

THE CONTROVERSIAL ORIGINS OF MEDIEVAL NAUTICAL CARTOGRAPHY

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Nautical charts, which are today accepted as factual records of geography, have uncertain and debatable origins. The much-discussed question as to where nautical cartography was first developed, was recently taken up by H.C. FREIESLEBEN in two papers published in the *Journal of Navigation* [1], which prompted the author to write this bibliographic synthesis.

The basis for the work has been provided by a number of references, dated at the end of the 19th century, which have resulted in an outburst of interest in historic cartography as Columbus' 5th centenary approaches. These works may appear outdated after the publication of recent essays and repertories [2], but have actually provided the fundamentals for subsequent studies. Other references, published in nautical and geographical journals, deal with the Italian contribution to the development of navigation and cartography. In spite of this 'regional' point of view, these theories have been formulated on the strength of various documentary material, fully integrated into European historical geography.

Each of the hypotheses that follow provides a specific viewpoint on the basis of the documents considered, and taken together, they generally illustrate the essentials of the matter.

Of the great scholars of the past, some thought that medieval cartography developed gradually from the classical tradition, i.e. from sailing directions, maps of the world, and local surveys produced in the Antiquity. Others believed that nautical charts were a product of the Middle Ages, consequent to the development of navigation, to be credited to a specific country or even to a personal author. Thus the Atlantic peoples and particularly the Catalans, the Arabs, and the Italians have all claimed to be the 'inventors' of medieval nautical cartography. The supporters of the Italian tradition divided into those who supported a Genoese or a Pisan origin.

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THE GERMAN VIEWPOINT

FREIESLEBEN, placing the origins of nautical charts within Italian soil, indicates Frederick II, King of Sicily, of the German House of HOHENSTAUFEN, as the patron of medieval cartography. He recalls the initiative given by the King to South-Italian culture, and points out that the oldest medieval pilot book, known as *Compasso da navigare*, mentions Manfredonia, founded by his son Manfredi.

The *Compasso* seems to accord special evidence to places close to Pisa and Genoa, which were particularly dear to the King because of his admirals being Pisan and Genoese Ghibelline. In brief, since the *Compasso* is recognized as a fundamental document of medieval nautical knowledge, FREIESLEBEN deems it improbable that such vast knowledge could be expressed by individuals, unless it was supported and supervised by an organisation which, at the time, would probably have been in the Sicily of the HOHENSTAUFENS, where Frederick II acted as a patron of the sciences and scholarly education. FREIESLEBEN also points out that the contribution given by Aragon to medieval cartography: the family ties, cultural affinity, and commercial bonds between the Staufens and the Aragonese would again indicate Frederick II as the guiding spirit of medieval nautical learning.

FREIESLEBEN recalls that a century before, at the Norman Court of Roger II, Frederick's grandfather, the Arabian geographer EDRISI had produced his world map, which may have encouraged Frederick to pursue active nautical interests.

As regards the German cartographic connection, B.R. MOTZO, an Italian supporter of the Pisan cartographic primacy, discussed in greater detail further on, had already some years previously observed that the German Court certainly was familiar with the development of Italian culture and with the evolution of the Italian vernacular, of which the *Compasso* is the oldest existing scientific expression. Nonetheless, the author of that pilot book seems to have accorded little attention to the southern coasts of Italy, briefly described in the *Compasso*, which would hardly be the case, had the book been written at the Staufen Court. [3]

Concerning EDRISI's cartographic relevance, other expert opinion considers his charts to be nothing more than a re-make from PTOLEMY's production with the addition of Arabic legends. The Arabians' dominance in Southern Italy and Spain in the early Middle Ages, induced some scholars to attribute to them some influence on medieval cartography, while L. LELEWEL published, in mid-19th century, a repertory of Arabic charts supporting this theory [4]. But the prevailing opinion on LELEWEL's geographical studies is that the charts reproduced by him as Arabic products are to be considered reconstructions of his own work, based on coordinates deduced from Arabic literature which he completed with the geographical knowledge of his time.

THE CLASSICAL DERIVATION

A different hypothesis on the origins of medieval cartography was forwarded in 1909 by K. KRETSCHMER [5], who believed that the need for nautical charts was felt in the classical world when navigation extended to the whole Mediterranean area and beyond, and sailors faced the high seas, long after sailing directions had been in use for short coastal voyages.

In ancient times, navigation was restricted to the fine weather season and primarily to coastal waters, because sailors had no means of determining the cardinal points in cloudy weather on the open sea. They could only refer to the *peripli*, which were descriptions of coasts and routes based on other sailors' experience, and supplied distances between known places, which helped sailors determine their position at sea. In the Middle Ages, Mediterranean traffic increased, under the influence of the Arabs first, and of the Italian Maritime Republics afterwards. But, up to the introduction of the compass, the pilot book and the nautical chart, navigation remained difficult and slow. Nautical charts used in the rough and damp environment of a ship at sea were liable to damage, and are likely to have been destroyed or lost in shipwrecks, in the Middle Ages as well as in earlier times. They were made for the purposes of sailors and were copied for use and not for preservation, and probably were never given much thought as valuable manuscripts to be kept for posterity. This may be the reason why charts prior to the 13th century have not survived, while there exist several *peripli*, mostly similar both in form and in contents to the medieval sailing directions.

The oldest *peripli* date back to the 5th century B.C., but seem to have been subject to alterations and additions by uneducated copyists, on the basis of information received from sailors. Amended and enlarged versions were therefore produced at different times and in various places, their authorship often resting with the compiler of the original text.

The Greek geographer Marcianus from Eraclea, probably of the 5th century A.D., recalls the many *peripli* he has seen, and mentions numerous navigators of Greek origin, which suggests that Rome played quite a small part in the development of navigation. From the centuries immediately following PTOLEMY we have the *Stadiasmus* ..., of interest for both the history of navigation and the study of local changes, which is assigned to the 4th or 5th century A.D. The author probably was a Greek from Alexandria, because this is the starting point for his descriptions, which first go westwards along the African coast and then eastwards and northwards along the coasts of the Near East.

There are other geographical works of Greek origin, from the 4th to the 12th century of our era, even though they are considered compilations from older texts [6]. Nevertheless, KRETSCHMER says they prove the existence, for more than a thousand years of the *peripli* and of the nautical charts they complemented even though no specimens of the latter exist.

Safe navigation on the high seas also implied the use of the compass which was complementary to the pilot book and the nautical chart. How and when the

compass entered the Mediterranean is not known. The polar magnetic properties of magnetite were of common knowledge in the earliest classical world, while more than two thousand years B.C. the Chinese used a magnetic instrument which is very precisely described in much later works of about the 3rd century A.D. Since 1200, various men of letters, of different nationalities, speak of a magnetized needle afloat in a basin of water, and as the use of the compass is reported in China long before that time, the instrument is likely to have reached the Mediterranean by way of India and Arabia. Legend has it that it was invented by Flavio GIOIA of Amalfi, but since the instrument must have been gradually improved upon by skillful sailors until it eventually acquired the shape of a box containing needle and compass-rose, GIOIA is more likely to have gained his fame as a maker of compass-boxes.

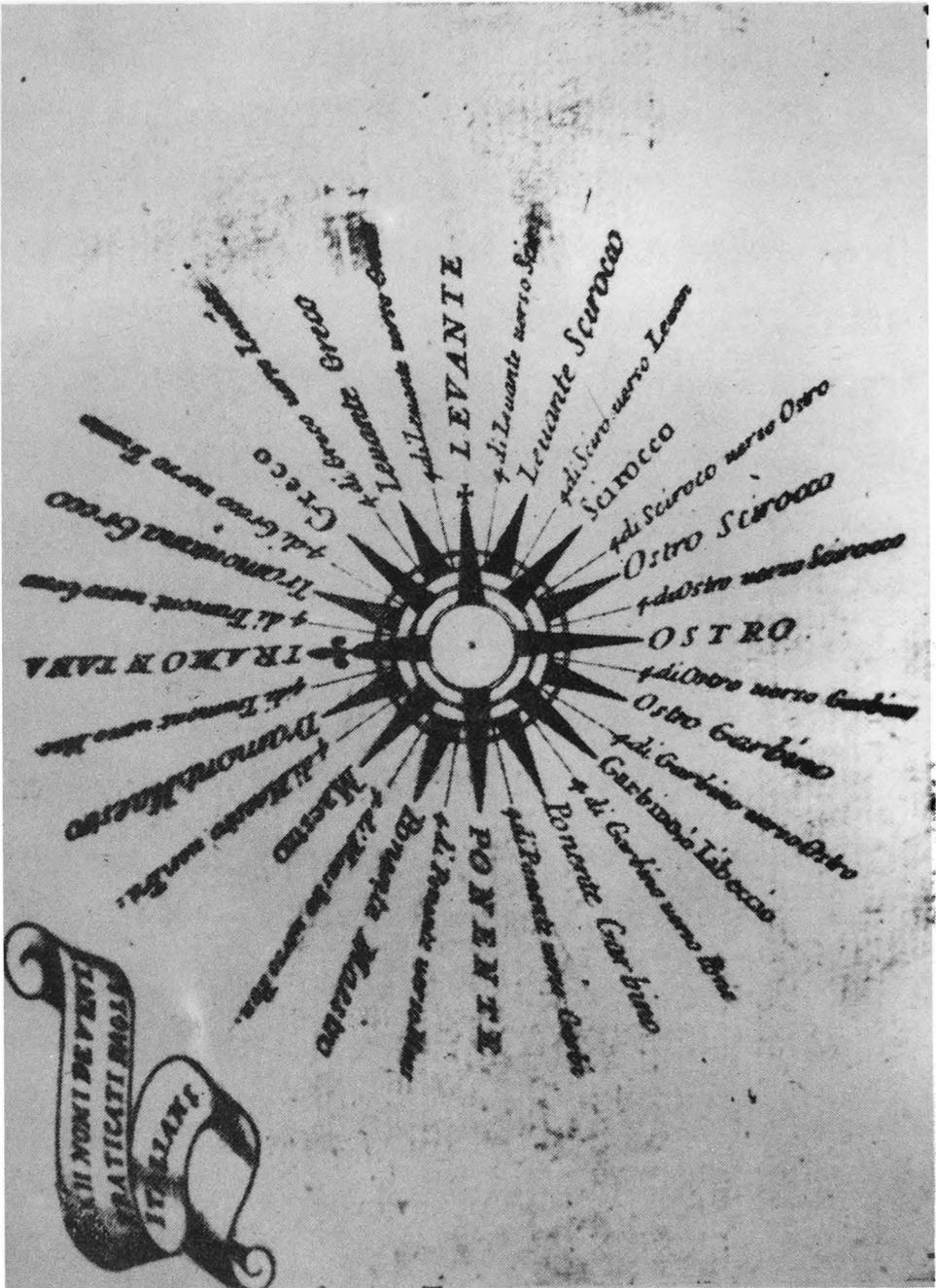
However, variation remained unknown for a long time, and sailors probably attributed the oscillations of the needle to instrumental errors. Ignorance of variation resulted, on the charts, in an evident disorientation, which remained uncorrected as late as the 16th century.

That nautical charts directly derive from sailing directions is proved, according to KRETSCHMER, by a number of elements: on medieval charts, the Atlantic coasts seem to be 'compressed', while the Mediterranean ones are correctly represented. This cannot but depend on the respective length units being different. By applying the cartometric method [7], he expresses his belief that medieval cartographers used a 'long' Atlantic mile, close to the Roman mile of 1480 metres used in the *peripli*, and a 'short' Mediterranean mile equal to about 1270 metres, which he connects to a 'pes geometricus' used in the 13th century as a terrestrial length unit. The approximate relation of 6 to 5 between the 'long' mile and the shorter Mediterranean mile, closely approaches, in the *peripli*, the ratio of distances measured ashore and the same distances measured at sea. Besides, in spite of the gap of about seven centuries between the latest *peripli* of the 5th century A.D. and the earliest medieval pilot book of the 13th century, there is no formal disruption between the two, which confirms their ideal continuity in time. There are obvious differences: medieval names are adopted in place of Latin ones, miles are substituted for 'stadia', and routeing instructions are added after the introduction of the compass. But the traditional structure of nautical information remains essentially unchanged, from the classical *peripli* through to the medieval sailing instructions. Reliable knowledge gradually accumulated and, probably in the 13th century, resulted in charts of commendable accuracy, which were at first issued to illustrate the contemporary sailing directions, as complementary aids to navigation.

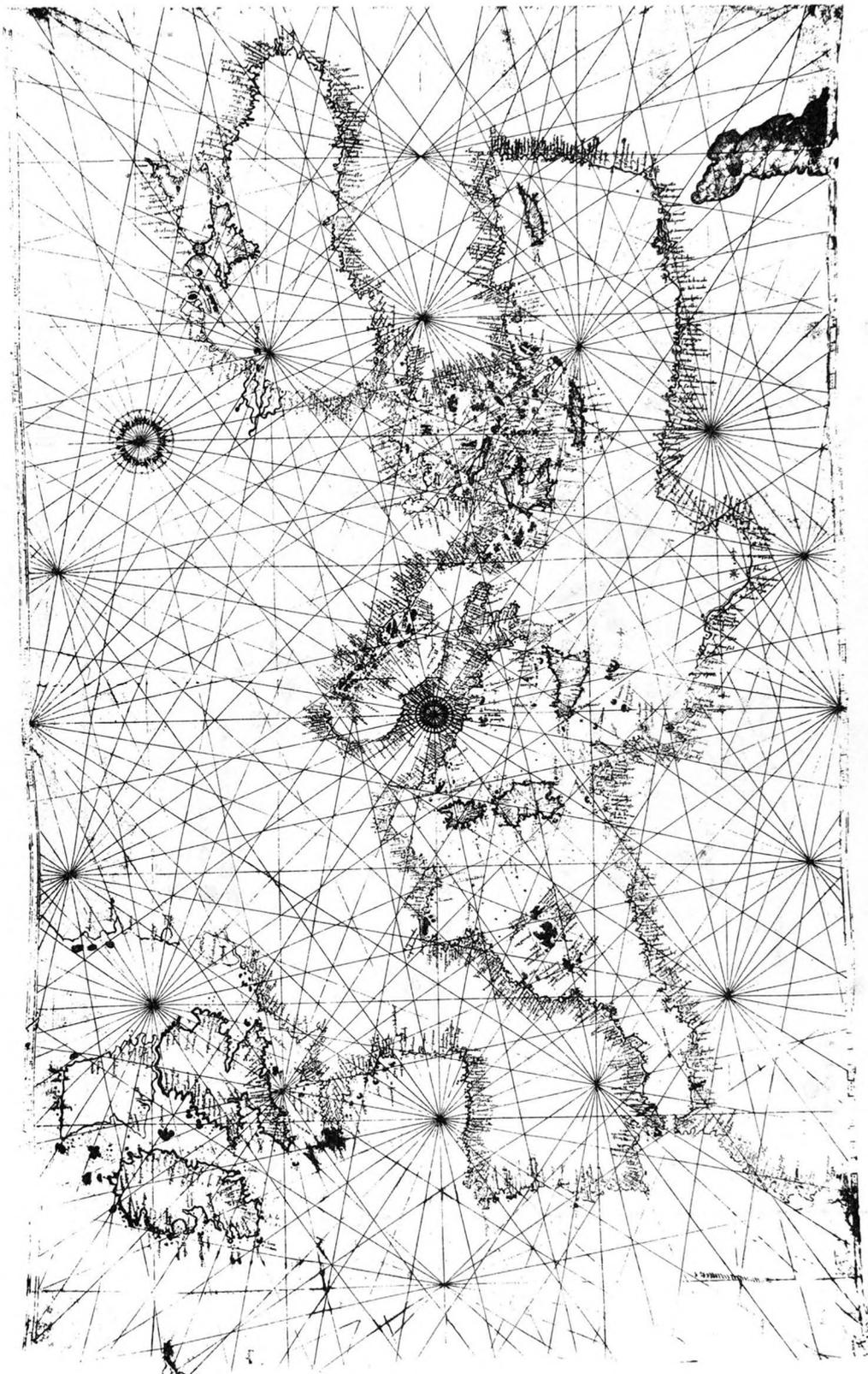
The existing charts, from the 13th century onwards, show a highly pictorial quality. This may indicate that they probably were the product of the wealthy patron, of the learned geographer, or of the mathematician ashore, who collated and improved on sailors' practical knowledge. These richly decorated and illuminated charts were therefore to be found, to a great extent, in the libraries of influential homes rather than on board ships at sea, which may account for their preservation.

Porto picano e porto de catena. e de la re
 lacatena e fonto plano entorno .v. passi. La cotta
 ga de porto picano e cotale. che d'agarbino. a una
 secca ennaquale e. una torre che se appella Ligel
 hora. e e lontana dal porto entorno .x. mil. di
 leuante. a una torre ennaquale se fa fano de
 notte. La strada de porto picano e cotale. quanto
 lo fonto parte entre il monte. fa quella via c'entra
 en porto necto. tenece le scuche e perque ne c'entra
 nel leuante c'monte necto. De porto picano il
 mte de pica .xij. mil. uerlomestro. De porto picano
 alagorgona .xxv. mil. p'garbino. De la ditta isola
 de gorgona a porto nectaro. lx. mil. p'namotana.
 Pica. a fiume che se clama arno. e a m'afce a
 mare. p'laquale fare po entrare le uno secale. e
 so dal'afce entro a porto picano. entorno .vij.
 mil. uerlomestro di Porto picano.

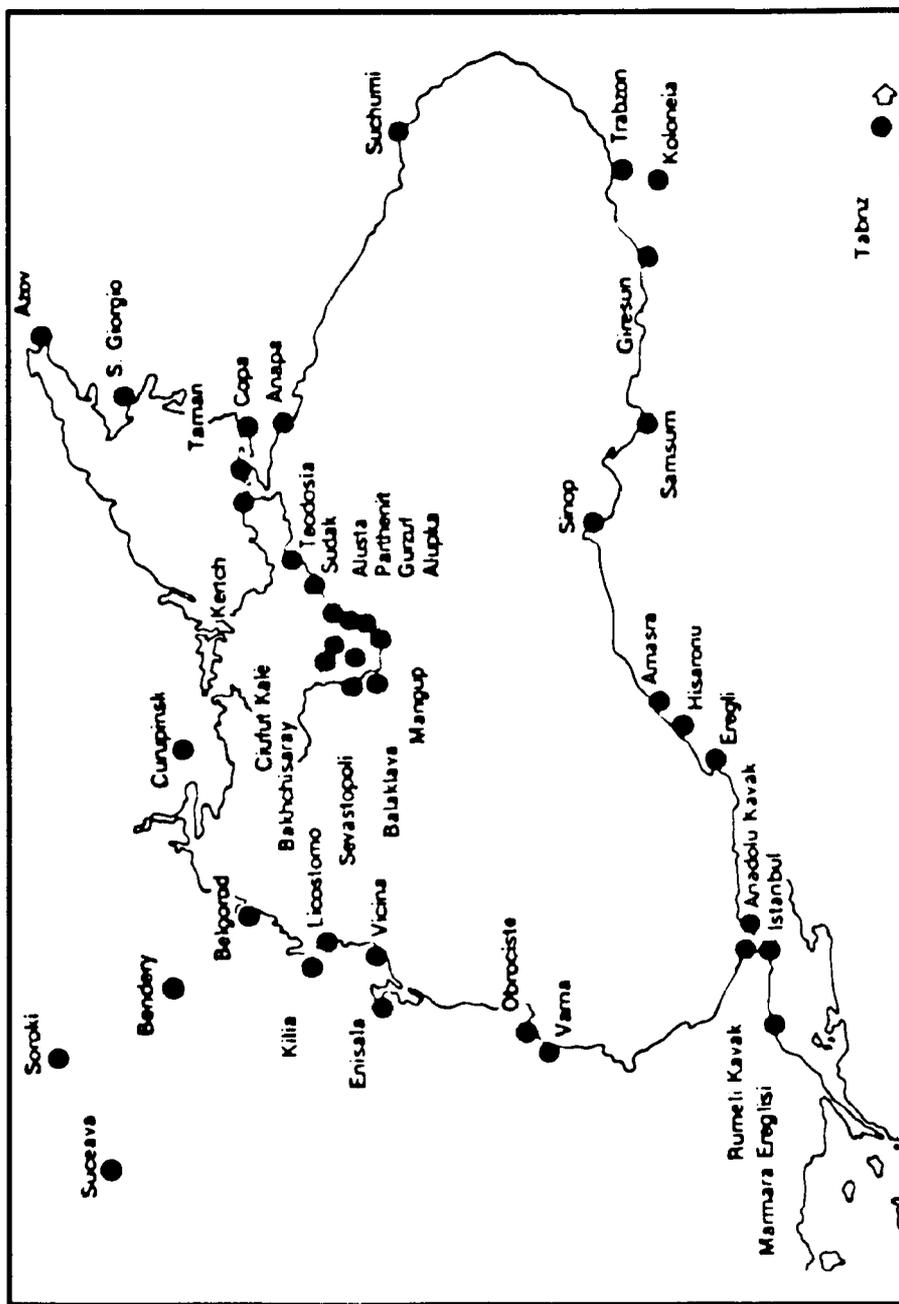
De porto picano a p'garbino lx. mil. ent' s'into
 emecco di. Sopra lonbino. x. mil. a j. isola.
 che se clama climba. che e m'afce a m'afce
 ano porto. lo porto se appella strata. e m'afce a



The Italian windrose. From the 15th century onwards. In Compasso cit.



'CHARTA NAVIGATORIA AUCTORIS INCERTI SECVLI XV,
IN BIBLIOTHECA UPSALIENSI CONSERVATA'. In Periplus cit.



The Genoese settlements in the Black Sea, in the 13th and 14th centuries. (In P. STRINGA. Genova e la Liguria sul Mediterraneo, Genova 1892).

THE CATALAN HYPOTHESIS

A different hypothesis altogether was advanced by A.E. NORDENSKIÖLD, at the close of the 19th century, which attributed the cartographic and nautical development to the Catalans.

At the end of last century, he published two large repertoires [8] of nautical knowledge and cartographic documents, from the earliest references of Antiquity to the existing charts of the 16th century. The oldest map referred to is a papyrus of the 13th century B.C., showing a plan of some Nubian gold mines, but no graphic nautical material exists from Antiquity. In the Homeric poems, the earth was described as a flat disc encircled by the river Ocean, while in a central position there were the Olympus, and Greece with its islands. The Classical World was frequently surrounded by fantastic pictures of monsters and incredible inhabitants of the exterior regions, derived from legends narrated by novelists and historians, or from misinterpretations of travel accounts.

The concept of a sacred centrality, typical of oriental philosophy as well as of the biblical tradition, survived well into the Middle Ages, with a cartographic production rich in shapes and contents, which reflected an inclination for cosmogony and theology rather than for geography and navigation. Typical products of the times are the so-called 'T-O' world maps, where the 'O' represents the boundary of the world, while the 'T' expresses the tripartition of the world — Europe, Asia, Africa — but also represents the Trinity. Its horizontal dash connects the North of Europe to Africa; and the vertical axis — always oriented with East at the top — represents the Mediterranean. The 'T' also indicates the Cross, and the Mediterranean, the route of evangelic propagation. At the center there is Jerusalem, while the surrounding regions are inaccurately represented and richly decorated with emblematic figurations.

The Romans, being great travellers, felt the need to assess the extension of their possessions, which was seen by the *mensores* who accompanied the consular legions. A full description of the Empire was provided by M. Vipsanius AGRIPPA in the form of a world map, which seems to have been drawn on the walls of a *portico*, and belongs to the tradition of the *itineraria picta*. The *itineraria*, or road maps, were lists of staging posts which the Romans required when their road-net reached its maximum expansion during the growth of their Empire. These early maps were made in various forms: some were assembled together like books, some were engraved on bowls or on clay tables and some were written in the form of commemorative descriptions of the Emperors' travels. The *itineraria picta* were graphic descriptions intended for specific military use. Of these only a few examples still exist, such as a fragment of a shield displaying posts in the Black Sea region, or the well-known *Peutinger Table*, which is a reproduction — probably made in the 12th century — of a cartographic document of the late Empire, drawn on parchment.

But as to marine charts in the form of maps specially intended for seafarers, they are not even mentioned by Greek and Roman authors, except for the bare mention, in PTOLEMY's *Geographia*, of a cartographer called *Marinus* of

Tyre, who presumably lived around the year 120 of the Christian era. Because such a name is not reported in any text prior to PTOLEMY, NORDENSKJÖLD feels doubtful if such a person really existed, even though he is inclined to believe that PTOLEMY must have founded his work on cartographic documents preceding the 2nd century A.D. Nevertheless, since there are no marine charts existing for the first thousand years of our era, nor are they mentioned in late Latin literature, NORDENSKJÖLD does not believe in the uninterrupted development of a cartographic tradition from Antiquity up to the medieval documents, and is therefore inclined to assign to the latter full originality as a product of their time. He thus concludes, upon examination of the existing charts from the 12th to the 16th century, that all of them are but slightly amended copies of a single archetype, no longer existing in its original version, which was closely reproduced by copyists in as late as post-Columbian years.

Using his personal definition, he calls the cartographic archetype 'normal portulan', which must have been the first general chart of the Mediterranean, composed when a number of local maps and reports from different places and different times, founded on sailors' experience or sketched at sea directly, were assembled into the most perfect medieval map. That this archetype was thereafter copied by draughtsmen and never subjected to any substantial revision is shown by a number of recurring features on all the existing charts. They were usually drawn on whole sheets of parchment which were kept in rolls; or, for easier handling, they were divided into smaller leaves which were glued on this boards of wood or card, bound together like pages of an atlas. The drawings were usually polychromatic and the various colours had different purposes. Most place-names were written in black while some were marked by red, which seems to indicate not so much their size or political relevance, as their suitability for landing or provisioning, or for other necessities of significance to sailors. Proportions of islands, cliffs and capes were altered to underline their relevance for coasting voyages, irrespective of their true shapes and little geographical importance. Often names of places and harbours, long-destroyed, may occur in late charts, while frequently there are chronological and legendary allusions together with allegoric figurations of towns and coastal perils. Instead of the geographical coordinates now in use, the charts are crossed by a typical grid of straight lines, or 'rhumbs' oriented in the directions of the main winds, and generated from nodal point of intersection or 'roses'.

The purpose of these 'roses' which point to the true North, irrespective of magnetic variation, and therefore have nothing to do with the compass, is uncertain. Neither does NORDENSKJÖLD consider the rhumbline network to have been intended to facilitate the copying of the maps, because it seems to him to have been laid down after the drawing of the map itself. Nevertheless, he mentions some of his contemporaries who had opinions to the contrary, which seem to have been confirmed by recent experiments based on examination by microscope of a number of existing charts [9].

Almost all portolan charts are supplied with a scale of distances — often looking like a ribbon placed within the map border — which seems to be the same on all the charts. It is in fact always divided into fifths which seem to denote the same distance on all the charts. On the other hand this distance does not correspond to any measures used at the time, while its unit of length is not

expressed. In order to determine these length-units, NORDENSKJÖLD measured distances from prominent places or embayed harbours on all the medieval charts, and compared them with the corresponding distances on modern maps. From his measurements he deduced that the cartographer used a length-measure of about 5830 metres, which NORDENSKJÖLD calls 'portolan mile' to avoid confusion with other medieval measures. In the 17th century, a famous Spanish man of science stated, in a work on weights and measures, that one Catalan league equalled 5.74 kilometres, which is very close to the 'portolan mile'. Therefore NORDENSKJÖLD deems it most probable that such a Catalan league was the length-measure used for the portolan charts, which were thereafter reproduced, in Italy and other Mediterranean countries, by copyists who were evidently unaware of the value of the scale.

As regards the date of the 'normal portolan', NORDENSKJÖLD considers the following facts: the oldest dated existing chart being VESCONTE's map of 1311, [10] shows that the 'normal portolan' — i.e., the archetype that served as a model to VESCONTE, and to his contemporaries and successors — was drawn before that date. On the other hand most charts of the 14th and 15th centuries show Porto Pisano, destroyed by the Genoese in 1290, which suggests that the 'normal portolan' must have been compiled before that year. But it must be of a later date than 1266, when the Genoese founded a colony at Caffa on the Black Sea, because that region was well-known to the author of the 'normal portolan' since it is precisely represented on all the existing nautical charts.

Concerning the language used on the 'normal portolan', NORDENSKJÖLD notices that all the existing portolan charts are written in Latin, in local dialects of the Italian coast-towns, in Catalan, or in a kind of mixture of all these languages. This points to some Latin scholar who was able to combine the different languages into his masterly compilation from local charts written in different dialects by sailors of different nationalities. Because of the large number of Catalan charts existing from DULCERT's chart of 1339 [11] to the 17th century, and because of the Spanish league already mentioned, NORDENSKJÖLD does not hesitate to state that the 'normal portolan' is a Catalan product. What for him clinches the matter is the fact that the very first mention of a nautical chart is to be found in a scientific treatise written by the Catalan erudite Ramón LULL (1235-1315?). He had travelled extensively by sea, had probably become acquainted with sailing matters, and was a man of letters well conversant with Latin. It therefore appears most likely to NORDENSKJÖLD that he was either the author or at least the leading spirit in the compilation of the 'normal portolan'.

THE GENOESE CHARTING SCHOOL

In his treatise *Arbor Scientiae*, Ramón LULL answers his own question. 'How could sailors measure distances at sea?' That they used 'chartam, compassum, acum, and stellam maris'. While NORDENSKJÖLD thought this statement conclusive for his 'Catalan theory', other scholars including REVELLI — an Italian historian and a supporter of the Genoese tradition — disputed LULL's

scientific authority [12]. The simplicity of his answer to such a difficult problem suggests in fact a superficial knowledge of nautical matters, far from that extensive experience on the strength of which NORDENSKJÖLD credited him with the authorship of the 'normal portolan'. REVELLI actually believes that LULL's words *chartam* and *compassum* indicated something quite different from the nautical chart and the pilot book. In the 13th century, in fact, a cartographic reproduction was still called *mappa(mundi)* and only in the 14th century the term *charta* acquired the meaning of map, while *carta* first appears on Pietro VESCONTE's map of 1311. Therefore REVELLI is inclined to believe that by *charta* LULL meant the ordinary writing paper — used perhaps to jot down sketches or ship reports — according to the general use of the time when *vellum* was still employed for valuable writing. Likewise he thinks that *compassum* may indicate the compasses, used as a means for measuring distances on a sheet of paper, because the Latin verb *compassare* stood for measuring, while the *liber compassum* was the register where sailors recorded distances between ports. It is therefore possible that the word acquired the extensive meaning of instrument fit for measuring. *Acum* can only be the magnetic needle, while according to REVELLI *stella maris* designates the polestar — ever a sailor's guide — rather than the wind rose. All the same, there exist other interpretations of the word *compassum* which will be reported further on, while it is here worth adding that the frequent ribbon-like form of the scale on medieval charts suggests that sailors used tape-measures rather than compasses. On the contrary, on later land charts there often are compasses drawn close to the scale, together with instructions as to the way of using them. This may just indicate that compasses were not in use in the Middle Ages.

Be it as it may, REVELLI's theory mainly rests on the many charts of Genoese origin existing from 1311 to 1350, in addition to the well known *Carta Pisana* of uncertain, though certainly earlier, date and unknown authorship, dealt with further on [13]. The 13th century seems in fact dominated by the Genoese production, while the first Venetian document is a nautical atlas of 1321 made at Marin SANUDO's workshop, where the Genoese cartographer Pietro VESCONTE worked for a time. The atlas seems to have accompanied SANUDO's *Liber mysteriorum fidelium crucis ...*, written between the years 1306 and 1321 in order to incite the Powers of Christendom to a new crusade. It is therefore assumed that SANUDO, a scholar and a traveller, requested VESCONTE cooperation to illustrate his works of faith. As a matter of fact the whole Venetian production of the 14th century seems to bear distinctive Genoese features, which supports a widely-spread opinion that VESCONTE was expressly requested to move to Venice and produce his charts not only for SANUDO, but for local merchants too, interested in the fairs in Flanders, because of his extensive knowledge of the North European coasts.

Later Venetian charts by F. PIZIGANI, are dated 1367 and 1373, while the so-called *Atlante Pinelli*, of anonymous origin and unknown date, is placed at around the end of the century and is similar to a nautical atlas by the Venetian Niccolò de BOMBITIS. Therefore a whole century of Italian and mostly Genoese cartography precedes the earliest Catalan Atlas dated 1375, of uncertain authorship.

NORDENSKJÖLD's theory of a Catalan cartographic primacy seemed to be confirmed at the time by an early chart where the inscription says:

*Hoc opus fecit Angelino Dulcert ano M CCC XXXVIII
de mense augusti in civitate maioricarum.*

In his *Periplus* NORDENSKJÖLD mentioned this chart as a Catalan product, while other scholars evidenced its similarity to the Catalan Atlas of 1375. Italian and French historians such as a MAGNAGHI, Ch. de la RONCIÈRE and L. GALLOIS [14], rejected the Catalan attribution of DULCERT's map, mostly on the grounds of its likeness to an earlier map by the Genoese cartographer DALORTO. The inscription on the latter says:

*Hoc opus fecit Angellinus de Dalorto anno DNI M CCC XXX
de mense marcii composuit hoc.*

As to the date, some doubts arose as to what was the last Roman figure, if an X or a V, so that the chart may be of 1330 or of 1325, but this is irrelevant to the matter in hand. The doubt concerning the spelling of the author's name on both charts, due to the uneven surface of the parchment, is more fundamental to the issue so that it was suggested that the author's name was Angelino DALORCO from the Ligurian village of Orco Feglino. This hypothesis is supported by the christian name Angellinus — or Angelino — which is a common Ligurian name unknown in Majorca, while the first of the two surnames, if we take it that they are different on the two charts, may have been hispanized. It was in fact general practice, at the time, to adapt foreign names to local pronunciation and spelling. But if the author was Italian, why did he not say so, stressing instead the fact that he was in *civitate maioricarum*? MAGNAGHI thinks that he either wanted to indicate his temporary residence, or meant to pay a tribute to his host country, by concealing his nationality.

Other textual features are advanced by MAGNAGHI in favour of the Genoese origin of DULCERT's map: Ligurian names designate distant places; Genoa's Saint — San Giorgio — occurs frequently as a place-name; and a statement written by the Alpine border calls Italy 'Greatest of all Nations', which can hardly be expected of a non-Italian cartographer. Also suggestive is the fact that DULCERT wrote in Latin — which was the language generally used by the Italian cartographers — while the Catalan charts are written in Spanish; also, that the inscriptions on the two charts are identical in style.

As to the debated question of the scale which seems to be the same on all the existing charts, the fact that their length-unit is not expressed suggests to MAGNAGHI that it is the same on all the charts. This would indicate that they were produced at a single cartographic centre where only one length-unit was adopted in order to facilitate the use of charts to sailors of different nations. According to different expert opinion, the omission of the scale-value shows that each cartographer followed the local custom, and that sailors used charts produced in their native countries.

Be it as it may, both theories express their supporters' belief that the first medieval charts were produced in Genoa, on the grounds of the historic events that took place at the time in question. It is in fact general knowledge that the Italian Maritime Republics dominated over the Mediterranean scenery in the late Middle Ages, and that Genoa was predominant for a period after its victory over Pisa in 1284, while Venice was defeated twice — in 1294 and 1298 — and its Oriental penetration was checked for a length of time. Genoese settlements were

established widely around on the Black Sea, while Poland was reached by way of the Danube where the Genoese took control of the salt 'industry'. Others settled within the Indian sultanates and reached China, where their presence is attested in early 14th century. As regards the western side of the continent, as early as the 12th century, they were called by the Portuguese and by the Catalans to defend their coasts against the Moors. For their naval assistance, they were granted commercial privileges and full possession of 1/3 of the territories they helped recover, while the isle of Majorca became an active Genoese commercial center. The Genoese presence beyond Gibraltar, attested since as early as 1120, suggests equally flourishing maritime activities on the Atlantic coasts, while mercantile associations with other European countries are documented throughout the 13th and 14th centuries. According to the annalists of the time, so great was the influence of the Genoese merchants, that fairs in the Flanders were hindered because of an edict against them, while the Italian financial and banking relevance in England is also testified to by the fact that the district where foreign bankers and merchants were under obligation to reside at, was called Lombard Street. [15] A French chronicler reports that Louis IX, leader of the Crusade against Tunis in 1270, sailed on the Genoese vessel PARADISO commanded by the Genoese Pietro d'ORIA. In the proximity of Sardinia, the King wanted to be informed of their position, which the ship commander showed him on a nautical chart. It is conceivable that it was a Genoese chart because — as mentioned above — it was customary for sailors to use home-made charts.

Later on, Philip IV entrusted his fleet to Genoese admirals such as GRIMALDI, MARCHESE, and ZACCARIA and the latter drew up for the French King a famous plan for a naval assault upon England. His plan of war and geographical descriptions closely correspond to VESCONTE's nautical charts, which suggests that VESCONTE provided cartographic support to the Admiral's naval activities [16].

THE PISAN VIEWPOINT

What can be gathered from chroniclers and annalists of the time evidences the Genoese relevance in the whole Mediterranean world, but yet another Italian theory was advanced, which favoured the cartographic primacy of Pisa on the strength of the textual analysis of the already mentioned *Compasso da Navegare*. This is the pivot of any cartographic speculations, because it is the oldest existing pilot book, which the Italian medievalist B.R. MOTZO subjected to close philological analysis. The text of it is known since the 15th century, because it formed part of a manual of marine matters assembled together by Guido d'UZZANO, a merchant of Leghorn. Because it was attributed to him and was thought to be a late example of Italian prose, it was given little consideration and therefore its significance was overlooked as a medieval document as well as the oldest scientific work written in the Italian vernacular. A few versions of this text exist, similar in bulk, except for minor details. But MOTZO eventually discovered — in the National Library in Berlin — the so-called *396 Hamilton Codex* dated 1296, which proved to be no less than an older version of the *Compasso*, even though not the original text. MOTZO believes in fact that the existing copies,

including the *Hamilton Codex*, are remakes of an older work which he assigns to about 1250, on the score of formal and textual features of the existing versions.

It was customary to amend and improve pilot books, which were 'dynamic' objects in constant evolution, just as they are constantly updated today in between new editions, upon information received from various sources. Likewise the original *Compasso* must have been immediately reproduced into a number of copies, till eventually every ship had its own copy together with the complementary portolanic chart. Because of the many amendments and additions, there probably were not two copies alike, which from time to time must have induced some compilers — though incompetent in maritime matters — to combine the different versions into one, as seems to be indicated by the many repetitions and contradictions in the *Hamilton Codex*. This confirms that the latter must be a copy of an earlier version, and considering the ultimate amount of amendments therein, MOTZO believes it must have taken a considerable length of time — no less than 50 years — to alter the original text. Besides, the *Hamilton Codex* registers contain place-names which give definite chronological limits to the original text. It mentions in fact Aigues Mortes, erected by order of Louis IX after 1226, when he was given the sovereignty of the coasts of Linguadoca. Louis IX wanted a harbour in the Mediterranean and therefore had Aigues Mortes built as a starting place for his crusades. There is Olivoli which was enlarged and renamed Villefranche in 1295 by the Angevin Charles II. Porto Pisano is described as it was before 1290 when the Genoese and the Florentines half destroyed it. The book also mentions Agostara, today's Augusta, which was rebuilt in 1232, while it describes Siponto 'a good harbour' although the town was abandoned between 1256 and 1258, when its inhabitants moved to the more salubrious newly-built Manfredonia. As to Brindisi, the *Compasso-Hamilton Codex* does not mention the improvements made in 1276.

That the unknown compiler made use of and adapted minor local sailing directions is also shown by the recurring local forms of speech and dialectal terms which were used in the different regions described in the *Compasso*. For instance the south wind is usually called Mezzo dī, but in writing about the Spanish and Moroccan coasts, the author calls it Sarquino, from the Arabic Sarqui which also originated Saracen. A cape was called Cavo in Venice, Co in Genoa, and Capo in Tuscany; accordingly, together with the latter predominant form, the former two words are used in the descriptions of the pertinent coasts. The south-west wind is mostly called Afracino — the African wind — but also Garbino or Lebeccio, after the Venetian and Genoese tradition, respectively.

This miscellaneous terminology also shows that the original *Compasso* was used by sailors all over the Mediterranean, and was therefore subject to continual updating. Therefore, in spite of the many classical terms which recall the Roman and the Latin-Oriental influence, the *Compasso* is unquestionably a product of its time. The toponymy is in fact that in use in the 12th and 13th centuries; foreign names are Italianized; and Italian names are given to distant places. Like the Latin *peripli*, the *Compasso* gives just a brief description of the coasts to the exclusion of any information other than nautical, but is much richer in coastal details useful to sailors, concerning shallows, reefs, harbours, currents, winds. But what makes it a 'modern' pilot book is that it gives distances in miles — as mentioned above — and indicates positions and routes according to the Italian rose of 8 to 16 winds.

In a poem, written in early 1300, the Italian Francesco da BARBERINO calls the nautical chart '*compasso*'. This acceptance of the term must have eventually migrated to Arabia, because from the *Historical Prolegomena* by the historian IBN KHALDÜN (1332-1406) we learn that 'All the [Mediterranean] countries are described on a sheet that sailors call Kumbâs [*compasso*] ... which does not exist for the surrounding river [the Atlantic ocean], where navigation is therefore impossible'. This passage implies that the Arabian writer is talking of a nautical chart of the previous century, or he would not say that navigation is impossible in the Atlantic for want of charts. Besides their peculiar denomination, the compasso-book and the compasso-chart — i.e., the cartographic archetype called 'normal portulan' by NORDENSKJÖLD, of which the *Carta Pisana* is the oldest copy — share other features: on the grounds of these, MOTZO intends to show that they were written by a single author at about the same time.

In the first place the fact that both of them are strictly confined to the description of the coastline and the sea, while every detail on the interior is omitted, indicates the same mental approach. Furthermore, on the compasso-charts, from the *Carta Pisana* to the later specimens, names are written at right angles to the coastline from left to right in the same direction they follow in the compasso-book. This is particularly evident where islands are concerned, because on their oriental coasts place-names are written upside-down, and in order to be able to read them, one needs to move the chart about, as it happens with a ship that continually changes position in navigation. Also significant, with respect to the source being the same of the book and the chart, is the fact that the two complement each other. The book is in fact insistent on descriptive information on the quality of the sea and of navigation, which cannot be represented on the chart, while the latter is more abundant in names of place, so that the written description and the graphic representation complete each other. MOTZO has no doubts that the *Compasso* and the *Carta Pisana* were compiled by a single author, who felt the need for a nautical 'outfit' to be used on board.

As to where they were produced, MOTZO feels confident about their Pisan origin because of several indications: on all the existing versions of the *Compasso* the language seems definitely Tuscan; the coasts of Tuscany appear to have been described with special competence and insistence as have the coasts of Sardinia where Pisa entertained exclusive commercial interests. On the contrary the earliest version of the *Compasso* — i.e., the *Hamilton Codex* — does not include the description of the Black sea, which seems to have been added to later versions only: were the *Compasso* a Genoese product, the author would not have omitted that region where the Genoese had established flourishing settlements since mid-1200. His geo-trigonometric knowledge enabled him to calculate drift angles, while his competence as a mathematician and a pilot indicates a connection with the Tuscan school of PISANO FIBONACCI and Campano da NOVARA, which is confirmed by R. WAGNER: in his essay on *The origin of the medieval Italian nautical chart* [17], he shows in fact the correspondence of the length-unit on medieval charts to a *miliarum geometricum* used by Campano da NOVARA.

And finally MOTZO points out that names recurring both on the *Compasso-Hamilton Codex* and on the *Carta Pisana* were omitted or modified on charts of later production. An example — which may be of interest to those who are familiar with the Italian Riviera — is the name of the Ligurian town Sanremo:

originally the town was called San Romolo (Saint Romulus), and this is the name reported on both the *Compasso* and the *Carta Pisana*, whilst on all posterior documents it figures as Sanremo, after the local pronunciation — San Rômu — of the proper name.

Because of all the arguments put forward in his essay, MOTZO deems it credible that the *Compasso* and the *Carta Pisana* were of Tuscan origin and complementary to each other, and were therefore produced by a single author at much the same time, which he assigns to about 1250, on the score of his multidisciplinary analyses.

CONCLUSION

If the Italians were so active in the medieval maritime and commercial world, as borne out by the accounts of the time, it seems hardly plausible that they were not self-sufficient as regards their nautical documentation, as implied by FREIESLEBEN when he states that only the Staufen Court in Southern Italy had the accomplishments to produce charts and nautical documentation. On the other hand speculation is still possible on the origin of the nautical chart. Large periods of time in the nautical history of different Mediterranean countries are still unknown for want of documents. Nevertheless, these gaps do not necessarily exclude the probability that such documents were produced, and have been lost since. Also, additional evidence may crop up upon fresh consideration of existing documents, as shown by the outcome of CAMPBELL's recent microscopic examination, which indicates that the question is not, by all means, exhausted. Finally, 'the origins of medieval cartography must today be studied specifically within the framework of a common ... Mediterranean cultural heritage, in the face of which nationalisms fade away and the disputes ... concerning the priority of one or the other school ... die out', as recently advised by G. FERRO, professor of geography at Genoa University [18].

References

- [1] FREIESLEBEN H.C.: The Origin of Portolan Charts, in *The Journal of Navigation*, Vol. 36 (1983), pp. 124-129 and Vol. 37 (1984), pp. 194-199.
- [2] cf. for instance,
RONCIÈRE de la Ch., M. MOLLAT DU JOURDIN: *Les Portulans. Cartes Marines du XIII^e au XVII^e siècle*. Fribourg, 1984.
SHIRLEY R.W.: *The mapping of the world. Early printed world maps 1472-1700*, London, 1984.
MORELAND C., D. BANNISTER: *Antique Maps (Christie's collectors guides)*. 2nd Ed. Oxford, 1986.
- [3] *Il Compasso da Navigare: opera italiana del secolo XIII a cura di B. R. MOTZO*. Cagliari, 1947.

- [4] LELEWEL J.: Géographie du moyen âge. Bruxelles, 1852-58.
- [5] KRETSCHMER K.: Die italienischen Portolane des Mittelalters: ein Beitrag zur Geschichte der Kartographie und Nautik. Berlin, 1909.
- [6] MULLER K.: Geographi graeci minores. Paris, 1855.
- [7] Other scholars objected that the controversial cartometric method is unreliable because the writing material is subject to creasing and wrinkling, which considerably affect small formats.
- [8] NORDENSKJÖLD A.E.: Periplus, an Essay on the Early History of Charts and Sailing Directions. Stockholm, 1897, Facsimile — Atlas to the early history of Cartography ... Stockholm, 1889.
- [9] The History of Cartography. Edited by J.B. HARLEY and D. WOODWARD. University of Chicago Press, 1987. It includes an essay on 'portolan charts' by T. CAMPBELL, the map librarian at the British Library, who subjected four of the British Library's medieval charts to microscopic examination. He found that on three of them the rhumbs lay beneath the coastline, while the fourth chart is open to doubts.
- [10] The chart, with the inscription 'Petrus Vesconte de Janua fecit istam cartam anno Domini MCCCXI', is kept at the Archivio di Stato in Florence.
- [11] 'Hoc opus fecit Angelino Dulcert año MCCCXXXVIII de mense augusti in civitate maioricarum'.
- [12] REVELLI P.: Cristoforo Colombo e la scuola cartografica genovese. Genova, 1937. R. LULL's nautical competence is also disbelieved by E. GELCICH in *L'infanzia della scienza nautica*, published in *Rivista Marittima* No. 7-8, 1890, p. 132, and by T. BERTELLI, in *Appunti storici attorno all'uso topografico e astronomico della bussola*, published in *Rivista Geografica Italiana*, VII, 1900, p. 2.
- [13] The *Carta Pisana* was first discovered in a Pisan library and eventually reached Paris' National Library — probably in 1839 — where it is kept in the Map Gallery. On the Catalogue of the Library it is assigned to the year 1275, but no elements on the chart itself corroborate this date.
- [14] MAGNAGHI A.: Sulle origini del portolano normale nel Medio Evo ..., published in *Memorie geografiche*, 1909, and *Il Mappamondo genovese di Angelinus de Dalorto*, published in *Atti del III Congresso geografico italiano*, Firenze, 1899.
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RONCIERE de la Ch.: *Histoire de la Marine française*, 1899-1900.
- [15] Cf. STRINGA P.: *Genova e la Liguria nel Mediterraneo*. Genova, 1982.
AIRALDI G.: *Genova e la Liguria del Medioevo*. Torino, 1986
DE NEGRI T.O.: *Storia di Genova*. Firenze, 1986
- [16] RONCIÈRE de la Ch.: op. cit.
- [17] The essay appeared in Report of the VIth Int. Geog. Congress. London, 1896.
- [18] FERRO G.: *Nautical charts from Ligurian museums and libraries from the 14th to the 17th centuries*. Bologna, 1899.