute is chosen.

After about six years surveying in the Red Sea *Magnaghi* returned in 1925 to home waters where she was fitted with an ultra-sonic sounding apparatus by Langevin-Florisson with a Marti graphic recorder so that she was able to take for the first time "wireless sounding" as they were termed. Captain Luigi Tonta, Director of the Hydrographic Office (later Director I.H.B. 1927-1932) and Monsieur Florisson were onboard for trials of this sounding equipment which gave excellent results. So fitted, she was well equipped for a systematic survey of Graham Bank which had been located by *Washington* in 1890, lying in the wide channel between

Cap Bon and Sicily. Having surveyed the bank by use of moored beacons, *Magnaghi* anchored and showed a light from the masthead which was intersected by theodolite angles from three stations in Sicily over 40 miles distant. Adventure, Panteleria and Talbot banks in the same vicinity were subsequently surveyed and similarly fixed by this novel method.

Admiral Magnaghi had given to the Italian hydrographic service a feeling for geophysics and oceanography which has continued to exert the greatest influence, so that scientific as well as hydrographic cruises have always been a feature of the work of the Italian surveying ships. Magnaghi invented a number of instruments that were used in the 19th century cruises of the *Washington* such as those for sounding in great depths, appliances for reversing the thermometer and instruments for measuring deep-sea currents.

Radio telegraphy was used after World War I for fixing the longitude of Derna Lighthouse and in 1926 for connecting the longitude of Genoa to Mogadiscio. Gravity measurements have always been important and a submarine was used for these determinations around Sicily and Calabria in 1931-1932.

In 1928 the *Citta di Milano*, the ship which accompanied the airship *Italia* to the Arctic Ocean carried out an extensive series of hydrographic and scientific investigations in the Spitzbergen region; a complete astronomical determination of latitude, longitude and azimuth was made, and the relative gravity difference between Kings Bay and Genoa was determined.

In 1926-1927 a service named "Meteo Marina" for the dissemination of meteorological information to mariners by W/T was established at the Hydrographic Institute.

Magnaghi had been very successful in the 19th century in securing the collaboration of eminent draughtsmen and engravers so that at an early stage a high standard of chart production was set which was maintained until 1915 when Italy entered the first World War. After the war however, the increase in marine traffic produced a demand for charts which could not be met by the staff of copper engravers inevitably reduced by the inability to recruit during wartime. Whereas only about thirty copies may be obtained from a copper printing press in the course of an eight hour working day, it was thought that an off-set lithographic press would be capable of producing about 2 000 copies in the same period. A decision to go over to the latter process was made without sufficient forethought resulting in a serious lowering of the standard and a loss of "style" in the Italian charts.

The use of copper was almost completely abandoned and some first class engravers were lost, whilst a sufficient number of draughtsmen, lithographers and photographers could not be found to master the newly introduced processes. The changing of the Director and Heads of Sections every two years as was now naval practice, mitigated against forward planning which was so necessary at this vital stage. Something had to be done, and under Captain Romagna-Manoia, Director in 1930, constructive steps were taken.

Artistic ability is uncommon in Genoa so a diligent search was made

in Florence and Milan for draughtsman and cartographers and young men to take up again the skills of copper engraving; whilst competition examinations were advertised for apprentice draughtsmen. A search was made for lithographers with a special desire to find "transposers", men capable of assembling on a single zinc plate the various drawings and mosaics.

A large Zeiss camera was purchased and arc lamps, so that exact exposure times could be used, together with a pneumatic printing down frame, a machine for regraining the zinc plates, and numerous accessories.

A new section, "The Revision of Charts Section", was established for the all important task of proof reading the chart. The existing Cartographic Section was strengthened by appointing as Chief a senior officer of great experience for a longer period.

Another significant move was made to increase the speed of chart production whilst preserving a high standard and particular style. This was the now familiar "sticking up of soundings", to be extended later to nomenclature. Its first complete use resulted in the uniform and rapid production of eight charts of the Gulf of Sidra, which filled a wide gap in colonial charting in Libya between Misurata and Bengasi. 30 000 square miles were surveyed completely in 1930 by *Magnaghi* and two smaller vessels *Dardanelli* and *Azio* using Langevin echo sounders, although the boats working inshore still relied on lead and line.

The compilation drawings, which were made from the surveys and on scales $\frac{1}{3}$ rd larger than the charts to be printed, were, for the first time in the Italian office, made as rough drafts having positional accuracy only, with no attempt at high class calligraphy. On these drawings 50 000 soundings were depicted from the 400 000 shown on the fair sheets.

The drafts were then reproduced photographically and transferred to a zinc plate as if for printing, but only a few copies in black and in blue on stout paper were pulled, these being known in the office as "calco" (blue does not reproduce photographically). A number of these were revised by individuals in the Revision of Charts Section, the various corrections being collected onto a single black calco by the master draughtsman, after which he made the final drawing in black ink on a blue calco including everything except the soundings.

To facilitate the sticking up of the soundings, sheets of figures were printed on waxed paper by photo-litho in various suitable sizes; commercial type from a Turin firm had been modified to meet the desired cartographic requirements. An unskilled operator, sometimes an able seaman, was given a black calco and, using a razor-blade knife to cut out the sounding figures from the sheet, placed them appropriately with two pin-pointed pencil-sticks over the soundings on the calco, the wax holding each sounding in position; parallel pencil guide lines enabled the soundings to be set at the correct angle. A speed of 500 placements a day was achieved.

This completed sounding calco was carefully applied by the transposer to the zinc plate and, owing to the thick black ink with which the sounding figures had been printed, the soundings were transferred to the zinc. The finally drawn calco carrying coastline etc. was then applied to the same zinc, so that the soundings were again transferred to complete this final

drawing which was then sent to the photographer for final reduction to a negative to the scale of the chart and subsequent transfer to the printing zinc.

Even as the new process was being perfected the young copper engravers recruited some five or six years previously were coming into their own, and by their skill, and a capability which was developed for transferring copper engravings to printing zincs, began again to hold their own. The two processes continued side by side to standardise the new high quality of the published Italian charts.

In 1937 began a three year survey campaign off the Italian Somaliland coast where, exposed as it was to the monsoons, boatwork was restricted to about 100 days in the year. *Magnaghi* was accompanied by *Cherso* for this work, but it would not have been a feasible proposition had not six new survey motor boats been built, each fitted with the Hughes "Universal" type ultrasonic sounding machine.

Cariddi and *Berta*, later relieved by *Palmaiola*, carried on surveys in home waters up until 1942, two years after Mussolini had made his sudden and unprepared entry into the war. With the two survey ships sunk, in addition to the loss of *Magnaghi*, sea operations then ceased, whilst the Institute was transferred to Montecatini owing to the heavy bombardments of Genoa.

After the Armistice in 1943 the Germans ordered the Institute to move to Stresa where the prime duty of the staff was the preservation of the collection of irreplaceable plates and instruments.

In 1946 the ancient *Azio* was commissioned for a general visit to all Italian ports to locate and fix many new dangers caused by the war and to bring the Sailing Directions up-to-date, completing the work in Venice a year later. Two land parties were somewhat similarly employed in this immediate post-war phase, whilst at the Institute plans were made for a completely new survey of the Italian coasts and adjacent seas.

In 1947 Capitano di Vascello Alfredo Viglieri became Hydrographer and commenced a vigorous programme of training to provide officers for the post-war resurgence of hydrographic work; whilst he pressed the Government continuously to purchase the ex-Canadian sloop which lay in Genoa harbour. This vessel was eventually commissioned in February 1953 as the surveying vessel *Staffetta*. She was well adapted for survey work with four sounding boats equipped with Atlas-Werke echo sounding machines. The ship herself, which carried 114 officers and men, with accommodation for two scientists, was fitted with four echo sounding machines, two Atlas-Werke for depths down to 1 600 metres, one NMC Submarine Signal Corp instrument for depths down to 7 000 metres and one Carpentier set for average and shallow depths. No mention was made at the time of *Staffetta* commissioning of her having onboard any long-range electronic ranging equipment.

The Italian nation had voted for a Republic in 1946 and, as the post-war years passed, the disasters of the war were almost forgotten, being replaced by a pride in the deeds of the Resistance in the closing stages of the war, and a new-found freedom from Fascism. The nation was

dedicated to building the new Republic in a spirit akin to that reigning in Italy in 1870. The Italian Hydrographic Office, now without its royal title, was caught up, as before, with this national feeling and the Director and staff began to work once more towards providing Mediterranean mariners with up-to-date charts of the highest quality.

ACKNOWLEDGEMENT

The author wishes to thank Capitano di Vascello Ezio Serra of the "Istituto Idrografico della Marina" for his friendly assistance in assembling the data for this study.

Work on the preparation of this paper has been made possible through the N.A.T.O. Research Grants Programme.

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