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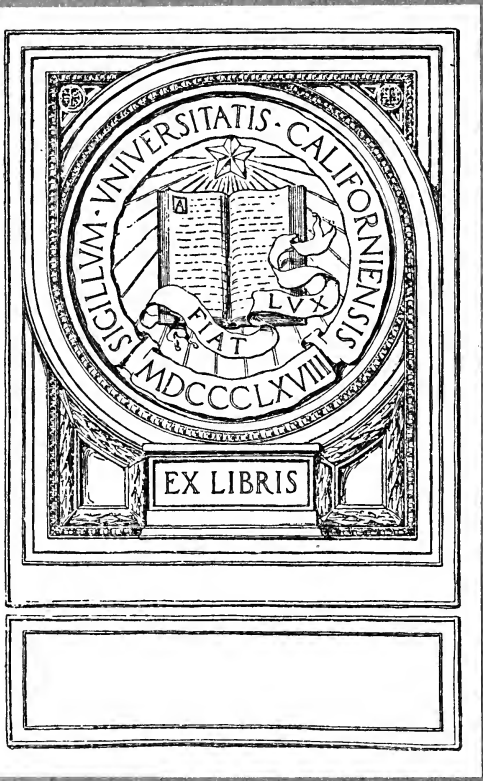
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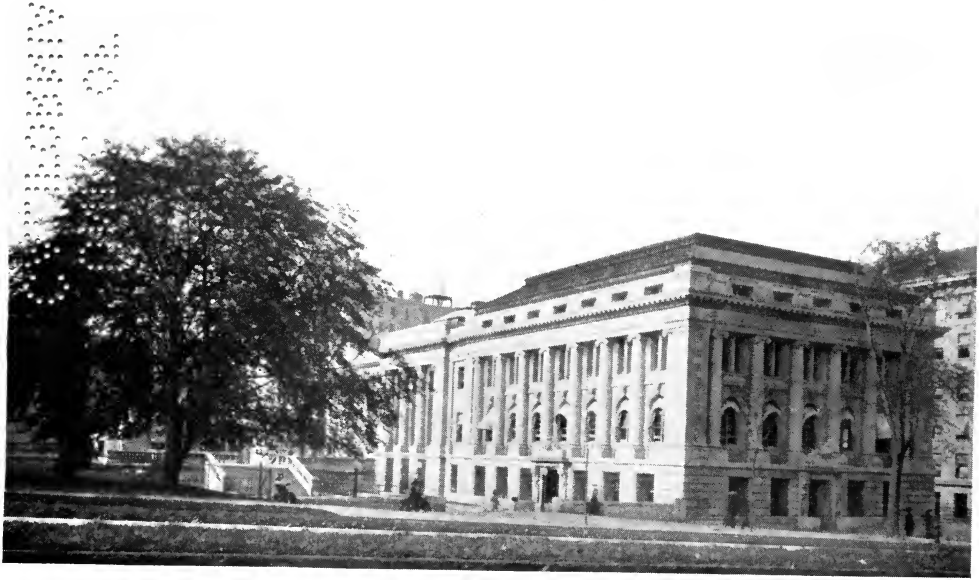

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MAPS

BRY. OF

REPRODUCED AS GLASS TRANSPARENCIES

SELECTED TO REPRESENT
THE DEVELOPMENT OF MAP-MAKING FROM THE
FIRST TO THE SEVENTEENTH CENTURY

BY

EDWARD LUTHER STEVENSON, PH.D.

THE AMERICAN GEOGRAPHICAL SOCIETY
NEW YORK CITY
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FOREWORD

In this exhibit the attempt has been made to illustrate the development of map-making, and the expansion of geographical knowledge as cartographically represented, from Roman days to modern times. The forty-one maps selected are typical. The fact, however, is recognized that in so limited a number of reproductions many of the details and peculiarities, which are characteristic of the maps drawn during this long period, do not appear.

These transparencies, on glass plates about 44 by 56 cm. in size, have been placed in the lecture hall windows of The American Geographical Society's Building, 156th Street and Broadway. Although they vary somewhat in their dimensions they are as nearly uniform as the peculiarities of the original maps permit. Except in few instances, where convenience in arrangement of the reproduction has directed, the order of the numbers is chronological.

The numerous maps in fac-simile which are framed and adorn the walls of the building exhibit certain features not to be found in the transparencies, and furnish additional cartographical information.

E. L. S.

February 22, 1913.

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1.—PEUTINGER TABLE, Early Roman Map.

This map derives its name from Konrad Peutinger, a distinguished German humanist of the Renaissance period, who was its possessor at the time it first attracted attention, 1507. It appears to be a copy, made in the thirteenth century, of an old Roman original since lost, and is treasured not only by the Royal Library of Vienna, where it may now be found, but by all interested in the history of geographical science, as the choicest cartographical monument of antiquity.

It is properly designated an itinerary or road map, called by the Romans *ITINERARIA PICTA*, and lays down the world as then conceived by one who would have his map serve an especially practical purpose. He has indicated the Roman highways, and has represented the towns through which one would pass in going from one locality to another in the Empire, regardless of strict accuracy as to distance and direction. The eleven segments of this map, altogether more than eighteen feet in length and slightly more than one foot in width, embrace the region stretching from Spain to India. The sections here reproduced include, first, the larger part of Italy, wherein the importance of Rome as an imperial residence is emphasized by a special vignette; and second, the region to the east, wherein Constantinople appears as the most important imperial city. Though

not drawn with accurate proportions, the peculiar shape of Italy, for example, is easily recognized.

2.—WORLD MAP OF COSMAS, Sixth Century.

The world map of Cosmas was drawn to illustrate the geographical theories set forth by Cosmas Indicopleustes in his work designated "Christian Topography." The author, a monk, was probably a native of Alexandria and lived in the sixth century of the Christian Era. It is generally accepted that his "Topography" contains the oldest Christian maps which have survived. They therefore stand as representative of the earliest efforts of mediæval cartographers to picture in outline the earth's surface.

Cosmas rejects the geographical ideas of the ancients, finding in the Scriptures a basis for his theories. According to him the Bible should be accepted no less as a guide in science than as a guide to faith. The tabernacle, he thought, should be taken as a model of the earth, of the firmament, and of the heavens above, the earth occupying the floor of the universe. "Thou shalt also make a table; two cubits shall be the length thereof, and a cubit the breadth thereof . . ." Ex. xxxvii, 10, was for him a justification in representing the length of the earth as twice its breadth. A rectangular earth seems to have been justified by the statement, "I saw four angels standing on the four corners of the earth, holding the four winds of the earth," Rev. vii, 1. Beyond the encircling ocean Cosmas placed the earthly paradise whence flow the four sacred rivers, their source being hidden from man, but their waters reaching the earth by flowing beneath the encircling ocean. All this

we find laid down in his world map. He represents four indenting gulfs, at the south the Red Sea and the Persian Gulf, at the north the Caspian Sea, and at the west the Mediterranean, in accord with a belief of the time.

3.—WORLD MAP OF BEATUS, Eighth Century.

In the mountainous region of Liebana, once a part of Asturias, lived toward the close of the eighth century a Benedictine monk known in his time and to history as Beatus. As the teacher and spiritual guide of Queen Adosinda, he must have enjoyed special and rare privileges for the pursuit of his studies, since the royal residence was not far from the famous Monastery of Astorga, a home of the highest culture and learning of the time. Here he wrote his great work called "A Commentary on the Apocalypse." This work, existing to-day in many manuscript copies, is considered especially interesting by reason of its numerous miniatures in West Gothic and Byzantine Gothic style, among which may be found a world map. The map appears to have been inserted in the work principally for the purpose of illustrating the spread of Christianity over the earth. Like most mediæval maps, it is oriented with the east at the top. Here in the earth's remotest bounds the earthly paradise almost invariably may be found sketched, and the story of the Garden of Eden often is simply represented in picture. Europe, Asia, and Africa or Lybia appear, and also what is common to the Beatus maps, the region of the antipodal peoples, that is, those who live on the opposite side of the earth to us.

In this particular map Beatus has represented the

Twelve Apostles, placing each in that region to which church history and tradition assigned him. Rivers cross the map, most of which can be identified, though inaccurately drawn. Important cities are distinguished by the rough outline of a building. In every detail accuracy is wanting, but strict geographical accuracy was not then held to be important.

4.—ST. SEVER WORLD MAP OF BEATUS, Eleventh Century.

This map, about 46 by 72 cm. in size, appears to have been derived, though not in all its features, from the original Beatus world map of the eighth century. It is the most important of the ten known derivatives, and appears to have been drawn at the Monastery of St. Sever near the middle of the eleventh century. The map is now in the possession of the Bibliothèque Nationale of Paris. In its details it far surpasses the Beatus map referred to as No. 3. Though omitting, for example, the representation of the Twelve Apostles, it is filled with picture and legend showing strikingly the survival of many earlier pagan beliefs, and the influence of early mediæval geographical notions such as had been advanced in the quasi-geographical writings of Isidor, Orosius, and St. Augustine.

It will be observed that the east is placed at the top, where is sketched an elaborate representation of the earthly paradise. Around the world flows the encircling ocean, especially distinguished as water by its islands, its numerous fishes, and its crudely drawn boats. The continents and numerous localities are designated by name; important cities are distinguished by picture,

HEREFORD WORLD MAP, 1283. No. 5

as Rome, Constantinople, Antioch, and St. Sever in Southwestern France, with its cross-adorned church. Italy, for example, is entirely wanting its peculiar outline, and can be distinguished only through its name; the Black Sea is but a long extended arm of the Mediterranean. The Fortunate Islands are placed west of Africa. The map admirably reflects the attitude of the time towards geographical science in Christian Europe.

5.—HEREFORD WORLD MAP, 1283.

In the Cathedral of Hereford, England, hangs this remarkable map, the work of Richard of Haldingham and Lafford, says a legend written thereon. It is about five feet in diameter, drawn in colors on parchment of fine quality, and dates from the latter part of the thirteenth century. The east is at the top, which is crowned with an elaborate representation of the Judgment Day. At the four corners are the four letters spelling the mournfully suggestive word, M O R S, Death. At first view, all appears confusion in the map itself, crowded as is this veritable circle of the earth with picture and with legend. In the center is Jerusalem, doubtless given this important place in his system by the author to accord with the scriptural statement, "This is Jerusalem: I have set it in the midst of the nations and countries round about her." Islands are represented in the encircling ocean, conspicuously Great Britain and Ireland. The marvelous races described in fable and story find a place in the far-away or border regions of the earth.

One may obtain a far more intelligible understand-

ing of many of the mediæval geographical myths and fables, as, for example, of the Alexander legends, or of many a story of the classical day, from a study of this map than from the best made modern map. The Barns of Joseph (Pyramids), the Ark of Noah, the principal mountains, rivers, great gulfs and seas are represented, but have been curiously conceived and drawn.

6.—EBSTORF WORLD MAP, 1283.

In the year 1833, dust-covered and cast aside with other material as of little value, this old parchment map was found in the Benedictine convent of Ebstorf, Germany. It is one of the largest mediæval world maps known, being more than eleven feet in diameter, one of the richest in geographical details, and one of the most brilliant in colors. In a sense it appears to sum up the unscientific or quasi-scientific geographical knowledge of the Christian middle ages, resembling in this respect the Hereford Map of England, here appearing as No. 5. It is oriented with the east at the top, where, near the representation of the earthly paradise, is an elaborately drawn head of Christ. The idea of representing the world as the body of Christ is carried out by placing at the right and the left the hands, and at the bottom the feet. Jerusalem is at the center, and many of the larger as well as the smaller geographical divisions of the earth are indicated by name. Cities and towns are brilliantly represented in picture; the encircling ocean, the indenting seas and gulfs, and the principal rivers appear, but with the usual inaccuracies. The marvelous races have also their place in regions remote, as have many other traditions handed down from the days of Pliny, Solinus,

and the early Christian writers on geography. The map cannot be taken as one marking the beginning of a new, but rather as one marking the climax and conclusion of an old, era.

7.—CATALAN WORLD MAP, 1375.

Second only to the Italians in the maritime enterprises with which the middle ages closed and a new era began were the Catalonians of eastern Spain and of the neighboring Mediterranean islands. To Cresquez lo Juheu of Catalonia this world map is attributed. It appears to have been drawn for King Charles V of France, and may well be called epoch-making in its importance. More comprehensive than any of earlier date, it represents the results which had been achieved by the great overland travelers, including in particular much of the geographical knowledge brought back from the far East by Marco Polo. It gives to India a more nearly correct shape than may be found on any other map of the century. Its representation of the Atlantic islands, including the Azores, the Canaries, and the Madeira group, is unequaled by any of previous date. The expedition of Jayme Ferrer of the year 1346 down the west coast of Africa is given a detailed reference. This expedition marked a new terminus for discovery to the southward.

The map-maker filled his map with picture and legend after the mediæval style, quoting much, as stated above, from Marco Polo's narrative, and recording in particular the information brought back by traders who passed along the northern overland route into north central Asia.

8.—PIZIGANI MAP, 1367.

The Venetian brothers Francisco and Dominico Pizigani supplied the geographical information for the construction of this map which bears their name, and the date 1367. The original, belonging to the Library of Parma, is about 138 by 92 cm. in size, and is remarkably well preserved. It exhibits certain features of the portolan or sailor's charts, being crossed by numerous direction lines and containing many coast names. The geographical information, however, is not confined to the coast regions. Like the Catalan Map, No. 7, of almost equal date, it contains many legends descriptive of the localities in which they have been placed. The cities especially distinguished by the picture of a building are very numerous, the great majority of which are in the interior continental regions. The eight principal winds or directions are indicated by artistically drawn heads. For so early a date the Scandinavian or North-land region is remarkably well represented. The entire continent of Europe, with the borderlands of the Mediterranean and the Black Sea, cannot fail to attract by reason of their near approach to accuracy.

Compare, for example, the Pizigani with the Hereford World Map, No. 5, and the Catalan, No. 7.

9.—PORTOLAN CHART OF ROSELLI, 1468.

Portolan charts are the first modern scientific maps. They present a striking contrast to the mediæval cloister maps, such as the St. Sever, No. 4, or the Hereford, No. 5. They appear to date from the earliest period of our great modern maritime explorations, that is, from about 1300.

This chart by Petrus Roselli, dating from 1468, has been selected as a good representative of the type. It may be stated that the earliest examples presented in particular the Mediterranean coasts, but as the years passed more distant coast regions were included. Primarily these charts were for the use of seamen, hence the geographical nomenclature was confined almost entirely to the coasts, that is, to harbors and ports, hence the name Port or Portolan chart. They were crossed with numerous lines called compass or direction lines, radiating from centers systematically placed, which centers were often highly ornamented with compass or wind roses. Charts such as these served the early seamen of the Mediterranean, the early navigators along the Atlantic coasts of Europe and Africa, and Columbus himself with his companions and his contemporaries in their great enterprises. It was on the enlarged portolan charts that the new discoveries were first recorded, as, for example, on the Cantino Chart, No. 20, or the chart of Canerio, No. 42.

10.—CATALAN WORLD MAP, about 1450.

One of the treasures to be found in the Royal Estense Library of Modena, Italy, is this fine example of a circular Catalan world map. Among the seafaring Catalonians of the fourteenth and fifteenth centuries there appears to have been developed a remarkable skill in chart making, first as applied to the construction of portolan charts of limited coast regions, then to the construction on the same scientific principles of world charts. This chart, which in the original is about 125 cm. in diameter, gives the entire world as then known, with

the regions remote from Mediterranean Europe considerably distorted. It is the work of a skillful draughtsman, who, like his contemporaries, undertook to tell a geographical story through picture and legend, as well as to record the simple known geographical facts which might be of special value to navigators. It will be observed that along the coast lines the names of towns, harbors, and ports are particularly numerous. Africa has a peculiar shape, but gives evidence of a knowledge, though not accurate, of the trend of the coast in the region of the Gulf of Guinea. The islands are numerous which dot the Indian Ocean, a representation which was derived from the narrative of Marco Polo. Jerusalem is no longer regarded as the center of the world as in the day when Haldingham constructed the Hereford Map, No. 5. The importance of China and the Far East is noted in legends which are inscribed in the interior.

11.—VENETIAN MILITARY MAP, Fifteenth Century.

This somewhat peculiar though interesting attempt to present a bird's-eye view of a section of northeastern Italy seems to date from the latter part of the fifteenth century. Cities, rivers, and highways are laid down not with strict accuracy, but in a manner which made it a fairly serviceable military map, which it was intended to be. It doubtless was constructed in Venice, and was intended by its author to serve the useful purpose of guiding the Venetian armies in their conquests on the mainland. The important cities of the region are distinctly designated by name, and are given special promi-

nence by means of picture. In the list of cities are to be found Milan, Pavia, Como, Lodi, Cremona, with numerous others of greater or less importance.

12*a*.—MELA WORLD MAP, Fifteenth Century.

In a manuscript copy of a geographical work written by Pomponius Mela in the first century A.D., presented by Cardinal Guillaume Filaster in 1417 to the Library of Rheims, is this beautifully executed initial letter O of the word "Orbis," which with some appropriateness is made to contain a map of the world. Like the St. Denis map, its companion in this transparency, it is rather decorative than scientific. "The four angels standing at the four corners of the earth" are represented in mediæval fashion. The continents Europe, Asia, and Africa are designated, each containing a few local geographical names, as of rivers, mountains, and political divisions. It is interesting to find that Abyssinia is called the India of Presbyter John.

12*b*.—ST. DENIS WORLD MAP, Fifteenth Century.

The Chronicle of St. Denis preserved in the Sainte-Geneviève Library of Paris contains this circular map of the world, so drawn as to warrant its classification with those maps which are strikingly decorative in character. It appears to date from the last quarter of the fourteenth century and exhibits in a very general and very imperfect manner the geographical views of the period. The three continents are indicated, around which flows the encircling ocean. Very conspicuous buildings emphasize the importance of certain cities, as

Paris, Rome, Antioch, Jerusalem, Carthage, Alexandria. Without the large circle have been sketched twelve small half circles in which are the names of the winds by which direction was commonly indicated before the general use of the compass.

13.—GENOESE WORLD MAP, 1457.

This map, having the unusual oblong shape, being 42 by 81 cm. in size, represents the habitable world with its longitude practically twice its latitude. Its author, who undoubtedly was a Genoese, does not record his name, but gives 1457 as the date when his work was executed.

The map belongs to a period of transition, exhibiting an attempt to harmonize the ancient and mediæval geographical ideas with recent geographical discoveries. It is a less pretentious map than is that of Fra Mauro, though not second to it in scientific importance, attracting at first by reason of its numerous legends, its architectural subjects, its crowned kings, and its marvelous animals of land and sea. The continent of Europe is well drawn; Asia and Africa are less accurate, though they exhibit a marked advance in geographical knowledge over that recorded in previous maps. Much of the information relative to the distant East appears to have been drawn especially from the Italian traveler Nicolo Conti and from Marco Polo. The author gives us one of the earliest representations of the Chinese Wall, makes record of the Chinese junks built with compartments such as may now be found in the best ocean-going vessels, and adds much interesting information concerning Cathay or

China, the interior of both Asia and Africa, and the navigation of the Indian Seas.

14.—WORLD MAP OF FRA MAURO, 1459.

In the Ducal Palace of Venice may be found this very remarkable map of the world drawn by the Camaldolese monk, Fra Mauro, in the years 1457 to 1459.

The work of that great patron of maritime exploration, Prince Henry the Navigator of Portugal, had now been almost completed, and the prime purpose for the draughting of this map appears to have been to sum up that work and to give it permanent record in a great world map, which map should also exhibit as fully as possible the complete status of geographical knowledge up to that date. The original has a diameter of more than six feet. It far surpasses in the gorgeousness of its execution and the richness of its details any world map hitherto constructed. Many of the peculiar features to be found in the work of mediæval map-makers are to be found in the work of this monk of Murano, but it marks so great an advance, incorporating as it does so many of the scientific features of the portolan charts, that it becomes one of the most important examples of a new era of map making.

The whole proportion of things recorded—rivers, mountains, towns, descriptive legends—is, however, exaggerated, especially in the regions remote from southern Europe. One becomes somewhat bewildered in attempting to make the map serve as a geographical guide. The peculiar outline of the continent of Africa and of Asia is in part due to the circular form of the map, but in greater part to imperfect knowledge.

15.—PTOLEMY WORLD MAP, 1486.

During the fifteenth century, and by many during the following century, Ptolemy was recognized as the best authority on geography. In the second century of the Christian era he had prepared his great work on Cosmography, which probably was accompanied by a series of maps, since he gave therein specific instruction as to the best manner of draughting them. During the middle ages this work of Ptolemy suffered an eclipse, but in the period of great geographical explorations it was rediscovered and he became anew a teacher in his chosen field. Ptolemy's maps were first printed in Italy about 1475. The Ulm edition of 1482 was the first edition printed in Germany. It is in the German edition of 1486, which, like the preceding, was also printed in Ulm, that the world map here reproduced may be found.

According to Ptolemy's idea the habitable world is about seventy degrees in width, stretching from western Europe to the extremes of Cathay. Among his conspicuous errors may be noted the connection of Africa on the south with eastern Asia by an unexplored continent, thus making of the Indian Ocean an enclosed sea. The Mediterranean is given too great a longitudinal extension, an error retained in most maps of the region until the seventeenth century. He had a misconception of the shape of India, of Scotland, and of the distance from the Sea of Azov to the Baltic, as of many other geographical details of which we now have accurate knowledge. In this world map the wind heads are retained, that is, the winds or direction being personified as with the ancients.

Ptolemy World Map, 1486. No. 15.

16.—BERGHAUS WORLD MAP, 1909.

This map has been especially selected to show, by contrast with the Ptolemy World Map, the earth's surface as now known, and to mark the advance in map drawing and map printing from 1486, when Ptolemy's map, one of the first engraved world maps, was issued, up to the present time.

17.—WORLD MAP OF JUAN DE LA COSA, 1500.

This map, the work of a companion and officer of Columbus on his first trans-Atlantic voyage, is the oldest known map on which the New World is represented. An inscription on the left tells us that "Juan de la Cosa made it at the Port of Santa Maria in the year 1500." The original, 180 by 96 cm. in size, now preserved in the Naval Museum at Madrid, was found by Baron Walckenaer in the year 1832 in an old Paris bookshop, and was later purchased by the Spanish Government for 4,020 francs. The author drew his map on parchment, adding to it the rich colors found in mediæval illustrated manuscripts. The New World appears on the left, not accurately drawn, but with so near an approach to accuracy as to enable one to identify numerous localities represented on the Atlantic coast. In the extreme north of this Atlantic coast appears the legend, "Mar descubierta por Ingleses" (Sea discovered by the English), which seems to point to a knowledge of the Cabot expedition of 1497. The West Indian Islands are conspicuous, giving evidence of a fairly accurate knowledge of the island of Cuba. The map does not show that the author believed the newly discovered region was

a part of Asia; quite the contrary, though he was uncertain of the extent of the country.

The continent of Africa is remarkably well drawn, while the Far East gives evidence of very uncertain geographical knowledge.

The map exhibits some of the characteristics of the mediæval cloister maps, telling in picture, for example, of the Wise Men coming out of the East guided by the Star, and of Gog and Magog, the destructive races of northeast Asia, doubtless meaning thereby the Mongols or Tartars. It well represents the geographical notions of the time.

18.—MARTIN BEHAIM GLOBE, 1492.

In the very year in which Columbus crossed the Atlantic on his first voyage of discovery, Martin Behaim in Nürnberg was engaged in the construction of this oldest known terrestrial globe. The author had passed some years in Portugal, perhaps had met Columbus and talked over with him the problems of western oceanic exploration, and may have influenced him with his geographical ideas. The globe is one of striking interest because of its date and because of its summary of geographical knowledge recorded at the very threshold of a new era. Behaim tells us that his map was based upon Ptolemy, upon the travels of Marco Polo and of Sir John Mandeville, and upon the explorations carried on by King John of Portugal. It has a diameter of about 20 cm.; is drawn on parchment which has been mounted on a prepared globe shell, and is now preserved in the archives of the Behaim Family of Nürnberg.

That half of the globe here represented includes the

continent of Asia with the bordering oceans to the east and the south. The principal islands of these oceans are indicated and include Cipangu (Japan), Java, Zanzibar, Madagascar, Taprobana, each of which is described in an elaborate legend, as the several regions have been so described where space has permitted. These geographical records are among the most interesting features of the globe.

19.—MARTIN BEHAIM GLOBE, 1492.

That half of the Behaim globe here represented includes the continents of Europe and Africa, together with the great expanse of the Atlantic Ocean embracing its islands which were then known, that is, the Azores, the Canaries, the Madeira group, and the Cape Verde Islands. The New World very naturally does not appear on the globe. The author has much underestimated the distance from Portugal to China, erroneously representing Japan as near the actual longitude of Mexico. The newly discovered Spanish and Portuguese possessions, in particular, are indicated by appropriate banners. The fabulous islands of the Atlantic are laid down, each with a legend telling the commonly accepted story concerning it, among which islands we find Saint Brandans, Antillia, and the Island of the Seven Cities. Africa is interestingly drawn, exhibiting among other features the last vestige of that extension to eastward, at its southern extremity, which Ptolemy made to reach even to the east coast of Asia.

20.—WORLD MAP OF CANTINO, 1502.

An especial distinction belongs to the Cantino chart by reason of the fact that it contains the second oldest known attempt to sketch the New World which has come down to our day. The original is a planisphere on parchment, richly colored, measuring 220 by 100 cm., and is preserved as one of the priceless treasures of the Royal Estense Library of Modena, Italy.

Cantino was the special envoy of Hercules, Duke of Ferrara, at the Court of Portugal, and as such he was commissioned to obtain for the Duke a map especially illustrating, to date, the trans-Atlantic discoveries made under the Portuguese and Spanish flags. We learn from a letter written by Cantino that the chart cost in Portugal by contract twelve gold ducats. Crossed by numerous compass or direction lines, adorned with numerous compass or wind roses, with its geographical nomenclature practically confined to coast regions, it is readily distinguished as a portolan or seaman's chart, such as is represented in No. 9, but a portolan chart now become a world chart. The Old World is well drawn, in particular the continent of Africa, whose coast regions had so long claimed the attention of the Portuguese. The newly discovered land in the west includes Newfoundland or the Labrador coast claimed for Portugal by reason of the Cortereal discoveries, and so designated by the Portuguese flag. A north continental region, North America, but unnamed, is indicated terminating at the south in a point of land which unmistakably is a representation of Florida. The south continental region, South America, but also unnamed, includes a section of the north and northeast coast of South America. The

West Indian Islands, notably Isabella or Cuba, and Haiti, are made duly prominent. Cantino adorned his chart with picture of city and landscape, giving us in South America one of the first attempts to illustrate the attractiveness of American fauna and flora.

21.—MAP OF JOHANN RUYSCH, 1508.

In 1508 there was issued from a Rome printing press an edition of Ptolemy's Geography or Cosmography, containing a new map of the world bearing the title "A more universal map of the known world constructed by means of recent observations." It was the work of a certain German, Johann Ruysch by name, concerning whom we have very little information. The map attracts in particular by reason of its new and peculiar projection, in which the North Pole appears to be placed at the center, giving us what is commonly called the polar projection. Until the recent discovery of the Waldseemüller world map of 1507 it passed as the oldest known engraved map on which the New World was represented. Greenland and the Newfoundland region discovered by the Cortereals is made a part of Asia. But little of the North American continent is represented, while South America is conspicuous, bearing the name "Terra Sanctæ Crucis," given to it by Cabral in 1500, and also "Mundus novus," the name employed by Amerigo Vespucci. Japan, or Cipangu, as represented on the Behaim Globe, No. 18, is omitted, because, as the author states, he thinks the newly discovered region in the North, that is, North America, is identical therewith. The Old World exhibits in a general way the progress made in discovery to date, but displays many of the features of Ptolemy's

maps. This reproduction is made from the only known manuscript copy of the map, probably drawn as early as 1512 by Glareanus.

22.—SYLVANUS WORLD MAP, 1511.

This cordiform world map appears in an edition of Ptolemy issued at Venice in 1511 by Bernardo Sylvanus of Eboli. It has the distinction of being one of the first maps printed with color, though the only color employed was red, and this alone for a part of the nomenclature. The form of the map seems to exhibit the influence of Waldseemüller's world map of 1507. The geographical data for the New World appear to have been derived from Portuguese sources, such as may be found in the charts of Cantino and Canerio. The Labrador region is called "regalis domus," a curious and confused allusion to the Cortereal discoveries. South America is called "terra sanctæ crucis." India and the Far East are somewhat Ptolemaic in outline. Wind heads are numerous, but the author has employed in most instances double names to designate direction, as Zephyrus and Occidens, or Boreas and Septentrio. The map exhibits an attempt to bring Ptolemy's cartographical representations up to date.

23.—GLAREANUS WORLD MAP, about 1512.

Glareanus was one of those many-sided geniuses of the Renaissance, being philosopher, man of letters, historian, mathematician, astronomer, and geographer. In one of his manuscripts, until recently in the possession of Colonel E. Renouard James, of London, may be found this map with six others, which map is here reproduced

for the first time. It represents the world, somewhat roughly drawn, on the projection employed by Waldseemüller in his world map of 1507. The New World appears as two large islands or continents, with two or three of the more important islands of the West Indian group. It is one of the first maps on which the name AMERICA appears.

Most of the maps of the first quarter of the sixteenth century represent, as does this one, a strait between North America and South America. It was that for which search was so frequently made in those early years, and which the map makers, though clearly wanting positive information, were accustomed to represent on their maps. It is the representation of a hope rather than of a fact.

24.—TYPICAL EARLY MAPS OF THE WORLD.

In this number an attempt has been made to bring together, for purposes of comparison, nine typical early maps of the New World.

1. A Portuguese map of about 1502 which omits North America, but exhibits the West Indian Islands, with Cuba extending quite as far north as England, representing an idea expressed by Columbus.

2. The Cantino chart of 1502 which represents, for example, North America, but does not express with certainty that this continent is bordered by a western ocean.

3. The Ruysch map of 1507, exhibiting a peculiar uncertainty concerning North America, making Greenland a part of northeast Asia and omitting Japan, because it was thought to be identical with the newly discovered regions of the Spanish.

4. The Glareanus map of about 1512 makes North America clearly appear as an independent continent, separated from South America and bordered on the east as well as on the west by the ocean.

5. The Stobnicza map of 1511, being an exact copy of Waldseemüller's map of 1507 on which for the first time a land connection between North and South America was represented.

6. The Maiollo map of 1527, giving practically the entire Atlantic coast of the New World and the west coast with the peculiar indentation of Verrazanian origin.

7. The Gastaldi map of 1548, representing both the idea of an Asiatic connection of the New World and at the same time a belief in its European connection at the north.

8. Agnese chart of about 1546, being a typical early Spanish representation of the New World with its too rapid trend to eastward of the Atlantic coast of North America, but with the general coast features fairly well done.

9. The rare Gilbert map of 1576, representing a northwest passage, and North America independent of Asia.

25.—MAP ATTRIBUTED TO REINEL, about 1516.

The original of this map, attributed to the cartographer Pedro Reinel, who was one of the most famous map makers of the early sixteenth century, may be found in the Bibliothèque Nationale of Paris. It embraces the western parts of Europe and Africa, the central and northern Atlantic and the mainland of the New World

in three disconnected sections: the first designated as "terra corte regalis," or the region of Labrador, and eastern Canada; the second as "terra Bimene," an early name for the Florida region; the third as "mundus novus," or the northeastern section of South America, together with a fourth section, the West Indian Islands, which have no general designation. The map is particularly striking from an artistic standpoint, being decorated with numerous banners representing Spanish and Portuguese territorial ownership, with vessels sailing hither and thither over the Atlantic, and with numerous landscapes wherein are pictured various animals and forests. The coast names are principally Portuguese and are written in red and black, while the legends are for the most part in the Latin language. The sources of the map are largely Portuguese, though the author has clearly indicated an acquaintance with certain Spanish records.

26.—WORLD MAP OF APIANUS, 1520.

Apianus, a noted German cosmographer and mathematician, prepared the original of this map in 1520. He borrowed his geographical records largely from Portuguese sources, or from contemporary Lusitanio-Germaniac map makers, notably from Waldseemüller, whose map of 1507 he practically copied. This map of Apianus was long considered to be the first engraved map on which the name America appears, but the discovery, twelve years since, of Waldseemüller's great world map, referred to above, deprived it of this distinction.

The original is a well-executed woodcut, 29 by 42 cm. in size, and represents both the Old and the New World.

Spanish flags mark the discoveries and claims of that country in the west. A part of the north continental land here represented is called Parias, but across the south continental area the word AMERICA is conspicuously printed. Apianus states that this southern region was discovered in 1497, apparently recognizing the claims of Vespucci, but he immediately proceeds to modify this claim somewhat by stating that this land with the adjacent islands was discovered in 1497 by Columbus, a Genoese.

27.—RIBERO WORLD MAP, 1529.

Diego Ribero is reputed to have been one of the most distinguished cosmographers, that is, geographers, of the early sixteenth century. His world maps appear to have been based upon the official geographical records collected by order of the Spanish Sovereign and preserved in the archives of the Casa de Contratación. The map dates from 1529, and is remarkable for its fullness of geographical information and the near approach to accuracy of its details. The original may be found in the Museum of the Propaganda, Rome.

The map represents the New World as one land mass, giving the entire Atlantic coast line from Labrador to the Strait of Magellan, with a section of the Pacific coast from southern Mexico to Peru. Certain conspicuous features of early portolan charts are retained, as, for example, the crossing lines and the compass roses. The descriptive legends are numerous, and are of great historical interest. We read, for example, that there is nothing worth obtaining in Labrador; that no gold can be found in the region visited by Gómez, that is, the

eastern United States of the present, because it is too far from the tropics; that New Spain, by which Mexico is meant, is so called because it contains products to be found in Old Spain; that gold and silver can be found in the interior of the La Plata region. The Old World has been well drawn. Here the names and legends seem to have been inserted with the same attention to details and accuracy that we find in the case of the western hemisphere. The papal Line of Demarcation is the prime meridian; degrees of latitude and longitude are marked; trade routes are indicated by well-drawn sailing vessels.

28.—MUNICH-PORTUGUESE MAP, 1519.

In the Royal Library of Munich may be found this Portuguese map drawn on parchment and exquisitely colored. In size it is 63 by 125 cm. Neither date nor author's name appears on the map, but there is evidence that it was made about the year 1519. It is the oldest map known on which attention is called to the discovery of the Pacific by Balboa, though his name does not appear. This reference we find in a legend in the ocean to the west of South America. Near the western coast line is represented an exploring party in open boats.

Labrador is indicated as an isolated region to the west of Europe, to the southwest of which is "Terra Bimini," that is, Florida, likewise isolated and with an indefinite outline, as if doubt were entertained whether to represent it as an island or a continental region. The eastern coast line is continuous from Yucatan to the La Plata River. The map is one of the oldest known on which the Line of Demarcation is represented as the prime meridian. For African and East Indian discov-

eries it is one of great value as well as one of importance for its representation of discoveries in the New World. Descriptive legends are numerous. The map is highly ornamented with ships, tents of barbarian kings, flags, mountains, in the draughting of which skill of a high order is indicated.

29.—PORTUGUESE MAP OF SOUTH AFRICA AND THE FAR EAST, about 1513.

This Portuguese map, neither signed nor dated, has been thought to have been constructed as early as 1513. It includes the coast region of the Old World from the Gulf of Guinea on the west of Africa to southeastern Asia, together with the Moluccas or a portion of the East Indian Islands. For the latter representation it is a map of striking importance. A very significant feature is the apparent indication of a coast line on the right which has been taken to be a representation of the west coast of North America. If this conjecture is correct, it is a record of special interest, since it will be remembered that this coast is thought not to have been visited by European explorers until a much later date. It may be the record of an expedition concerning which we have no other information.

30.—GLOBE OF JOHANN SCHÖNER, 1520.

In the German National Museum of Nürnberg may be found this mounted wooden globe, the work of Johann Schöner, a noted cosmographer and mathematician. It bears date 1520 and has a diameter of 35.5 cm. Schöner is known to have drawn several globe maps, the first

in 1515. The work here represented is, however, his best that has been preserved. His geographical information was received from German and Portuguese sources, and he gives us practically the same representation on a globe that Waldseemüller gives in a plane map. The continents of both North and South America he represents as large islands, the former curiously bearing the name "Terra de Cuba," and the latter "America vel Brasilia sive Papagalli Terra," that is, America or Brazil or the Land of Parrots. Japan is in close proximity to the west coast of North America, and Newfoundland or "Terra Corte Realis" is a large island to the northeast. In the south, beyond South America, is represented a large land area designated as "Brasilia Inferior." It is especially interesting here to note that a strait separates this land from his "America," as a strait separates North from South America, and that this representation dates from 1520. Schöner had indeed indicated this strait, which is now called the Strait of Magellan, on his globe map of 1515.

31.—WORLD MAP OF SEBASTIAN MÜNSTER, 1540.

In the Basel edition of Ptolemy's Geography, printed in 1540, is a world map by Sebastian Münster. This map gives evidence of a decline among the Germans of that cartographical skill which they had exhibited in the earlier years of the century. Certain Ptolemaic features are retained in the map, but the New World is given due prominence. That indentation on the west coast of North America is exhibited, which peculiarity

had its origin in the report of Verrazano and which appears so prominent in the Verrazano map of 1529, though it had earlier been represented by Maiollo in his map of 1527. For the first time in a map of the New World, Münster indicates a passage or strait between "Bacalhos" in the north, by which name Greenland seems to be meant, and "Francisca" on the south, which is a name for the Canadian region, through which strait one might pass to the Moluccas. Though marking such a passage on his map, it actually was first traversed by Amundsen in 1905. North America is called "Terra Florida," though its western part, represented on the map as lying to the east of Asia, is called "Temistitan," which is an early name for Mexico.

32.—WORLD MAP OF MARTINES IN HEMISPHERES, 1562.

The first of the charts in a portolan atlas dated 1562 by Giovanni Martines is a representation of the world in two hemispheres. Martines was one of the foremost Italian chart makers of his day, being not only a skillful draughtsman, but also a careful and critical student in the field of chart making. Each of the hemispheres in the original has a diameter of about 16 cm., or nearly four inches. These hemispheres are therefore somewhat enlarged in this reproduction. Meridians and parallels are drawn at intervals of fifteen degrees. In his general continental outlines his representations are fairly accurate, but a striking feature is his great Austral Continent which he calls "terra incognito." No earlier chart is known on which there is a reference to Anian, a name once applied to the Bering's Strait. Geograph-

ical names are not numerous, and those given are of local territorial areas.

33.—WORLD MAP OF AGNESE, about 1545.

Batista Agnese was one of the most prolific portolan chart and atlas makers of the sixteenth century. As a draughtsman and miniaturist he exhibited remarkable skill, holding a foremost place, in particular, among his Italian contemporaries. His work, however, appears to have been done rather for the libraries of princes than for the practical use of mariners. This world map, selected from the best known copy of his atlases, is typical. The continents are well drawn, but the general effect is artistic rather than scientific. A very common feature of his world maps is the representation of the course followed by the Magellan expedition, which was the first to circumnavigate the globe.

34.—DESCELIERS WORLD MAP, 1550.

This map is representative of the best work done by French cartographers about the middle of the sixteenth century. The original, belonging to the British Museum, is 215 by 135 cm. in size, and is remarkable for its artistic and scientific merit. The author expresses a disbelief in an Asiatic connection of America; a belief in such connection, it may be said, being generally entertained at that time. It is rich in nomenclature which is of particular interest for the region of French discoveries in the New World.

The sources for the map appear to be largely French, and only in part Spanish or Portuguese. The Atlantic coast line of North America is a decided improvement

on that coast as represented in earlier maps. While the decorations of the map are somewhat profuse, they are, however, in keeping with the best artistic work of contemporaneous cartographers.

35.—CABOT WORLD MAP, 1544.

In one of the inscriptions on this map we read that it was drawn by "Sebastian Cabot, captain and Pilot Major of his Sacred Imperial Majesty the Emperor Don Carlos, the fifth of this name, in the year 1544." Though the map is referred to as the work of Cabot there is considerable uncertainty as to the part he took in its construction. The original is 220 by 120 cm. in size, including the two columns of inscriptions. At this time Cabot was in the employ of Spain, but it seems probable that the map was engraved in the Netherlands. It appears to represent the coast of the New World to that most northern point reached by Cabot in 1498, the entrance to Davis's Strait, the Strait of Belle Isle as surveyed by Cartier in 1534, and the Gulf and River St. Lawrence. The entire Atlantic coast is well drawn, but the west coast of North America extends only to that point reached by Castilo in 1541, whose map of the region seems to have been incorporated in the Cabot map. There are many errors in details, but in the general geographical outline the work has been well done for the period. It is from one of the inscriptions, No. 8, that we learn Newfoundland was discovered by John Cabot and Sebastian, his son, June 24, 1497, here, however, erroneously written 1494. The projection is that which, for example, we find in the Ortelius map, No. 37. The map is adorned with an artistic picture of the Annuncia-

tion and the Imperial coat-of-arms and with four wind heads, as in certain earlier maps.

36.—WORLD MAP OF FORLANI, 1565.

This map of the Italian Forlani of 1565 is a good example of the excellent work in copper engraving done in Italy about the middle of the sixteenth century. Though the Italian map makers established for themselves an enviable reputation in the fourteenth and fifteenth centuries and found employment in Spain and Portugal in the opening years of their great trans-oceanic discoveries and explorations, they were slow in giving fitting prominence to these discoveries in their cartographical work done at home; that is, they were much inclined to hold to tradition. As artistic draughtsmen they always exhibited great skill. In the first half of the sixteenth century, when copper engraving was coming into favor, they applied most successfully the new art to map work. Forlani's work, it will be noted, retains the artistic and fanciful wind heads. The form of his map gives rise to certain distortions. In outline his New World is of Portuguese origin.

37.—ORTELIUS WORLD MAP, 1564.

Abraham Ortelius, a distinguished geographer and mathematician of the Netherlands, issued in 1564 this world map, 150 by 87 cm. in size, which in its projection shows strikingly the influence of Waldseemüller's great map of 1507. The only known copy of the map may be found in the University Library of Basel, Switzerland. It is a carefully prepared piece of work, though exhibiting numerous errors in its details, and many distortions

by reason of its projection. This is the only reproduction of the map which has ever been made.

38.—ORTELIUS WORLD MAP, 1570.

Ortelius is especially known through his great work issued at Antwerp in the year 1570, which work is commonly referred to as the first modern atlas. It contains fifty-three maps with accompanying text, most of which maps were reproductions, more or less modified, of the work of other cartographers. Perhaps one of the greatest services rendered by Ortelius was his part in the elimination from world maps of many of the lingering Ptolemaic and mediæval traditions.

His world map, here reproduced, is one of the most interesting of those he placed in his atlas. Certain distortions are noticeable, occasioned by his peculiar, though not hitherto unknown projection, and numerous errors appear in those regions which were little known. North America has a breadth entirely too great. South America has an unaccountable extension on the southwest, which peculiarity was long retained in the Mercator and the Ortelius maps. His "terra Australis" is a most conspicuous feature, quite equaling in extent the area of the known continents. In the extreme north he likewise has indicated extensive land areas. It may be noted that he gives the name America only to North America, and that he has no general name for South America.

39.—MERCATOR WORLD MAP, 1569.

The Flemish mathematician and geographer Gerhardus Mercator has a place of foremost rank among

those who have made contribution to geographical science.

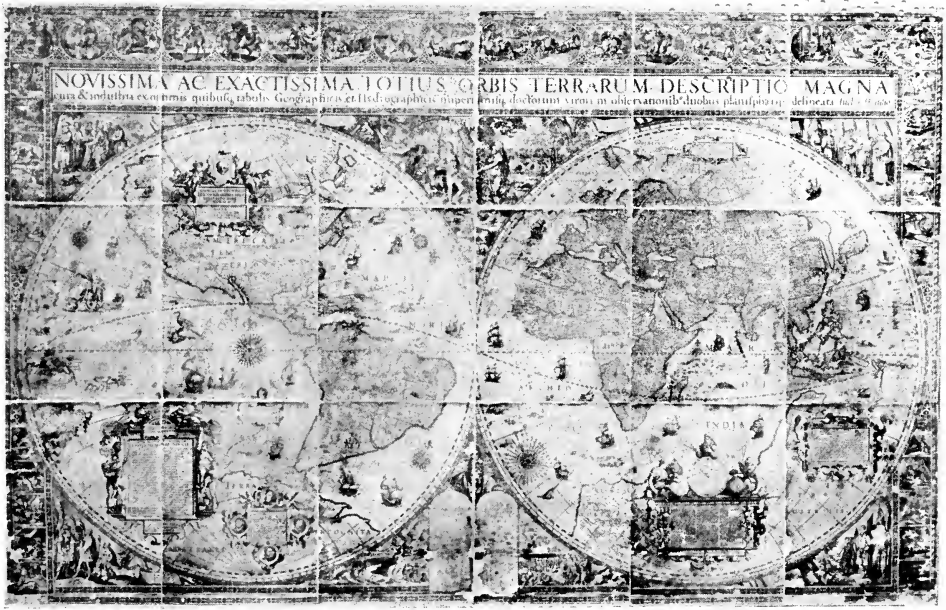
In 1569 his great world map, here reproduced, was drawn on what has since come to be known as the "Mercator Projection." In this the parallels and meridians intersect at right angles. For regions near the equator the representation is very nearly accurate, but the exaggeration in latitude increases toward the poles, where it is at infinity. This great planisphere, according to its title, was intended for the use of navigators, its peculiar construction admirably fitting it for the purpose. The great distortion especially noticeable in North America is due to the application of his scientific principle. Mercator's work is most interesting and accurate for the Old World, particularly Europe. He has retained in his map some of the old traditions, notably the fabulous islands in the Atlantic; he followed the Zeno map for Greenland and the neighboring regions, recording many of the fictitious names to be found in that map. Mercator's influence was far reaching, not only through this particular masterpiece, but through the numerous editions of his atlas.

40. — WORLD MAP OF BLAEU IN HEMISPHERES, 1605.

This great world map of Willem Janz Blaeu is a reproduction from the unique copy now to be found in the rich cartographical collection of The Hispanic Society of America. It is probable that it was draughted in the year 1605 by order of the Estates General of Amsterdam. Each hemisphere in the original is 120 cm. in diameter. It is therefore one of the largest as it is one of the most

detailed engraved maps of the period. Blaeu became one of the most distinguished map and globe makers of the Netherlands, a country which in the late sixteenth and early seventeenth centuries could well boast of leadership in this field.

Blaeu's map presents, with a remarkable approach to accuracy, the outlines of the Old and the New World. He has adorned it with pictures, but not of the fanciful type to be found in the work of the mediæval map makers. He has dotted the seas with exquisitely drawn ships and compass roses. He represents a great Austral Continent at the south, which he calls "Magalanica." Near the Strait of Magellan he has placed excellent portraits of the four explorers who to that date had circumnavigated the globe. There are curious but not unnatural errors in the region of Hudson's Bay and the Great Lakes. His map was drawn just before Hudson undertook his expedition by the northeast route to China, failing which he turned to the westward and explored a part of the coast of North America. A comparison here of the Blaeu map of 1605 with the Hondius map of 1611, No. 49, in many features so strikingly similar, is especially interesting.



World Map of Hondius, 1611. No. 49.

MAPS FRAMED AND HANGING ON THE WALLS OF THE BUILDING

41.—WORLD MAP OF LEARDO, 1452.

This original parchment map, one of the finest products of the skillful Italian map maker Leardo, represents the world as it was known about the middle of the fifteenth century. The west coast of Africa, where the Portuguese under the leadership of Prince Henry were actively engaged in exploration at this time, is well drawn. Many of the features of mediæval maps have, however, been retained, as the representation of important cities by the picture of a building, the Red Sea with its traditional color, the world as encircled by the ocean. The unknown region of South Africa is made somewhat conspicuous, as if to center attention in that direction. Leardo's map is oriented with the east at the top, which therefore places the south at the right. The author has surrounded his map with a broad circular band, in which he has inscribed elaborate astronomical tables, a feature which is not common to world maps of the period.

42.—MARINE WORLD CHART OF CANERIO, about 1502.

The parchment original of this chart, 225 by 115 cm. in size, is to be found in the Archive du Service Hydro-

graphique de la Marine, Paris. Canerio calls himself a Genoese. In the lower corner on the left of his map appears his signature, "Opus Nicolay de Canerio Januensis." Very little is known of the author. It is probable that he was one of a number of Italians who found employment as map makers in Portugal or in Spain in the early years of great trans-oceanic discoveries. We find in this work, as in the Cantino, No. 19, an excellent example of the earlier portolan chart, No. 9, so enlarged as to become a world chart.

Only the eastern coast line of a part of the New World appears, with a few of the West Indian Islands. Africa and the Far East, regions likewise of new discoveries and explorations, are remarkably well drawn. The chart is one of the oldest known on which wind or compass roses appear, being here grouped in a system.

43.—WORLD MAP OF WALDSEEMÜLLER, 1507.

In 1507 Martin Waldseemüller issued a little volume which he called COSMOGRAPHIÆ INTRODUCTIO. It was in this volume that the name AMERICA, as applied to a part of the New World, first appears in print. "Inasmuch as both Europe and Asia received their names from women, I see no reason why any one should justly object to calling this part Amerige, i. e., the land of Amerigo, or America, after Amerigo, its discoverer, a man of great ability," says the author in referring to the discovery of America by Vespucci.

In the same year, 1507, Waldseemüller issued this world map, the largest engraved map then known, and the first containing the name AMERICA. Though inaccurate in many of its details, it is remarkable for the

geographical knowledge which it records within fifteen years after the first trans-Atlantic voyage of Columbus. Only one of the original copies of the map is now known, this being discovered twelve years since by Professor Joseph Fischer, S. J., in the library of Prince Waldburg of Wolfegg, Germany. This facsimile is one of a number issued by Professors von Wieser and Fischer in size of the original.

44.—WORLD CHART OF WALDSEEMÜLLER, 1516.

The original of this chart was found by Professor Fischer in the same volume which contained the previously mentioned map of Waldseemüller, No. 43. It appears to be an engraved copy of Canerio's chart, No. 42, somewhat altered by the insertion chiefly of numerous ornamental details. Certain parts of the work of engraving have been attributed to Albrecht Dürer. It is in a legend on this chart Waldseemüller records that he had produced his map of 1507 in one thousand copies, only a single example of which is now known.

45.—WORLD MAP OF MAIOLLO, 1527.

In the Biblioteca Ambrosiana of Milan may be found the original of this fine example of early map making. It is 175 by 60 cm. in size, and bears the author's inscription which gives us the specific information that he draughted it in Genoa, December xxii, 1527. It possesses many striking and interesting features. In the central American region we find a strait represented, but of its real existence the author was not quite cer-

tain, seeing that he refers to it as "streito dubitoso." It is the representation of a natural waterway from the Atlantic to the Pacific in that day sought for by explorers, but a dream to find its realization in the artificial passageway soon to be opened.

The sweep of the west coast of North America, approaching the Atlantic coast in the region of Chesapeake Bay, resembles the Verrazano map of 1529, which indicates a peculiar misconception as to the distance from the Atlantic to the inland or western sea, often on later maps referred to as the Sea of Verrazano.

46.—WORLD MAP OF VERRAZANO, 1529.

In the museum of the College of the Propaganda, Rome, is preserved the original of this large world map, which is 260 by 130 cm. in size, and which, as an inscription tells us, was made by "Hieronemus de Verrazano," the brother of the great explorer. In its outlines of the New World it clearly resembles the map of Maiollo, No. 45. Numerous regional names appear, as "Terra Laboratoris," "Terra Florida," "Hispania," "Terra America"; landscapes are represented, and the Old World continents, in particular Europe and Africa, have been represented with a remarkable approach to accuracy. The names inscribed along the Atlantic coast of the New World are of great historical interest. Here is recorded the information brought back to France by Giovanni Verrazano, who had explored this region in 1524 for King Francis I, at which time he had visited and roughly charted, among other localities, that of New York Bay.

47.—WORLD MAP OF MERCATOR, 1538.

Of this world map, representing the earliest work of Mercator, but two of the original copies are known; the one here referred to belonging to The American Geographical Society, the other being in the possession of the New York Public Library. The peculiar heart shape is but one of the many designs worked out by the cartographers of the period in their search for the most effective plan for representing the world on a plane surface. The map records in a fairly accurate and general manner the geographical knowledge respecting the world as known at the time it was engraved. For the first time on a map the name AMERICA is here given to both the northern and the southern continent of the New World, that is, to North and to South America, a name which Waldseemüller, No. 43, gave only to a section of South America. A comparison of Mercator's map of 1538 with his map of 1569, No. 39, will not be without interest.

48.—WORLD MAP OF SEBASTIAN CABOT, 1544.

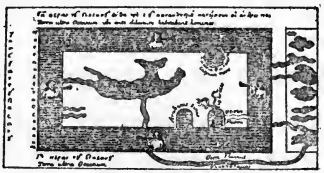
See No. 35 for a description of the Sebastian Cabot Map, which is here reproduced in size of the original.

49.—WORLD MAP OF HONDIUS, 1611.

The only known original copy of this map was found in 1901 in Wolfegg Castle by Professor Joseph Fischer. Hondius was one of the most distinguished cartographers of his day, and in this world map we have perhaps the finest illustration of his knowledge and skill.

At the extremity of South America appear the por-

traits of the four men who, prior to the engraving of his map, had circumnavigated the globe. An interesting record, inscribed northeast of Europe, tells us that Hudson reached this point, but was blocked by the ice. This is the first map record of the failure of Hudson in that region, the result of which failure led him to turn his attention to a western expedition and to the discovery of the Hudson River. The map is one of the first to represent the currents of the ocean and the trade winds, with an indication of the direction of the same. In explanation of his ornamental border, which is an attractive feature, Hondius tells us that "for adornment and for entertainment" he has here represented the various animals which are useful to man.



World Map of Cosmas. No. 2.

A Description of Early Maps

Originals and Facsimiles

(1452-1611)

Being a part of the permanent wall exhibition of

The American Geographical Society

With a partial list and brief references to the reproductions of others which may be consulted in the Society's Library

By

EDWARD L. STEVENSON

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For reproductions of mediaeval maps and portolan charts see:

KONRAD MILLER: Mappaemundi, Die ältesten Weltkarten. 6 Hefte.

C. RAYMOND BEAZLEY: The Dawn of Modern Geography.

J. LELEWEL: Géographie du Moyen Âge. Atlas.

BARON A. E. NORDENSKIÖLD: Facsimile Atlas.

———: Periplus.

VISCOUNT DE SANTAREM: Atlas composé de mappemondes et de cartes hydrographique et historique depuis le XI[e] jusqu' au XIII[e] siècle.

E. F. JOMARD: Les monuments de la géographie ou receuil d'anciennes cartes européennes et orientales, publiées en facsimile de la grandeur des originaux (Library of the Hispanic Society of America).

THEOBALD FISCHER: Sammlung mittelalterlicher Welt- und Seekarten italienischen Ursprungs, with Ongania facsimiles.

KONRAD KRETSCHMER: Atlas zur Entdeckung Amerikas.

E. L. STEVENSON: Portolan Charts, Their Origin and Characteristics.

———: Atlas of Portolan Charts.

———: Portolan Atlas signed "Joan Martines en Messina Any 1582."

———: Portolan Atlas signed "Yhs Ma Xgo Conte de Ottomano Freducci.

———: Facsimiles of Portolan Charts. 16 reproductions.

———: Maps reproduced as glass transparencies.

Maps Framed and Hanging on the Walls of the Building

No. 1—WORLD MAP OF JOHANNES LEARDUS, 1452.

This original parchment map, one of the finest products of this skilful Italian map maker, represents the world as it was known about the middle of the fifteenth century. It retains certain mediaeval map features such as an orientation with the East at the top, numerous towns represented in picture and scattered somewhat promiscuously over the map, the Red Sea colored red, being round in form with an encircling ocean.

It lays down the record of West African coast exploration, so far as that exploration had been carried under the leadership of Prince Henry the Navigator. The unknown region of South Africa has been made somewhat conspicuous as if to center attention in that direction. The Gulf of Guinea gives evidence of an acquaintance with its northern coast line, and the Mediterranean region, including the Black Sea, is well drawn. The outlying regions on the border of the known world are still fancifully represented, but the author seems to have felt himself justified in rounding out his space with conjectural continental outlines. In a broad band encircling the map proper the author has inscribed elaborate astronomical tables, with allegorical figures at the four corners of the parchment sheet.

References

Giuseppe Crivellari: Alguni Gimeli della Cartografia Medievale existenti a Verona.

Baron A. E. Nordenskiöld: Periplus.

Theobald Fischer: Sammlung mittelalterlicher Welt- und Seekarten.

Other Important Maps of the Period:

See references under No. 2.

No. 2—GENOESE WORLD MAP, 1457.

This is a facsimile, including the colors of the original, of a parchment map preserved in the National Library of Florence. It is clearly of Genoese origin but of unknown authorship, being dated, on the left, 1457.

To it a peculiar interest attaches by reason of the character and fullness of its records. It belongs to a period of transition. Ptolemy's Geography had been recovered, and that ancient cosmographer was becoming anew a teacher to the peoples of Europe. The author surpasses his contemporaries in exhibiting an effort to bring into harmony the ancient and the mediaeval geographical ideas with those of his own day. He makes record of explorations by land and by sea which lead us directly into the day of New World discoveries.

Its eliptical shape, not altogether common to maps of the period, nor to those of earlier centuries which have survived time's destruction, makes the longitude appear to be about twice that of the latitude.

The map is liberally ornamented with architectural subjects, with crowned kings, with marvelous animals of land and sea, as if these were all important entries from a geographical standpoint. The author appears to have known his Pliny, whom he cites in his legends. He follows Ptolemy closely but not slavishly. The Indian Ocean is no longer an enclosed sea; considerable acquaintance with the northland of Europe and Asia is indicated, likewise with India and with East and West Africa. He follows Ptolemy in his representation of the Mountains of the Moon and the lake sources of the Nile, as he does in his representation of the Red Sea, the Arabian Sea, the Persian Gulf and the coast line of India. He shows an acquaintance with the record of Marco Polo and of Nicolo di Conti, overland travelers into China and far away Cathay. One is particularly attracted to his well drawn Mediterranean regions, in which he has followed the best type of the portolan chart. He represents the islands recently discovered or rediscovered, for some of them had been known to the early

Romans, to the west of Africa, and he gives remarkably interesting record of the progress of Portuguese discovery down the African coast.

REFERENCES

E. L. STEVENSON: Genoese World Map 1547. Facsimile with critical text.
THEOBALD FISCHER: Sammlung mittelalterlicher Welt- und Seekarten.

OTHER IMPORTANT MAPS OF THE PERIOD:
Andrea Bianco, 1436.
Borgian Map, 1450.
Catalan World Map of Florence, 1450.
World Map of Fra Mauro, 1459.
Portolan Charts of the period.

No. 3—THE GLOBE OF MARTIN BEHAIM, 1492.

This is one of the three facsimiles, in this country, of the oldest extant terrestrial globe. The original, having a diameter of about 20 inches, has its map drawn on parchment which has been pasted on a prepared globe shell and is now preserved in the archives of the Behaim family of Nürnberg.

Martin Behaim belonged to the merchant class of this flourishing South German city. He found his way to Portugal, became interested in Portuguese African exploration, returned in the year 1490 to his native city, where on invitation of its Council he undertook the construction of what he called his "Erdapfel." There has been preserved to us somewhat detailed information as to the progress of the work, from its beginning to its completion.

A belief in a spherical earth dates from a rather remote antiquity, and there had been many attempts before Behaim's day at a material representation of its sphericity, but his globe now holds the unique distinction of being the oldest which has come down to us. Its map is of striking interest because of its date, and because of its summary of geographical knowledge recorded at the very threshold of a new era. He tells us that it is based upon Ptolemy, upon the travels of Marco Polo and of Sir John Mandeville, upon the explorations carried on by King John of Portugal and the peoples of the Mediterranean Lands.

Very naturally he omits the New World, but he exhibits the

possibility of an ocean voyage westward from Europe to the shores of eastern Asia, though he has much underestimated the distance from Portugal to China, erroneously representing Cipangu (Japan) as near the actual longitude of Mexico. His map is filled with pictures and legends which he intended should be strictly geographical in character, and more than 1100 place names are given.

Many of the fabulous islands of the Atlantic and other oceans appear, each with a legend telling the commonly accepted story concerning it, among which islands may be named Saint Brandans, Antillia, and the Island of the Seven Cities.

He gives very detailed information concerning the Portuguese discoveries, including the voyage of Bartholomew Diaz to a point on the east coast of Africa. Here we find an interesting feature, this being the last vestige of the extension of that continent eastward at its southern extremity, which Ptolemy had made to reach even to the east coast of Asia.

References

E. G. Ravenstein: Martin Behaim, His Life and His Globe.

F. W. Ghillany: Geschichte des Seefahrers Ritter Martin Behaim.

E. L. Stevenson: Terrestrial and Celestial Globes, Their History and Construction, with consideration of their value as aids in the study of geography and history.

Other Important Maps of the Period:

The Laon globe, ca. 1493.

Map of the world by Henricus Germanus, 1492.

Ptolemy Maps in editions of 1478, 1482, 1490.

No. 4—WORLD CHART OF ALBERT CANTINO, 1502.

This is a facsimile, omitting the colors of the original, of a parchment map of large size belonging to the Royal Estense Library of Modena. Its record of the latest geographical discoveries in the west, includes a reference to the third voyage of Columbus, to the Corte Real voyages, to the expedition of Cabral, and to that of Hojeda with whom Vespucci sailed in the year 1499. There is good reason for thinking it exhibits in part the cartographical work of Vespucci.

The land visited by the Corte Reals is called "Terra del Rey du Portuguall," and to the northeast of this land we find a region, "A parte de Asia" apparently drawn as a peninsula of the Old World mainland. No generic name is given to the northwest continent here represented, but there is no justifiable reason for believing the cartographer thought this to be a part of the east Asiatic region. Cuba bears the name "Ilha yssabella," and below the West Indian Archipelago we find the name Antilles, first employed to designate these islands, in the legend "Has antilhas del Rey de castella."

The South American coast line beginning in the vicinity of Margarita Island extends to about 38° south latitude. Of the twenty-nine names along this coast but three appear on the Juan de la Cosa map of 1500. Across the southern continent, which is ornamented with an elaborate landscape and the oldest of its kind known, is written the legend telling us that "All this land was discovered by command of the King of Castile."

For a study of exploration and discovery in the East the map is also one of great value. The coast nomenclature of the African coast is exceedingly rich. India is no longer the India of Ptolemy.

Considering the treatment to which this old document has been subjected it may be considered as being remarkably well preserved. Stolen from the Ducal Library of Ferrara more than three hundred years ago, it eventually passed into the hands of a Roman shop-keeper who found it most useful as a cover for a common screen and he trimmed it to suit his purpose. More than sixty years ago it was purchased and presented to the Library which now claims it as one of its priceless treasures.

References

Henry Harrisse: Les Corte-Real et leurs voyages au Nouveau-Monde.

E. L. Stevenson: Maps Illustrating Early Discovery and Exploration in America. This facsimile is No. I of the series.

Other Important Maps of the Period Closely Related to Cantino's Chart:

Map of Juan de la Cosa, 1500.

See for further references the following:

No. 5 and the maps there referred to.

No. 5—WORLD CHART OF NICOLO DE CANERIO, 1502.

This facsimile of Canerio's World Chart, omitting the colors of the original, has made easily available one of the most valuable of the earliest efforts to lay down the coasts of the New World. The original is a vellum manuscript document preserved in the *Archives du Service Hydrographique de la Marine* of Paris. Canerio called himself a Genoese; he probably was one of those Italians who found employment as map-makers in Portugal or in Spain in the early years of great trans-oceanic discoveries. Clearly he had gathered his information from a Portuguese chart or from Portuguese charts. It exhibits many of the characteristics of the portolan chart, its geographical nomenclature being practically limited to the continental coasts, and its compass or direction lines are made to radiate from centers regularly distributed over its surface, the principal center being located in the heart of Africa.

In its general outlines it closely resembles the World Chart of Cantino, No. 4, but it was worked out with less care and skill. Along the border on the left there is indicated, perhaps for the first time on a marine chart, degrees of latitude which extend from 56° south to 71° north latitude. His Africa and his Mediterranean coast lands are drawn with a remarkable approach to accuracy, and his names of localities are more numerous than are those on any other charts of that early period. Only those Atlantic coasts of the New World are represented which had been visited before 1502, and it is particularly interesting to note that it makes record of explorations which are not to be found referred to in written reports. There is no indication that the newly discovered lands were thought to be a part of Asia.

Greenland is made to project westward as a peninsula of Europe; the region visited by the Corte Reals is represented lying too far to eastward, perhaps to bring it within the Papal assignment to Portugal of that part of the world in which its King might lay claim to newly discovered lands; the peninsula of Florida is well outlined, considering the early date, but we are ignorant of the explorer who first sketched its coasts; an unex-

plored area is indicated in the region of Central America, and the South American coast is represented from the Gulf of Maracaibo to the mouth of the La Plata River, along which we find twenty-five more names than appear on Cantino's Chart. These must have been assigned by one or more of the eight expeditions made to these parts before 1502, and perhaps more of these names are traceable to Vespucci than to any other. Ptolemy is no longer the authority for the representation of the far eastern regions.

References

E. L. Stevenson: The Marine World Chart of Nicolo de Canerio Januensis.

L. Gallois: Une nouvelle Carte marine du XVI^{me} siècle, le Portolan de Nicolo de Canerio.

Henry Harrisse: The Discovery of North America.

Gabriel Marcel: Reproductions de Cartes et de Globes.

Other Important Maps of the Period Closely Related to Canerio's Chart:

World Chart of Cantino, 1502. No. 4.

Map of Pilestrina, 1503, Stevenson's reproduction.

Munich-Portuguese map, 1503, Stevenson's reproduction.

Maps of Martin Waldseemüller, particularly those of 1507, and 1516.

Pesaro world chart, ca. 1504, Stevenson's reproduction.

Map of Pedro Reinel, 1505.

No. 6—PESARO WORLD CHART, CA. 1504.

The original of this photographic reproduction, about 200 by 100 cms. in size, belongs to the Oliveriana Library of Pesaro, Italy. It is neither signed nor dated. Like the Cantino and the Canerio Charts it has many of the features of the portolan chart.

The extreme northern part of the New World is represented as three distinct regions, exhibiting much confusion as to the identity of Greenland and the land discovered by the Corte Reals. The Island of "Frislanda" is represented, and the name "Insula de labardor" is given to a small island lying to its south-west. The north continental coast line of the New World appearing, for example, in the Chart of Canerio, is omitted. Very many of the West Indian Islands, with names, are represented, while

the Island of Cuba has the outline as given by Juan de la Cosa, thus indicating an early source. The Atlantic coast of South America is drawn from Yucatan to a point near the mouth of the La Plata River. The names along this coast, not numerous, are of very early origin. The chart maker has represented, with some uncertainty, the mouth of the Amazon River, and while not accurately locating his mountain ranges gives special prominence to the fact that mountains constitute a prominent feature of this continent which he calls "Mundus Nouus."

In his outline of the Old World the author is in practical agreement with Cantino and Canerio.

In the heart of Africa Prester John is located, for whom the Portuguese made search in the days of Henry the Navigator. One will observe that the Mediterranean is represented with a much nearer approach to accuracy than may be found on the Ptolemy maps and those especially influenced by these maps, but the Caspian Sea, the land of Arabia, the Red Sea, and northern Africa from Cape Guardafui westward to the Atlantic coast are far from having their true relations and proportions given.

References

E. L. Stevenson: Facsimile reproduction of the Pesaro world chart.
Henry Harrisse: Découverte et évolution cartographique de Terre-Neuve. Raccolta di Documenti e studi, Pt. IV, Vol. II.

Other Important Maps of the Period Are Referred to Under Nos. 4 and 5.

No. 7—WORLD MAP OF MARTIN WALDSEEMÜLLER, 1507.

In the year 1901 Professor Joseph Fischer of Stella Matutina College, Feldkirch, Austria discovered in the library of Prince Waldburg of Wolfegg in Württemberg a copy each of two of the most interesting and important maps of the early sixteenth century. They are large engraved world maps, the work of Martin Waldseemüller.

The first of these appeared in the year 1507, the same year in

which Waldseemüller issued his "Cosmographiae Introductio" wherein he had proposed the name America for that part of the New World which he thought had been discovered by Amerigo Vespucci. "Inasmuch as both Europe and Asia received their names from women, I see no reason," he stated therein, "why any one should justly object to calling this part Amerige, i.e., the land of Amerigo, or America, after Amerigo, its discoverer, a man of great ability." He had further stated therein the purpose of his little book as being "to write a description of the world map which, we have designed."

His "world map" is the one here reproduced in facsimile, and on it for the first time we find the name "America" assigned to a part of the New World, that is to a part of South America.

For the Old World Waldseemüller has followed somewhat closely the Ptolemy maps. From Marco Polo he borrowed practically all the legends in northern and eastern Asia, and he tells us that he also had consulted the Portolan charts of the period, probably including such as the King Chart and that of Canerio.

If there could be any doubt at all as to the belief of Cantino, or Canerio, or of Juan de la Cosa relative to the independent position of the newly discovered lands in the West, judging from the manner in which they outlined those lands, there could not have been any doubt in the mind of Waldseemüller seeing that he has represented them as bordered by the ocean both on the east and the west. On the map proper he represents the north continental area as separated from that on the south by a wide strait, but on his inset map he has represented these continents, for the first time, as a continuous body of land.

This is the first large printed map on which the new discoveries of the Spaniards and the Portuguese are represented, and the first attempt to complete and to print on a large scale the world-picture of Ptolemy, by adding the statements of Marco Polo, and the records of the Portuguese marine charts of his day.

Waldseemüller's influence on the mapping of the New World in particular was wide-reaching, and the discovery of this copy

has made practically necessary the rewriting of much of the history of New World cartography.

References

Joseph Fischer and Franz von Wieser: Die älteste Karte mit dem Namen Amerika, aus dem Jahre 1507, und die Carta Marina, aus dem Jahre 1516.

Edward Heawood: The oldest map with the name America.

Charles G. Herbermann (Ed.): The Cosmographiae Introductio of Martin Waldseemüller in facsimile. United States Catholic Historical Society Publication, Monograph IV.

E. L. Stevenson: Martin Waldseemüller and the Lusitano-Germanic Cartography of the New World.

Other Important Maps of the Period Related to the World Map of Martin Waldsemüller:

Liechtenstein globe gores, 1509.
Glareanus maps, ca. 1510.
Waldseemüller-Ptolemy, 1513.
The Green globe, 1515.
Globe maps of Johann Schöner, 1515, 1520.
Boulengier globe gores, ca. 1518.
Cordiform map of Peter Apianus, 1520.
Map of Johannes Honterus, 1546.

No. 8—CARTA MARINA OF MARTIN WALDSEEMÜLLER, 1516.

This is a reproduction of the second map by Martin Waldseemüller, found by Professor Fischer in the year 1901 in Wolfegg Castle. It is both signed and dated, and we learn from one of its legends that the map of 1507 was printed in one thousand copies, of which but one seems to have come down to us.

This Marine chart appears to be what we may call a printed edition of Canerio's manuscript chart (No. 4), with certain modifications of rather minor importance, and one will find it interesting to make a comparison of certain selected details, such as the crescent-like figures on the left, and the system of compass roses with a large central rose in the heart of Africa. There appears reason for thinking that the Canerio Chart came into the hands of Duke René, Waldseemüller's patron, at the same

time that the letters of Vespucci were received, which Waldseemüller printed as an appendix to his "Cosmographiae Introductio," and that this served him as a source both for his map of 1507 and his Chart of 1516, particularly for the latter.

As an example of early engraving this Chart is notable; its ornamentation and much of its pictorial decoration suggests the work of Albrecht Dürer.

It will be noted that the name "America" does not appear but instead merely the names "Terra Nova," and "Brasilia sive Terra Papagalli." The name "Parias" has been transferred to South America, while the north continental area is called "Terra de Cvba Asie Partis," but no information whatever is given as to the manner in which this New World region was thought to be connected with the continent of Asia, since the author has omitted all that part of the world lying between 150° and 280°.

References

See references under No. 7.

Other Important Maps of the Period, Same as Under No. 7.

No. 9—TURIN-SPANISH MAP, 1523.

This is a photographic reproduction of an original parchment map belonging to the Royal Library of Turin, Italy. It is neither signed nor dated, but internal evidence warrants our placing it not later than 1523. In its nomenclature the Spanish and the Portuguese languages have been employed, and special emphasis seems to be placed on Spanish discoveries which had been made prior to its draughting.

Its coast nomenclature is unsurpassed in richness by any other map of that early period. More than three hundred names appear in the New World, and one is impressed with the rather unusually near approach to accuracy in the spelling of its coast names.

It omits the region in the north visited by the Corte Reals and

the Cabots. As much of the Florida coast is given as was visited by Ponce de Leon, indicating a knowledge of that explorer's expedition. To the peninsula is given the name "Isla Florida," which is a very unusual designation on early charts. From "Rio del Espirito Santo," where the north coast line of the Gulf of Mexico begins there is an unbroken coast to a point near six degrees up the west coast of South America, or as it appears, to that point whence Magellan set sail for his cruise across the Pacific. Here we read "Tierra de dezembre," which appears to be the latest discovery indicated and which probably records information brought back very soon after the passage of the strait.

The city of Mexico has the circular form appearing after the Cortes conquest. Only a small section of the Pacific coast of South America has been drawn. No part of this southern continent bears a generic name, but the author has sketched in it an elaborate forest in which the parrot is conspicuous, as in the Cantino and the Canerio Charts. In the north Atlantic "Islandia" is represented. Northern Europe appears as in the Donis maps and the map of Martin Waldseemüller of 1507. Coast nomenclature for the Mediterranean, the Black Sea and Africa is very extensive, but in the far East the names are few.

References

E. L. Stevenson: Maps illustrating early discovery and exploration in America, No. 6.

Henry Harrisse: The Discovery of North America.

Other Important Maps of the Period, and Somewhat Related:

Munich-Portuguese, 1519, Stevenson's reproduction.

Map of Maiollo, 1519, Stevenson's reproduction.

The maps referred to under No. 10.

No. 10—WORLD MAP OF VESCONTE DE MAIOLLO, 1527.

This is a faithful reproduction of an original parchment map belonging to the Ambrosian Library of Milan. Its author and date inscription reads: "Vesconte de Maiollo composuy hanc cartam in Janua anno dny, 1527, die XX Decenbri."

The author had a place of first importance among the cartographers of his day, and his effort in the preparation of this map seems to have been to include the latest word from discoveries in the New World, whether truthful or merely conjectural. The Old World section of the map accords in the main with other maps of the day. He makes conspicuous in Africa the Nile River and its source in the mountains of the extreme south, that is the Mountains of the Moon. He seems to center attention on the northern part of Europe and of Asia through his striking illustrations.

The map exhibits certain very novel features in its outline of the New World. Verrazano had reported his expedition along the Atlantic coast for the King of France in search for a strait leading to the Pacific, and his discovery of a narrow isthmus, in the vicinity of the Carolinas, beyond which lay the great western ocean. In attempting to represent this supposed discovery, a peculiar trend has been given to the Pacific coast of our present North America.

Early map makers had been indicating the existence of a passage way between North America and South America—for this repeated search had been made though not found,—but the map makers encouraged continued search by recording it as a geographical fact. Maiollo gives us the record that such a passage way probably existed, and he designates the same as a strait (canal?) but calls it "streito dubitoso."

Only the explorers Corte Real, Columbus, and Magellan are especially referred to by Maiollo, but the numerous French names along the Atlantic coast give distinct evidence that his information had been obtained, to a considerable extent from Varrazano's reports. We find such names as "Normanvilla," "Anguileme," "Anaflor," "Diepa," and "Francesca" a name given to the

entire northern region. South America is not well proportioned in outline. We find its northern section designed as "Terra noua descoberta per cristofa colonbo Januensem de re de spana," and its eastern section called "Terra sante crusis de la Brazile de portugale." The undiscovered Pacific coast is designed as "Terra incognita."

References

E. S. Stevenson: Maps illustrating early exploration and discovery in America. No. X.

Henry Harrisse: The Discovery of North America.

Other Important Related Maps:

See No. 11 below.

The World by Sebastian Münster, 1532.

Weimar-Spanish Map—Stevenson's reproduction.

Maps of Diego Ribero, 1529, Stevenson's reproduction.

Ulpius Globe, 1542.

No. 11—THE WORLD MAP OF HIERONIMUS DE VERRAZANO, 1529.

In the Borgian Museum of the College of the Propaganda, Rome, is preserved the original parchment map of which this is a facsimile in photograph, colored in accord with that original by an Italian artist in the Museum itself.

It is the work of the brother of the explorer Giovanni Verrazano and is signed "Hieronimus de Verrazano faciebat," its date being determined as 1529 by the record in a legend in what we may call North America, noting that the region had been discovered five years before by Giovanni da Verrazano. Since we know that Giovanni made his voyage of discovery in the year 1524 we can therefore place the date of its draughting.

The peninsula which we find on the Maiollo map of 1527 in the vicinity of the Carolinas is here represented. A legend to the right of it tells us "From this oriental sea is seen the western sea. There are six miles of land between one and the other." The western sea is nameless, but on certain later charts it is called "Mar di Verrzano." Near this peninsula we read that to the

country is assigned the name "Verrazano siue noua gallia—," but the origin of the name "Iucatanet" which also appears in this legend is unknown. Numerous French names appear along the coast which without doubt are of Verrazanian origin.

Errors in both latitude and longitude are striking in the geography, especially of the New World. In its representation of the Gulf of Mexico it is more nearly accurate than is the Chart of Francisco de Garay and the Charts of Diego Ribero. "Iucatana" is represented, though somewhat doubtfully, as an island. The Bermudas are not represented, the Bahamas appear but are nameless, and such of the West Indian Islands as are shown are well drawn, and the larger ones are named. Near the coast of Caraccas is the legend "Terra America," and south of it the name "Parias." To Brazil the names "Terra Sancte Crucis" and "Verzino" are given while in the interior we read "Mundus Novus."

In the representation of the east coast of Asia Ptolemy has, in the main, been followed, as he has been followed in the representation of northern and north-west Europe.

Verrazano has drawn his equator somewhat below the middle of his map, representing ninety degrees above and sixty-four degrees below the same, while he has included about three hundred and twenty degrees of longitude.

References

E. L. Stevenson: Maps illustrating early discovery and exploration, No. 12.
J. C. Brevoort: Notes on Giovanni da Verrazano.
H. C. Murphy: The voyage of Verrazano.

Other Maps of Importance of the Period and Related to Verrazano's:

See No. 11.
Maps of Pedro Reinel, 1515, 1519.
Map in Ptolemy Atlas of 1530.
Maps of Agnese, ca. 1545.
Globe of Ulpius, 1542.
Map of Gastaldi, 1548.
Map of Nicolas Desliens, 1541.
Map of Pierre Desceliers, 1550.
Map of Ruscelli, 1548.

No. 12—MAP OF THE WORLD BY GERARD MERCATOR, 1538.

Of this world map by Mercator but two original copies are now known, one belonging to the American Geographical Society and the other to the New York Public Library. Next to his map of Palestine of the year 1536 this represents his earliest independent work. It is drawn on the double cordiform projection, a projection it is interesting to compare with that employed by Waldseemüller in his map of 1507 (No. 7).

In this map Mercator departed from that idea largely prevailing in his day which connected the New World with Asia, an idea becoming especially pronounced after the conquest of Cortes. He not only makes the New World a separate and distinct region but applies the name "AMERICAE" to both North and South America, long thought to be the first application of that name to both continents. Recent discovery now assigns this honor to the Green Globe of Paris, made probably as early as 1515.

In its continental outlines Marcator's map does not equal certain others of the period. He does not give the latest and best information concerning the geography of the far East; he surrounds both the north and the south pole with a great continental body of land, perhaps in part to be explained by his later expressed theory that such land areas must exist as a world balance.

References

J. Van Raemdonck: Orbis Imago, Mappemonde de Gerard Mercator de 1538.
E. F. Hall: Gerard Mercator. (In *Bulletin of the American Geographical Society*, 1878.)
Reproduction of the Map by the American Geographical Society.
Santarem: Facsimile Atlas.

Other Important Maps of the Period and More or Less Related:

Cordiform map of Orontius Finaeus, 1531.
Gore map of Alonso de Santa Cruz, 1542.
Globe gore map of Franciscus De Mongenet, 1552.
Globe gore map of Antonius Florianus, 1560.

No. 13—MAP OF THE WORLD ATTRIBUTED TO SEBASTIAN CABOT, 1544.

In the National Library of Paris may be found the only known original copy of the map of which this is an excellent photographic facsimile. Legend XVII, on the right, tells us that "Sebastian Cabot, captain and pilot major of his sacred and imperial majesty the emperor Don Carlos, the fifth of this name, and king, our lord, made this figure extended in plane, in the year of the birth of our Savior Jesus Christ, 1544." For numerous reasons there has long been, among students of these early maps, an inclination to doubt its strictly Cabotian origin. If in its geographical outlines and geographical records it is wanting such approach to accuracy as may be found in certain other maps of the period, this in part is attributable to the kind of projection employed, and to the sources employed.

It will be noted that the conspicuous legends on the right and the left had been separately engraved and attached to the map proper, and that they are given in both the Latin and the Spanish languages. Although, at this time Sebastian Cabot was in the employ of Spain as pilot major, it appears certain that the map was neither engraved nor printed in Spain. The first map of America printed in that country appeared in a work by Pedro de Medina in the year 1549, and the second in Gomara's History published in the year 1554.

As a record of the Cabot voyages to the New World it does not tell a faithful and true story as we know it from other sources, but the variation is not without much interest. Newfoundland, for example, is broken up into a group of islands. The record of French explorations in the region of the Gulf and River St. Lawrence is full, including the surveys of Cartier and Roberval. While its details respecting the geography of the Atlantic coast may be found to be far from accurate, the trend of that coast line in general is superior to that found on the majority of other early Spanish maps, such as those of Ribero.

The author of this map clearly drew his information, or much of it from other maps of his day, Spanish and French, but he exer-

cised a liberty with his material which exhibits carelessness and want of scholarship. For the western or California region the map of the pilot Domingo del Castillo of 1541 was followed.

References

J. G. Kohl: History of the discovery of Maine.
Henry Harrisse: John Cabot, the discoverer of North America, and Sebastian, his son.
George P. Winship: Cabot Bibliography.

Other Important Maps of the Period:
See Nos. 10 and 11.

No. 14—THE WORLD MAP OF WILLEM JANSZ. BLAEU, 1605.

The original of this map, of which but one copy is known, may be found in the Library of The Hispanic Society of America. It is the work of one of the most distinguished map makers of the period, being engraved on eighteen copper plates and printed in Amsterdam.

Most of its errors in the continental outlines are the common errors of the day. Africa has a breadth of more than eighty degrees, and the east coast of Asia, particularly its northern half is far from accurate. This section however is better represented than by Hondius six years later, who clearly suited his representation to a belief in a perfectly open sea route to China and the Orient by the north.

Blaeu's Mediterranean has much too great an extension in longitude, and is too narrow. The great austral continental land called "Magallanica" in the New World hemisphere, is that which so commonly appears in the world maps of the day.

North America is made to extend through more than one hundred and sixty degrees of longitude, while South America is given a breadth of more than sixty degrees. The erroneous representation of the "Martin Forbischers Strate," a curious early geographical blunder, is retained. The fabulous islands of "Frislandia," "Brasil," "Da Mann," "S. Brandan" still have a represen-

tation. The latest attempts of Willem Barentszoon and of other less distinguished explorers from Holland to find a northeast passage to China are recorded.

Blaeu has called attention to the four distinguished explorers who, prior to the time of the issue of his map, had circumnavigated the globe, placing their portraits in an elaborate cartouch south of South America, and notes their success in a somewhat lengthy legend, these four being Magellan, Drake, Cavendish, and van der Nort.

The artistic adornment of Blaeu's Map is not its least attractive feature. Its border alone gives it a high place among the fine examples of copper engraving of the period. Ships, sea monsters, and land animals are numerous.

References

E. L. Stevenson: Willem Janszoon Blaeu and his map of 1605.
J. P. H. Baudet: Leven en werken van Willem Jansz. Blaeu.
John Blaeu: Atlas, 12 Vols.

Other Maps of the Period:

World Map of Peter Plancius, 1592.
The maps of Jodocus Hondius, Gerhard Mercator, Peter Goos, Jan Janssonius et al. See No. 15.

No. 15—WORLD MAP OF JODOCUS HONDIUS, 1611.

The unique original of this map may be found in the Library of Wolfegg Castle, in which Library may also be found the Waldseemüller maps.

Hondius' Map, more elaborate than is that by Blaeu (No. 14), closely resembles it, and doubtless is in part a copy. It is interesting to compare the similarity in detail. The fact is exceedingly interesting that many of the objects otherwise similarly drawn are reversed in position as represented on the maps. Note for example the direction in which the portraits of the world navigators are made to face, and that the ships similarly placed are made to sail in opposite directions.

Record is made of the difficulties encountered by Hudson in his effort to make the north-east passage to China, failing which he

turned his prow to westward and entered the river thereafter to bear his name. Hondius makes corrections on the east coast of Greenland of errors which in part were attributable to Mercator as set down in his map of 1569, and brings into prominence the results of the explorations of Drake along the southwest coast of South America. In the maps of Mercator and Ortelius, that coast was made to turn toward the northwest instead of toward the northeast, as was correctly demonstrated by Drake.

He claimed as an especial merit of his map that he was the first to represent the currents of the ocean, and the winds which blow constantly in one direction through certain seasons of the year. These points are made conspicuous. On sheet 18 he says that "for adornment and entertainment" he has represented the various animals which are useful to man. There are many large pictures on the map including the Fall of Man, the Giving of the Law on Mount Sinai, Noah and his children and grandchildren, all of which he thought to have geographical interest.

References

E. L. Stevenson and Joseph Fischer: Map of the World by Jodocus Hondius.

Other Maps of the Period of Importance:
See No. 14.

Key to Location of Maps

Number on Map	*Chronological Number in this Pamphlet*	*Location*
I	4	EXHIBITION ROOM, first floor North Wall
II	14	EXHIBITION ROOM West Wall
III	15	EXHIBITION ROOM West Wall
IV	5	EXHIBITION ROOM South Wall
V	8	EXHIBITION ROOM South Wall
VI	7	EXHIBITION ROOM South Wall
VII	10	COUNCIL ROOM, off Exhibition Room North Wall
VIII	3	COUNCIL ROOM North Side
IX	13	EXHIBITION ROOM South Wall
X	9	EXHIBITION ROOM South Wall
XI	12	EXHIBITION ROOM East Wall
XII	1	HALL, second floor Head of Stairs
XIII	11	HALL, second floor South Wall
XIV	6	READING ROOM, second floor South Wall
XV	2	MAP ROOM, third floor West Wall

AMERICAN GEOGRAPHICAL SOCIETY
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EARLY TOPOGRAPHICAL MAPS

Their Geographical and Historical Value as Illustrated by the Maps of

THE HARRISON COLLECTION OF THE AMERICAN GEOGRAPHICAL SOCIETY

By

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EARLY TOPOGRAPHICAL MAPS

Their Geographical and Historical Value as Illustrated by the Maps of the Harrison Collection of the American Geographical Society

Mr. Francis Burton Harrison, former Governor-General of the Philippines, has recently presented to the American Geographical Society a collection of books and maps relating directly or indirectly to military events in Europe in the eighteenth and early nineteenth centuries. Nearly six hundred volumes, including such fundamental works as those of Clausewitz, Jomini, and Dumas, together with files of military periodicals of the time, provide a rich mine of source and secondary material for the historian of military theory and of the campaigns of Frederick II, the French Revolutionary Wars, and Napoleon. The maps (over seven hundred[1] separate sheets) most interesting from the historical and geographical point of view may be discussed under two heads: (1) topographical maps and (2) maps of military history.

Topographical Maps

In the preface to his atlas of the Wars of the Revolution, General Jomini, a great authority on military history who had been an officer of Napoleon, calls especial attention to some dozen topographical maps which he recommends for the purpose of filling in lacunae in the atlas. Many of these maps, the utility of which is thus attested by a highly competent contemporary critic, are to be found in the Harrison collection.[2]

[1] As announced in a brief note on the Harrison collection in the *Geographical Review* (Vol. 14, 1924, pp. 426–432, reference on p. 426), there were five hundred and fifty-one maps. Since the publication of this note Mr. Harrison has added materially to his gift.

[2] Jomini refers to Ferraris' "Belgium," Cassini's or Capitaine's "France," Müller's "Holland," the map of Germany of the Weimar Bureau, Cotta's "Swabia" or that of the Dépôt de la Guerre, Bacler Dalbe's "Alps" and "Italy," Roussel's "Pyrenees," Gotthold's general map ("la meilleure carte d'ensemble publiée jusqu'à ce jour"), Austrian general staff maps of Salzburg and Upper Austria, Bavarian government maps of Bavaria, and Haas's "Hesse." Of these the American Geographical Society possesses all but Müller's "Holland," Cotta's "Swabia," Roussel's "Pyrenees," and the Austrian and Bavarian official maps. The Society's set of Capitaine's "France" is in Belleyme's revision (see below, p. 28).

Furthermore, the collection includes other important specimens of the topographical cartography of the periods before and after the publication of Jomini's work.

Areas Covered and Scales

The primary purpose of the present booklet is not so much to give a detailed discussion of the various maps as to suggest some profitable uses to which scholars might put them. First, however, we must briefly indicate the areas covered by the most interesting of the sheets, with their dates, titles, and scales.

France as a whole is depicted upon the famous Cassini map (1750–1793) in one hundred and eighty sheets on a scale of 1:86,400.[3] It is also shown upon Belleyme's corrected version of Capitaine's map of 1790 (1:345,600)[4] dated 1815 to 1820; this map is in twenty-four *feuilles* or eighteen actual sheets with an index sheet. Arrowsmith's "Map of France, Belgium, and Part of Switzerland" (approximate scale[5] 1:467,000), London, 1817, was compiled from continental maps for the use of British students.

The Low Countries are shown on Ferraris' famous map of the Austrian Netherlands (Belgium), 1:86,400, of 1777,[6] in twenty-five sheets, and on an Arrowsmith map entitled "Holland from the Map Executed at the Dutch Military Dépôt" (approximate scale 1:117,000), 1815.

Germany is well represented both by general maps on a medium

[3] "Carte générale de la France levée géometriquement par ordre du roi; publiée par Mrs. de l'Académie."

[4] "Carte de la France comprenant toutes les mairies; divisée en départemens, arrondissemens et cantons, dressée par Louis Capitaine . . . ; revue et augmentée par Belleyme; . . . acquise par le Dépôt de la Guerre en 1815; perfectionnée et agrandie jusqu'au de là du Rhin et des Alpes de 1816 à 1821." See W. Stavenhagen: Skizze der Entwickelung und des Standes des Kartenwesens des ausserdeutschen Europa, *Petermanns Mitt. Ergänzungsheft No. 148*, 1904, p. 139; H. M. A. Berthaut: La Carte de France 1750–1898: Étude historique, 2 vols., Paris, 1898, 1899; reference in Vol. 1, pp. 66–69.

[5] The natural scales are not given upon many maps of this period. In some cases where it has been possible to determine the scales from modern descriptions of the maps, the authority for the figures given is stated in the footnotes. Elsewhere the approximate natural scale has been calculated roughly either from the graphic scale or from the grid of parallels or meridians.

[6] "Carte chorographique des Pays-Bas autrichiens . . . par le Comte de Ferraris . . . 1777." See Stavenhagen, *op. cit.*, p. 112, and, more especially, E. Hennequin; Étude historique sur l'exécution de la carte de Ferraris et l évolution de la cartographie topographique en Belgique depuis la publication de la grande carte de Flandre de Mercator (1540) jusque dans ces derniers temps, *Bull. Soc. Royale Belge de Géogr.*, Vol. 15, 1891, pp. 177–296. Also printed separately.

scale and by special larger-scale maps of regions that were of particular contemporary interest from the military point of view. Between 1807 and 1813 the Geographical Institute at Weimar published on a scale of approximately 1:170,000 a great map in two hundred and four sections of "Teutschland" including Austria, the Tirol, Switzerland, Styria, Carinthia, Bohemia, and Moravia.[7] This and a supplement[8] for Eastern France and Belgium in forty-five sections, dated 1814, form part of the Harrison collection. Saxony as a whole is the subject of Petri's map of the time of the Seven Years' War.[9] Its fifteen sheets cover the area roughly between Brunswick and Frankfort on the Oder to the north and Meiningen and Prague to the south. The scale is approximately 1:160,000. For the southern portion of the Electorate of Saxony there is a handsome map of 1804[10] on about half the scale of Petri's map. Constructed especially to illustrate the battles of the Seven Years' War, these sheets were drafted by F. H. Backenberg. Northwestern Germany is shown on von Le Coq's magnificent map of Westphalia (1805) in twenty-two sheets on a scale of approximately 1:85,000.[11] Farther south Swabia appears upon a map of the French Dépôt de la Guerre, 1818, in twenty sheets, scale 1:100,000.[12] For the region about Darmstadt, that part of Hesse lying between the Rhine, Main, and Neckar, we have the largest-scale map of the collection with the exception of certain city plans and battle maps. This is undated;

[7] "Carte topographique et militaire de l'Allemagne en 204 feuilles publiée par l'Institut Géographique à Weimar, 1807–1813."

[8] "Supplement oder Erweiterung nach Westen der topographisch-militairischen Charte von Teutschland in 204 Sectionen unternommen von dem Geographischen Institute zu Weimar, 1814."

[9] "Gantz neue und vollstaendige geographische General-Charte vom gantzen Churfürstenthum Sachsen . . . Diese Carte ist angefertiget und gezeichnet in den Jahren des jetzt glückl. geendigten Krieges 1759, 60, 61, 62, und 1763, von dem Königl. Preussischen Ingenieur-Obristlieutenant Petri."

[10] "Situationscharte von einem Theile des Churfürstenthums Sachsen, der Ober-Nieder-Lausitz und Schlesiens; nebst denen Stellungen, Bataillen und Gefechten, die zwischen den kaiserl. kön. und königl. preussischen Armeen, besonders in den letzten Jahren des siebenjährigen Krieges, in diesen Gegenden vorgefallen sind." The date appears on the index on sheet VIII, "Bach sc. Dresden 1804"; and on sheet X is "1805."

[11] "Topographische Karte in XXII Blaetter den grösten Theil von Westphalen enthaltend, so wie auch das Herzogthum Westphalen und einen Theil der Hannövrischen, Braunschweigischen und Hessischen Länder. Nach astronomischen und trigonometrischen Orts-bestimmungen . . . herausgegeben von General Major von Le Coq im Jahr 1805, geschrieben und gestochen von Carl Jäck in Berlin." On the trigonometrical survey upon which this map was based, see W. Stavenhagen; Die geschichtliche Entwickelung des preussischen Militär-Kartenwesens, *Geogr. Zeitschr.*, Vol. 6, 1900, pp. 435–449, 504–512, and 549–565; reference on p. 446.

[12] "Carte topographique de l'ancienne Souabe et d'une portion des pays limitrophes, commencée en 1801 par les soins du Général Moreau; exécutée au Dépôt de la Guerre à l'échelle d'un mètre pour 100 000 mètres . . . , Paris, MDCCCXVIII." See Berthaut, *op. cit.*, Vol. 1, pp. 156–158.

the scale is approximately 1:30,000; it was made by Lieutenant Haass before 1804.[13]

The Harrison collection includes a number of exceptionally interesting specimens of the cartography of the Alpine region. The entire Alps are covered by maps, the work of General Jomini (1:512,000)[14] and of Arrowsmith (1:512,000);[15] on a larger scale by Bacler Dalbe's great map of the Alps and Northern Italy dating from 1798 (1:259,200; thirty sheets joined to make eighteen).[16] The western Alps, Piedmont, Lombardy, and Liguria appear on Raymond's twelve beautiful sheets (1:200,000) dating from 1820.[17] Switzerland is the subject of the "Atlas suisse," 1786–1802,[18] in sixteen sheets (1:115,200), and the Tirol is depicted on a scale of approximately 1:140,000 upon a map of the French Dépôt de la Guerre (six sheets, 1801)[19] based upon the earlier surveys of Anich and Hueber.

[13] The title on the first sheet is "Iter Bogen der angekündigten Situations Charte, aufgenommen und gezeichnet durch Haass Artillerie Lieutenant zu Darmstadt, gestochen von G. Felsing in Darmstadt." A work of triangulation was carried out between 1804 and 1808 to provide a trigonometrical net for this map which was already in existence at the time. See Emil von Sydow: Der Kartographische Standpunkt Europa's am Schlusse des Jahres 1856 mit besonderer Rücksicht auf den Fortschritt der topogr. Spezialarbeiten, *Petermanns Mitt.*, Vol. 3, 1857, pp. 1–24, 57–91; reference on p. 72.

[14] "Carte générale de la chaine des Alpes contenant la haute Italie, la Suisse, et l'Allemagne méridionale dressée pour l'intelligence de l'histoire des Guerres de la Révolution par le Général Jomini," 4 sheets, undated.

[15] "Map of the Alpine Country in the South of Europe," London, 1804, 4 sheets. Though no natural scale is stated upon this map, the scale is the same as that of Jomini's map, of which it would seem to be a not altogether accurate copy.

[16] "Carte générale du théâtre de la guerre en Italie et dans les Alpes depuis le passage du Var le 29 7bre V. S. jusqu'à l'entrée des francais à Rome le 22 pluviose an 6me Répain avec les limites et divisions des nouvelles Républiques, par Bacler Dalbe". . . , Milan, Year 6 [1798]. Stavenhagen, Skizze, p. 286, gives the scale of this map as 1:259,265 (= 1 *ligne* pour 300 *toises*), which would seem to be an error for 1:259,200. Berthaut, *op. cit.*, Vol. 1, p. 136, states that this map was published in 1801 on a scale of 1:256,000, both of which figures would seem to be erroneous.

[17] "Carte topographique militaire des Alpes, comprenant le Piémont, la Savoye, le Comté de Nice, le Vallais, le Duché de Gênes, le Milanais et partie des états limitrophes, dressée à l'échelle d'un mètre pour 200000 mètres par J. B. S. Raymond" . . . , Paris, 1820. See Stavenhagen, Skizze, p. 146; Berthaut, *op. cit.*, Vol. 1, p. 155.

[18] This map was made at the expense of J. R. Meyer of Aarau by J. H. Weiss of Strasbourg and J. E. Müller of Engelberg. See Stavenhagen, Skizze, pp. 53–54, and Siegmund Günther: Geschichte der Erdkunde, Leipzig and Vienna, 1904, p. 186, footnote 10.

[19] "Carte du Tyrol vérifiée et corrigée sur les Mémoires de Dupuits et la Luzerne et réduite d'après celle d'Anich et Hueber, publiée en l'an 9 [1800–01] par le Dépôt Général de la Guerre." Berthaut, *op. cit.*, Vol. 1, p. 167, followed by Stavenhagen, Skizze, p. 18, gives the scale of this map as 1:140,308, or $\frac{5}{6}$ *ligne* to 100 *toises*. Neither cites his authority for these figures. If the *ligne* and *toise* here referred to are the same units as the *ligne* and *toise* referred to in connection with the Cassini, Capitaine, Ferraris, and other maps, $\frac{5}{6}$ *ligne* to 100 *toises* would be a scale of 1:138,240. Sydow, *op. cit.*, p. 59, footnote 170, gives the scale of

For Italy as a whole we have Bacler Dalbe's map of the northern part of the peninsula referred to in the preceding paragraph and his southern Italy [20] in twenty-four sheets upon the same scale, 1802. For southern Italy there is also an Arrowsmith map dating from 1807 (with additions to 1821),[21] and, for Piedmont, there is Giuseppe Momo's map [22] of 1819 on a scale of roughly 1:310,000 (four sheets).

Besides the sheets of the Weimar Institute and the French map of the Tirol already mentioned, the Harrison collection includes some other important maps of the domains of the Austrian Empire. Bohemia is the subject of the earliest item of all,[23] that of Müller, dating from 1714–1720, in twenty-five sheets on a scale of 1:360,000. Hungary is covered by two handsome maps, one of 1769 (approximate scale 1:360,000; four sheets),[24] and one of 1806 (scale 1:469,472; twelve sheets).[25] Moravia and Austrian Silesia appear on a map by Bayer dating from 1818 (approximate scale 1:190,000; four sheets).[26]

Poland is represented by three topographical maps. The oldest of these is a somewhat sketchy piece of work of 1770 in twenty-five sheets and is on a scale of approximately 1:500,000.[27] Far superior

this map as 1:140,000. See B. Mazegger: Peter Anich und Blasius Hueber und deren Karte von Tirol, *Zeitschr. Deutschen und Oesterreichischen Alpenvereins*, Vol. 12, 1881, pp. 164–170.

[20] "Carte générale des royaumes de Naples, Sicile & Sardaigne, ainsi que des isles de Malte & de Goze, formant la seconde partie de la Carte générale du théâtre de la Guerre en Italie et dans les Alpes, par Bacler Dalbe" . . . , Paris, . . . "deposée à la Bibliothèque Nationale, en pluviose, an 10" [1802]. See Stavenhagen, Skizze, p. 286.

[21] "Map of South Italy and Adjacent Coasts by A. Arrowsmith, 1807, . . . additions to 1821."

[22] "Carta corografica degli stati di terra ferma di S. M. il Re di Sardegna . . . delineata dal regio ingegnere topografo Giuseppe Momo . . . ," Turin, 1819.

[23] "Mappa chorographica novissima et completissima totius Regni Bohemiae 1 : 137,000, in duodecim circulos divisae cum comitatu Glacensi et districtu Egerano." Title from Stavenhagen, Skizze, p. 17; title sheet missing in the set in the Harrison collection.

[24] "Mappa geographica novissima regni Hungariae divisi in suos comitatus . . . dedicata . . . Mariae Theresiae . . . et Iosepho II . . . promotore excellentissimo domino generali campi mareschallo et consilii aulae bellici praeside comite Mauritio à Lacy . . . anno 1769."

[25] "Mappa generalis regni Hungariae partiumque adnexarum Croatiae, Slavoniae et confiniorum militarium magni item principatus Transylvaniae . . . quam honoribus . . . Josephi Archiducis Palatini dedicat Joannes de Lipszky," Pesth, 1806. Stavenhagen, Skizze, p. 24, gives the scale of this map as 1:480,000; Sydow, *op. cit.*, p. 62, gives it as 1:469,472. Estimating from the grid of co-ordinates, the latter figure would appear to be more nearly correct.

[26] "Karte des Maehr. Schles. Gouvernements nach den neuesten astronomischen Beobachtungen und geometrischen Vermessungen verzeichnet . . . von Joseph Bayer." Elsewhere on the map: "Gestochen von F. Reisser in Wien 1818."

[27] "Regni Poloniae magni Ducatus Lituaniae Nova mappa geographica, concessu Borussorum regis . . . C. B. Glassbach sculpsit Berolini 1770." The following title is given in Stavenhagen, Skizze, p. 198, and would seem to refer to

from the scientific point of view is Rizzi Zannoni's map of Poland of 1772 (approximate scale 1:700,000; twenty-four sheets).[28] That part of Poland which was given to Prussia at the Second Partition, 1793, and which consisted of what was later the province of Posen and a portion of Congress Poland, was called South Prussia by the Prussians. This region is represented on Gilly's map dating from 1802–1803 (approximate scale 1:150,000; thirteen sheets).[29]

Finally mention must be made of Lapie's great map of European Turkey,[30] 1822, (1:800,000; fifteen sheets joined to make six), the first really satisfactory map of the Balkan Peninsula.

Grouping these maps according to scales, we find that all of France, Belgium, northwestern Germany, the Grand Duchy of Hesse, and the southern part of the Electorate of Saxony are shown on scales larger than 1:100,000 (1.58 miles to an inch), that is to say on scales large enough to permit the representation of relatively insignificant articulations of the drainage pattern, the meanders of small streams, and lesser variations in the relief. These scales are likewise large enough to show individual buildings in open country, churches, windmills, mines, farms; also the size and shape of settlements and the extent of the built-up areas of towns, villages, or hamlets. Virtually all local names may be given on maps of this scale together with the detailed character of vegetation: heaths, forests, marshes, cultivated ground. All roads, as well as many paths and trails, may be represented.

For the whole of Germany, Austria, Bohemia, Moravia, Styria, Carinthia, Switzerland, the Tirol, Lombardy, Pied-

a closely related map: "Regni Poloniae magni ducatus Lituaniae provinciarum foedere et vassallagio illis junctarum et regionum vicinarum nova mappa geographica," by J. J. Canter, 1 : 520,000, twenty-five sheets, Regensburg, 1770.

[28] "Carte de la Pologne divisée par provinces et palatinats et subdivisée par districts . . . dédiée à son altesse royale le prince Charles de Pologne . . . par . . . J. A. B. Rizzi Zannoni . . . 1772."

[29] "Special Karte von Südpreussen mit allerhöchster Erlaubniss auf der königlichen grossen topographischan Vermessungs-Karte unter Mitwürkung des Directors Langner, reducirt und herausgegeben vom Geheimen Ober Bau-Rath Gilly . . . 1802 u. 1803."

[30] "Carte générale de la Turquie d'Europe en XV feuilles dressée sur des matériaux recueillis par Mr. le Lieutenant-Général Comte Guilleminot, Directeur Général du Dépôt de la Guerre et Mr. le Maréchal de Camp Baron de Tromelin, Inspecteur Général d'infanterie par le Chev. Lapie . . . ," Paris, . . . 1822. See Stavenhagen, Skizze, pp. 313–314.

mont, Liguria, and parts of Silesia, Poland, and Holland there are maps on scales of 1:100,000 to 1:200,000 inclusive (1.58 to 3.16 miles to an inch). These depict all villages and many hamlets, the size and shape of towns and cities, all main and many secondary roads, and something of the general character of the countryside, whether forested or open, marshland or mountain.

For all of Italy we have maps on a scale of 1:259,200 (about 4.1 miles to an inch); all of Hungary is depicted on maps of scales of 1:360,000 and 1:469,472 (5.68 and 7.5 miles to an inch), sufficiently large to show towns, the more important villages, and roads of the first class. Finally, the entire Balkan Peninsula and Poland are represented on scales between 1:500,000 (7.89 miles to an inch) and 1:800,000 (12.62 miles to an inch).

In short, most of Europe west of Russia is depicted in the Harrison collection upon maps dating from before 1825 and on scales larger than one millionth; large parts of this territory are shown on much greater scales. A little reflection will bring to mind many interesting investigations which the historian or natural scientist might pursue using these maps as a part of his source material. Let us examine some services that these or any similar group of early topographical maps may render more particularly to the military historian and to the geographer, first noting what they actually reveal of topography and cultural features and, in the second place, regarding them as illustrations of stages in the evolution of cartography.

Topographical and Cultural Features Shown

In this connection we use the term topography to denote the physical and vegetational elements in the landscape, culture to denote the works of man.

Though the fundamental physical features of Europe have remained fairly constant during the last few centuries, the human geography of that continent has been greatly al-

FIG. 1—The vicinity of Dortmund in the Ruhr region, 1805.

FIG. 2—The vicinity of Dortmund in the Ruhr region, 1901.

tered. Provided the same facilities for survey and drafting had been available at all three dates, a carefully executed map of almost any inhabited part of western Europe as it was in 1800 would probably differ less from a map of the same area in 1400 than it would from a map of the same area in 1924. The Industrial Revolution has wrought a profound transformation in the appearance of the earth's surface as expressed upon a large-scale map. Railways, canals, and new roads have been built; new towns have sprung into being, and old ones have been vastly enlarged; forests have been cleared, valleys converted into reservoirs, and marshes drained.

The military historian of all but the latest wars should never rely upon modern maps alone for following the events of a campaign. The modern map reveals a multitude of confusing details which were not in existence at the time he may be studying. And yet the older maps are not altogether sufficient because of faulty topography, crudities in the representation of relief, and other inaccuracies. The serious student of the strategy of a Frederick or a Napoleon so far as possible should have before him *both* contemporary and modern maps of the various regions over which the campaigns of their generals were fought.[31]

Among geographers, even the specialist in physiography may profit from the study of old maps of large scale. Comparison of a chronological series of such maps for a particular area may well display successive changes in topography, in the configuration of shore lines and the course of rivers, in the growth of alluvial deposits, the building of deltas, or the conversion of ponds into marshland. More striking, however, are the services such maps may render toward an understanding of the human geography of a region. They furnish a means of tracing the evolution of various human elements. Economic,

[31] The fact that the Harrison collection is housed in the building of the American Geographical Society where students may make use of the Society's extensive files of modern maps adds materially to its practical value for purposes of research.

political, and social forces operating in different historical epochs have all inscribed their record upon the earth's surface. The cultural features, therefore, which appear upon a modern map are an elaborate complex of the old and the new. Two roads are represented, each shown by the same symbol. One is an eighteenth century highway: its neighbor was built but yesterday to a newly opened mine. How are you to tell the difference? A series of old maps should help us answer this question by giving a short cut to a chronological analysis. By means of early maps we may segregate the composite human elements of a region according to their approximate dates. If, in addition, we know something of the history of the region, the maps should go far toward enabling us to interpret directly the facts of present-day geography in the light of the historical events and movements which have produced these facts. And no study of human geography is worthy of the name which ignores the historical factor.

Careful comparison of some of the sheets of the Harrison collection with modern maps is remarkably instructive. For the sake of illustration we have reproduced in Figures 1 and 2 respectively the portions of Section 15 of von Le Coq's map of Westphalia, 1805, and of the Prussian Landesaufnahme map, 1901, Sheet 355, showing Dortmund and its neighborhood to the north. On the earlier sheet the town appears as a small, oval city, without suburbs. The later survey shows the nucleus of the old walled town still clearly in evidence but completely surrounded by the larger city of modern times. The built-up parts of neighboring villages have grown, and some have become suburbs of the city. Canals, railways, and new roads are everywhere in evidence. In the northern part of the map an entirely new village, Königsheide, with rectangular streets has appeared in country that the earlier map represents as heath. These are the facts presented by the maps. For the explanation of these facts we must look to the history of a century of industrial growth in the Ruhr valley;

for the explanation of Königsheide, perhaps, to the town-planning movement of the nineteenth century.

The cartograms (Figs. 3 and 4) are a series of plans of the vicinity of Brussels, all drawn on the same scale from old and recent maps in the possession of the American Geographical Society.[32] These tell vividly the story of Brussels' growth from the sixteenth to the twentieth century. Even if we have no knowledge of the detailed history of Brussels, much may be inferred from these cartograms in explanation of its present urban geography. The positions of certain of the narrower streets of the city were obviously determined by the position of the inner circle of fortifications shown in the cartogram of "ca.1550;" the encircling boulevards, as in Paris, replaced the outer ring of fortifications. The Industrial Revolution and the creation of Brussels as capital of an independent Belgium brought an increase in population in the nineteenth century, shown on the maps by a wide expansion of the built-up areas in all directions far beyond the boulevards.

The Maps as Illustrating the Development of Cartography

The evolution of cartography has been a long and complicated process. Though many studies of its history have been

[32] The cartograms were drawn from the following sources: "Ca.1550" from Jacques de Deventer's plan of the city (scale approximately 1:8650) as reproduced in "Atlas des villes de la Belgique au xvie siècle: Cent Plans du géographe Jacques de Deventer exécutés sur les ordres de Charles-Quint et de Philippe II," No. 9, Institut National de Géographie, Brussels, no date. "Ca.1670" from an undated plan (scale approximately 1:6000) by Frederick de Wit in an atlas of maps and plans with engraved title page bearing the inscriptions "Atlas. Amstelodami ex officina Jacï. de la Feuille. Cum Privilegio Ordinum Hollandiae et Westfrisiae. P. Harrewyn inv: et fecit 1685." De Wit produced many maps and plans during the last part of the seventeenth century and early years of the eighteenth. "1777" from "Plan Topographique de la Ville de Bruxelles et de ses environs . . . gravée par L. A. Dupuis géographe en 1777" (scale approximately 1:5200) forming Plate XXI of "Carte chorographique des Pays-Bas autrichens . . . par le Comte de Ferraris." "Ca.1860" and "ca.1871" from undated plans (scale approximately 1:14,500) in Bradshaw's "Continental Railway Guide" of about the period. The changes shown in the plan "ca.1871" were made between 1867 and 1871. "1890" from map of "Bruxelles et ses environs" (1:40,000) of the Belgian Institut Cartographique Militaire.

The built-up areas have been deduced from the maps and plans upon which the cartograms were based and cannot, of course, be regarded as altogether accurate in details.

published, the spirit animating most of their authors has been that of the collector or "cartobibliographer." Regarded broadly the history of cartography as an art and science is still more or less a virgin field. The maps of an age depict its intellectual character almost as faithfully as painting or sculpture reflect its imaginative and artistic impulses. Furthermore, the cartography of Europe since the seventeenth century has been closely bound up with specific events and movements in the political, military, and scientific spheres. From the technical point of view a multitude of factors have contributed to the progress of map making: improved field methods, inventions of new projections and methods of showing relief, increased skill in draftsmanship and reproduction.

All of these aspects of the history of European cartography might profitably be studied in the maps of the Harrison collection. In the present booklet we make no attempt to go into the matter more than superficially or to do more than indicate a few of the many highly interesting and profitable lines of investigation that could well be pursued. For historical details the writer owes much to Stavenhagen's important monograph referred to in footnote 4, above.

Most of the Harrison maps were made primarily for military purposes, for use in planning and in conducting campaigns and in studying the operations of former wars. Military requirements, indeed, have supplied a foremost incentive to the evolution of topographical surveying in Europe. Until the present day the best topographical maps of nearly all countries but the United States are those made and published by military agencies. Changes in the art of war have exerted an influence upon the evolution of cartography second only to the influence flowing from advances in the realm of pure science.

EXPLANATION OF FIGURES 3 AND 4—Fine single lines indicate streets that have been continuously in existence since 1550. Double lines represent important streets and boulevards of subsequent date. Heavy single lines are fortifications. Dotted lines are the routes of former fortifications. Fine single lines parallel to dotted lines are boulevards following the trace of demolished fortifications. Heavy cross-hatched lines are railroads. Shading indicates built-up areas. Isolated houses in the country are shown only on the cartogram "ca.1550." See above, footnote 32.

FIG. 3.—Brussels, ca. 1550, ca. 1670, 1777. For explanation see foot of p. 15.

FIG. 4—Brussels, ca.1860, ca.1871, 1890. For explanation see foot of p. 15.

Maps Dating from Before 1789

Admirable so far as they go, the earlier maps of the Harrison collection reveal the backwardness of mid-eighteenth century cartography when judged by the standards of the immediately succeeding epoch. Their primary defects are, first, the insufficiency—sometimes the total lack—of astronomically and trigonometrically determined points as a basis for topographical detail and, second, the primitive character of the representation of relief. Investigations pursued for purely scientific purposes developed methods that ultimately eliminated the first of these defects. Military necessity demanded and to a large extent effected the elimination of the second. By the time of the French Revolution astronomical and trigonometrical surveys had been carried out in many parts of Europe and notable progress was being made toward the improvement of the representation of relief. All this, together with added skill in the technique of copperplate engraving, was apparent in the quality of the finished products.

The oldest item in the collection is Johann Christoph Müller's map of Bohemia.[33] Though based neither upon astronomically calculated points nor upon triangulation, these sheets remained authoritative until as late as 1799. They remind us of the cartography of an earlier age, of sheets of some of the great Dutch atlases of the sixteenth and early seventeenth centuries. Degrees of latitude and longitude and their subdivisions are shown around the margin, but there is no grid upon the maps themselves. Relief is indicated by rounded molehills in perspective (Fig. 5). No one of these hills differs greatly in shape or size from any of the others. Purely conventional symbols indicating rolling or mountainous country, they fail entirely to bring out the quality of the relief. Woods are shown by neat symbols representing trees in perspective. There are some forty signs differentiating various works of man: for example, three grades of cities, five types

[33] See above, p. 7 and footnote 23.

FIG. 5—Part of the Erz Mountains as shown on Müller's map, 1714–1720.

of villages, ten kinds of mines, six kinds of mills; on the other hand, but one quality of road is shown. The lettering and general draftsmanship are clear, and the spaces in the corners and along the edges are decorated with attractive allegorical figures and Bohemian landscapes.

The lack of good military maps during the Seven Years' War was severely felt in Austrian army circles.[34] Under Maria Theresa and Joseph II extensive and important surveys of Austria and Hungary—some on a very large scale—were undertaken to make good this want. Lacy's "Hungary,"[35] 1769, was constructed as a general military map of that kingdom. As with Müller's "Bohemia" a slightly archaic atmosphere lingers about Lacy's map, handsome piece of work that it is. There is no grid of geographical co-ordinates, degrees, but not fractions thereof, being marked upon the margins only. Relief, on the other hand, is represented by hachures instead of molehills, though unrealistically and with almost as little sense of topographic form as in Müller's work. Mountain ranges are shown in the traditional caterpillar style occasionally to be found even to this day upon cheap commercial maps. Forests, swamps, sandy areas, and similar surface features are indicated; also the positions of various military units from generals' headquarters down to the posts of small detachments of frontier guards (*vigiliae confinariae*). Military influence is further revealed by the differentiation of no less than four types of roads and routes. The lettering is less strikingly bold than that of Müller.

Intrinsically more interesting but not so pleasing to the eye by reason of its overcrowding of detail is Rizzi Zannoni's "Poland," 1772.[36] This shows Poland as it was just prior to the First Partition in 1772 when the boundaries of the kingdom extended south to the Carpathians and Ukraine and east-

[34] See Stavenhagen, Skizze, p. 18. On Prussian cartography at the time of the Seven Years' War and after, see Stavenhagen, Die geschichtliche Entwickelung, pp. 441–445.

[35] See above, p. 7 and footnote 24.

[36] See above, p. 8 and footnote 28.

ward beyond the Dnieper and almost to the gates of Smolensk. The will to scientific precision appears to have animated the compiler, a well known geographer of his day and at one time official cartographer of the Kingdom of the Two Sicilies.[37] Topography is revealed in detail but not very clearly. Relief is indicated by mountains and hills in perspective somewhat as upon Müller's "Bohemia" and without much greater sense of form. The explanatory text is in French and Polish. No less than fourteen graphic scales are provided, showing Lithuanian, Polish, Russian, Tatar, Hungarian, Turkish, and English miles; also versts, leagues, and other units. A refinement of scholarship appears in the southeastern part of the map, where numerous place names of the Tatar steppes are given in the Tatar (Arabic) as well as in the Latin alphabet. A note states that the names of all places of which the latitudes and longitudes had been astronomically determined are underlined twice, those for which latitude alone had been determined are underlined once; but close examination discloses very few places of either class. Important centers like Riga, Vilna, Warsaw, Breslau, and Lublin are not underlined.

Before the middle of the eighteenth century methods of finding longitude by astronomical means were still more or less primitive, surveying instruments were crude, and the art of triangulation was in its infancy. Throughout a hundred and fifty years before this time, however, the scientific world had been deeply occupied with the problem of determining the size and shape of the earth. The origins of modern topographical methods may be attributed in part at least to methods developed in the course of investigations aiming at the solution of this problem. To determine the circumference of the earth one may measure as precisely as possible the length of a terrestrial degree of latitude or arc of the meridian. This

[37] See Attilio Mori: Cenni storici sui lavori geodetici e topografici e sulle principali produzioni cartografiche eseguite in Italia dalla metà del secolo XVIII ai nostri giorni, Florence, 1903, pp. 24–29.

may be done directly with chain or wheel.[38] It may also be determined indirectly and with a greater degree of accuracy by triangulation from a precisely measured base. Between 1530 and 1540 Gemma Frisius had proposed that triangulation might be used to fix the relative positions of certain towns in Belgium.[39] Inspired by this suggestion, Willibrord Snellius employed triangulation in his measurement of an arc of meridian in Holland in 1615.[40] Triangulation was used in the construction of a map of Württemberg in 1634–1635 [41] and was adopted by the great French astronomer Jean Picard to measure an arc from Paris to Amiens in 1669–1670.[42] It was employed for the measurement of arcs in Peru and Ecuador and in Lapland (1736–1743) during the famous expeditions sent out by the French Academy of Sciences to ascertain whether the earth is flattened or elongated at the poles and thereby to test the validity of Newton's then recently proposed hypothesis.[43] By comparison of the results of these measurements the fact was established that the earth is an oblate spheroid.

Further trigonometrical surveys for the purpose of correcting Picard's geodetic work in France and of checking the Lapland measurements were destined to be of great moment in the history of cartography. These were the surveys carried out by César François Cassini de Thury during the late thirties and early forties of the eighteenth century. This Cassini was third of a celebrated line of no less than five successive fathers and sons whose brilliant and accurate work

[38] Dr. Jean Fernel, early in the sixteenth century, undertook to measure an arc between Paris and Amiens by counting the rotations of a wheel. See Stavenhagen, Skizze, p. 123.

[39] In a short treatise, "Libellus de describendorum locorum ratione," which was inserted in Gemma Frisius' editions of Apian's "Cosmographia" after that of 1529. See *Geogr. Rev.*, Vol. 13, 1923, pp. 325–326.

[40] This measurement is described in Snellius: Eratosthenes Batavus, seu de terrae ambitus vera quantitate suscitatus, Leiden, 1617. See also Stavenhagen, Skizze, p. 105.

[41] Hermann Wagner: Lehrbuch der Geographie, 10th edit., Vol. 1, Part I, Hanover, 1920, p. 92.

[42] See Berthaut, *op. cit.*, Vol. 1, pp. 18–23; Stavenhagen, Skizze, p. 125.

[43] See Günther, *op. cit.*, p. 200, for a brief discussion with references.

in the fields of astronomy, mathematical geography, and biology added distinction to French science throughout a period of nearly two hundred years.[44] During Louis XV's campaign of 1746–1747 in Flanders, Cassini de Thury was engaged in surveys intended to connect a network of triangles previously established by him in France with Snellius' network in Holland. Military engineers meanwhile were at work upon topographical maps for which Cassini provided the trigonometric points. These maps, Cassini himself tells us,[45] were shown to the king during a grand review. Delighted with them, Louis exclaimed: "Je veux que la carte de mon royaume soit levée de même, je vous en charge, prévenez M. de Machault" (controller-general at the time). Louis' encouragement and interest marked the inception of the first great trigonometrical survey of a European state. For many years thereafter the energies of Cassini and of his son who followed him in the work were devoted to the carrying out of Louis' instructions, though innumerable vicissitudes intervened before all the plates were finally completed in 1793; and, indeed, the later sheets were not published until 1815. After the Seven Years' War, which necessitated the withdrawal of governmental aid, the survey was sponsored by the Academy of Sciences, and Cassini's map consequently is known as "Carte générale de la France, dite de l'Académie."

The influence of the Cassini map was very great: indirectly it inspired the making of accurate maps in other parts of Europe than France; directly it was amplified and corrected by various maps based upon or in extension of it. The results of this influence are well illustrated in many of the other items of Mr. Harrison's gift.

One of these is a great map of the Austrian Netherlands

[44] See J. C. Poggendorff: Biographisch-literarisches Handwörterbuch zur Geschichte der exacten Wissenschaften, 2 vols., Leipzig, 1863; reference in Vol. 1, cols. 388–393; Ludovic Drapeyron: La vie et les travaux géographiques de Cassini de Thury, auteur de la première carte topographique de la France, *Rev. de Géogr.*, Vol. 39, 1896, pp. 241–251; Berthaut, *op. cit.*, Vol. 1, pp. 1–70; Stavenhagen, Skizze, pp. 133–139.

[45] See Berthaut, *op. cit.*, Vol. 1, pp. 16–17.

the surveys for which were carried out under the direction of Count Joseph de Ferraris between 1770 and 1777.[46] A note upon the map explains in French "Since this map is a continuation of the Map of France [Cassini] and the latter has served as the base for its planning [*direction*], it has been necessary to give it the same scale, that is 1 *ligne* to 100 *toises* [1:86,400]." Colonel Hennequin points out that it was mainly due to the personal interest which the Empress Maria Theresa took in the work that Count Ferraris was able to push the surveys through to completion.[47] When once authorized, the maps were completed "with a speed of which there is no other example and which remains even to the present day [1891] a subject of astonishment."[48]

Perhaps because of this very speed the triangulation was not altogether satisfactory. The map itself, however, is a truly exquisite product of the draftsman's art and engraver's skill (see Fig. 6). As on the Cassini map, instead of a grid of the usual geographical co-ordinates, lines showing the distance in *toises* from great circles running at right angles east and west and north and south through the Paris observatory are given. The projection is the same as that of the map of France.[49] Few modern maps can compare with Ferraris' in clarity and taste of lettering. The sheets of Cassini's "Carte de France" look crude beside it. The quantity and variety of conventional symbols are enormous, every feature of the landscape being represented by a neatly drawn and highly appropriate sign. No less than seven grades of "human agglomerations"—to use the apt phrase coined by French geographers—are shown, from fortified cities to "hamlets without churches;" special symbols differentiate abbeys for

[46] See above, p. 4 and footnote 6.

[47] Hennequin, *op. cit.*, pp. 16–23.

[48] *Ibid.*, pp. 23–24.

[49] See the "Explication de la carte" forming Sheet 1; see also Hennequin, *op. cit.*, pp. 94–96. For the projection of the Cassini maps, a modified cylindrical projection in which the cylinder is conceived to be in contact with the spheroid, not along the equator but along the meridian of Paris, see Berthaut, *op. cit.*, Vol. 1, pp. 43–47.

FIG. 6—The vicinity of Louvain as shown on Ferraris' map, 1777.

men from abbeys for women and both of these from convents for men and for women. Isolated houses, roadside crosses, towers, three kinds of windmills (masonry, wooden, and wooden with habitation) are all designated, and the main highways are distinguished from secondary roads. In its wealth of detail, especially in its greater fullness in the network of roads, Ferraris' map was far superior for military purposes to the map of Cassini. The representation of relief seems somewhat more realistic on the Belgian sheets, though on both maps this is the weakest feature: on both, the tracery of the hachures makes the streams appear to flow in shallow troughs with flat-topped areas of plateau between. Finally, two interesting features of the Ferraris map deserve brief notice. One is a large-scale plan of Brussels that forms Sheet 21 and shows streets, gardens, fortifications, and public buildings in fine detail[50]; the other, a magnificent picture (Sheet 16) of the presentation of the map to the Emperor Joseph II against a wide background revealing a military encampment on a vast plain.

During the French Revolution the copper plates of the Ferraris map, which had been hidden in a cellar in Brussels, were brought to light and taken to Paris by the French. Copies were in great demand at the time of the campaign of 1814 when it is recorded that generals in the Allied armies gave as much as six hundred francs for a set.[51] The map remained authoritative for Belgium until about 1830. It cannot fail to be of value to students of the French campaigns in the Low Countries during the Revolutionary Wars and era of Napoleon, and it is probably the best contemporary map for following the strategy and tactics immediately before and after Waterloo.

[50] For a diagrammatic outline of the main features shown on this plan, see Figure 3, cartogram "1777."

[51] Hennequin, *op. cit.*, p. 106.

Public interest has recently been aroused in Ferraris' work because in accordance with the terms of the Treaty of St. Germain-en-Laye, 1919, Austria has restored to Belgium one of the three original sets of the manuscript map. See Albert Tiberghien: La carte chorographique des Pays-Bas autrichiens par le comte Jos. de Ferraris, *Bulletin Officiel, Touring Club de Belgique*, Vol. 28, 1922, pp. 524–526, and review of this article in *Geogr. Journ.*, Vol. 61, 1923, pp. 464–465.

Maps of the Period After 1789

The outbreak of the French Revolution was not marked by any sudden change in the character of cartographic representation. None the less it ushered in a new period in the history of cartography. With the wars of the French Revolution and Napoleon the formal tactics of the preceding epoch, when bodies of troops in close order were maneuvred about each other like chessmen, gave way to more individualistic tactics. Greater initiative was expected of those in command of small units and of the private soldier. In place of refined, geometric conceptions was substituted a closer adaptation of the tactics of each particular engagement to the particular conditions prevailing—conditions determined by the numbers and equipment of the troops, by their morale and leadership, and especially by the terrain. More precise and powerful small arms and artillery added urgence to the need of an accurate understanding of terrain, particularly in the matter of cover, and this expressed itself in a demand for better topographical maps and especially in a demand for maps showing relief with greater realism. Moreover, quite apart from tactical considerations, as armies grew in size at the time of Napoleon and as campaigns were pushed ever farther afield, the requirements of troop movement and transport could only be satisfied by better maps. It is significant that in France in 1793 the plates of Cassini's maps were taken over from the Academy by the military authorities (Dépôt de la Guerre). Under the Directory, the Consulate, and the Empire, military engineers were assigned the tasks of carrying out detailed surveys throughout most of western and central Europe. Similarly in the lands hostile to France these were years of feverish cartographic activity. The way was rapidly being prepared for the organization of the great national topographic surveys in the epoch soon to follow.

Contemporaneously with the production of Cassini's map of France—which, as we have seen, was protracted over a long

period—the need arose for a revised map on a more convenient scale. The Cassini map, with its one hundred and eighty sheets, was too bulky for many purposes, military and civil; and furthermore its defects, particularly in the representation of roads and relief, early became evident. A reduction of the "Carte de l'Académie" together with Ferraris' map of Belgium to a scale of 1:345,600, four times smaller, was published in 1790 by Louis Capitaine, who, during the latter years of the work, had been first engineer in charge of the Cassini surveys. Capitaine's map was the first to show the new administrative divisions of France into *départements*, *arrondissements*, *cantons*, and *mairies*.[52] Corrected by Belleyme between 1815 and 1821 and extended eastward to the Rhine and Alps, this map remained the principal medium-scale cartographic authority for France until 1840.[53]

For military purposes Capitaine's map was an improvement over Cassini's in spite of the smaller scale. Whereas only one type of road had been shown on the "Carte de l'Académie," three grades of highroads (*routes*) and one of secondary roads (*chemins*) are represented by Capitaine and Belleyme. Relief, especially in mountain regions, is drawn far more realistically than upon any of the maps we have been discussing so far. Darker shading on southeast slopes gives the illusion that light strikes the surface of the earth from the northwest and mountains thereby stand boldly forth. On the other hand, since no figures of elevation are supplied, it is impossible to tell the relative heights of mountains. The symbols for forests and for the works of man are generally the same as on the Cassini maps. No forests at all are depicted in the Alps, presumably for fear of overcrowding and spoiling the effect

[52] A rival map of France, the "Atlas national de la France" by Dumez and Chanlaire, was also published in 1790 and the years following. Its appearance provoked vigorous and spicy protests from the promoters of Capitaine's map, answered in equally strong language by Chanlaire. See Henri Mettrier: Un plan de division régionale de la France en 1790, *Bull. Section de Géogr. du Comité des Travaux Hist. et Sci.*, Vol. 37, 1922, pp. 149–203; reference on pp. 156–159. See also note in *Geogr. Rev.*, Vol. 14, 1924, p. 144.

[53] Stavenhagen, Skizze, p. 139.

of the relief. In the lower parts of France, as on earlier maps, one gets the erroneous impression of plateau surfaces intersected by troughlike valleys.

The firm of Aaron Arrowsmith in London was a leading commercial publisher of maps in the British Isles during the early years of the last century. Several of Arrowsmith's maps are included in the Harrison collection. They are clear, attractive, and easy to read, though they do not attain the standard of the maps of Ferraris or Capitaine. Arrowsmith's "Map of France" gives neither graphic nor natural scale, and the only way of determining distances upon it is by calculating them in minutes of latitude as indicated upon the margins. His "Map of the Alpine Country" is an inaccurate reproduction of Jomini's map. In spite of the good example which must have been furnished by the maps of Capitaine and others in the representation of relief, mountain ranges appear on Arrowsmith's sheets as caterpillars, and all mountains seem to have rounded summits.

The Harrison collection includes a map of Holland by Arrowsmith. The scale is large enough to show lesser topographical details, roads, dikes, *polders*, and canals. There is an inset "Map of the Triangles of Holland Executed in 1802, 1803, 1807, 1810 and 1811 by General Krayenhoff." The network of triangulation here shown was carried out by Cornelis Krayenhoff (1758–1840), general and minister of war under Louis Napoleon.[54] Stavenhagen asserts that it laid the foundations of the scientific cartography of the Netherlands; its extreme accuracy was demonstrated by later measurements.[55]

The topography of the Alps was a matter of particular concern to Napoleon. Through the western Alps ran the main lines of communication between France and her newly constituted vassal states in Italy. The central and eastern Alps formed the strategic barrier between Italy and the ever actively or potentially hostile Prussia and Austria.

[54] Poggendorff, *op. cit.*, Vol. 1, col. 1315.
[55] Stavenhagen, Skizze, p. 106.

Two maps of the Alpine region were prepared under the auspices of the French Dépôt de la Guerre. The first of these, the work of Bacler Dalbe, chief of Bonaparte's topographic bureau in northern Italy, shows the entire Alpine country and northern Italy from Alsace and Bavaria on the north to Rome on the south. Distinctively a military map, it displays (not altogether correctly[56]) the positions of the French and allied armies between 1792 and 1798 and includes a summary key to the movements of the armies during the campaigns of these years. Dalbe's map is also significant from the cartographic point of view. Mountain regions are indicated by hachures and shaded southeasterly slopes; in the higher regions the glaciers are tinted blue. According to Stavenhagen [57] this map and Dalbe's sheets for southern Italy remained the best representations of the Italian peninsula for a period of thirty years.

The second French map of the Alps was the work of the military engineer and captain of the corps of "Ingénieurs géographes," J. B. S. Raymond. Though not extending east of the Valtelline, it shows, besides the Alps proper, the plains of Lombardy and Piedmont and the Apennines north and northeast of Genoa. The scale (1:200,000) complies with specifications laid down in 1802 by a commission formed under the presidency of General Sanson for the purpose of bringing about uniformity of practice in the cartographic activities of the various map-producing bureaus of the French government.[58] Raymond's is a much more finished piece of work than that of Bacler Dalbe. The lettering is more delicate, and the draftsmanship as a whole is more elegant. Great skill is displayed in the representation of relief. It is indeed a far cry from the crude, medieval hills of Müller's "Bohemia" to the concise and realistic expression of Raymond's sheets, as skillfully drawn as any hachure map well could be. Raymond's work, however, is not wholly modern when we con-

[56] *Ibid.*, p. 286.
[57] *Ibid.*
[58] Berthaut, *op. cit.*, Vol. 1, pp. 137–143.

sider its complete lack of reference to measured altitudes.

Another set of maps of the Alps in the Harrison collection is worthy of note. The "Atlas suisse," 1786–1802 (Fig. 7), was the first really accurate scientific map of Switzerland based upon triangulation and precise measurements. Mountain summits determined by triangulation are indicated by small circles. The altitudes above sea level of the highest peaks in the Bernese Oberland, and of certain lakes and passes are given upon the general map of Switzerland in a table; upon the large-scale maps themselves the altitudes of various points in the Bernese Oberland are indicated in French feet above the level of Lake Thun. The latter figures are accurate, though an initial error of some sixty feet was made in calculating the level of Lake Thun. In general, northern Switzerland was mapped more correctly and in greater detail than the Valais, Ticino, and Grisons. The "Atlas suisse" was by all odds the best map of Switzerland before the famous Dufour surveys (1838–1865).

Representation of Relief

Enough has been said to show that a variety of means of indicating the irregularities of the earth's relief were employed in the different maps of the Harrison collection. In general, however, one of two main methods was adopted, though there were many different ways in which each method was executed and many transitional stages between the two.

According to the first, or oldest, method—which was the method of medieval cartographers—the observer is thought of as looking at the country obliquely from above; hills and mountains are drawn in perspective. This style of depicting relief was employed upon Müller's "Bohemia," Rizzi Zannoni's "Poland," and the Dépôt de la Guerre map of the Tirol. When skillfully executed, as upon the last-named map, the effect is extremely graphic, giving the impression of a bird's-eye view of the country. But what this method gains in pictorial beauty it loses in precision. At best it is unsatis-

factory for those who wish to acquire an exact understanding of the character of the relief. As has been suggested, the soldier in particular came to demand a more accurate means of representing slopes. Officers planning marches needed to know the gradients of roads and trails, to be able to tell from a map that wagons can follow this road, artillery that road, but infantry alone can cross this hill. Furthermore, only by maps upon which relief is accurately expressed is it possible for a leader to determine where his troops will find cover and where they will be enfiladed. As a consequence, the extraordinary improvement in the technique of relief on maps which took place during the century that we are considering was in the main the result of experiments carried out by army officers.

Petri's map of Saxony, drawn by a Prussian engineer officer at the time of the Seven Years' War, is said to have been the first map upon which the perspective method was replaced by the second manner of showing relief of which we have to speak.[59] The essential feature of this method is that the observer is conceived of as looking upon the country directly from above and that slopes are shown by hachures running up and down the gradient. The technique of representing relief by hachures, however, did not spring into existence full-fledged. It was hard to shake off the habit of showing mountains in perspective, and we have transitional stages in such maps as that of the Dépôt de la Guerre for the Tirol, Bacler Dalbe's northern Italy and the Alps, and even in the "Atlas suisse" where the feeling of perspective treatment lingered, though hachures were actually used (Fig. 7).

Though we may conceive of the observer as looking upon the country directly from above, it is also possible to think of the landscape itself as being illumined either from the zenith or from an oblique angle. In the first case the steeper slopes, no matter what direction they face, will appear to be darker than the gentler slopes which the light strikes more directly. These differences in illumination may be represented on a

[59] Stavenhagen, Die geschichtliche Entwickelung, p. 442.

FIG. 7—Part of Vallais as shown on the "Atlas suisse," 1786–1802.

map by hachures of varying thickness or in varying number to a given space. In 1799 a Saxon Major, Johann Georg Lehmann, published a book in which exact rules were laid down for representing relief in this manner.[60] Definite gradations in slope were indicated by definite styles of hachures, from thin, light, widely separated lines for gentle slopes, to thick, dark, closely spaced lines for steep slopes.

In the second case, where we think of the landscape as illumined by light from an oblique angle, the slopes away from the light will be darker; on a map they may be shown by thicker or more frequent hachures. Though less capable of absolute and scientific precision than Lehmann's method, this scheme makes possible an extremely realistic portrayal of the relief. There is danger, however, that the darker slopes will be mistaken for the steeper, though this danger is not necessarily present in every case. On the beautiful French Dépôt de la Guerre map of Swabia for instance (Fig. 8) the hachures are so skillfully manipulated that although the southeastern slopes are darker, they do not seem steeper than more lightly shaded northwestern slopes except where that effect is intended.

In looking over the Harrison maps we find examples of both vertical and oblique lighting. The Germans seem to have preferred the vertical, which appears in Haass' map of Hesse, in von Le Coq's Westphalia, and in "Situationscharte von einem Theile des Churfürstenthums Sachsen." Among the Swiss and French, on the other hand, there were many partisans of oblique illumination. This was the method used on the "Atlas suisse" and on the maps of Capitaine, Raymond, Bacler Dalbe, and the Dépôt de la Guerre map of Swabia. Somewhat later it was adopted upon the famous and beautiful map of Switzerland (1:100,000) known as the Dufour map. The French engineers and artillery officers, however, were advocates of vertical illumination; in 1826 a topographic commission made up of representatives of the

[60] Darstellung einer neuen Theorie zur Bezeichnung d. schiefen Flächen, Leipzig, 1799.

FIG. 8—The region south of Ulm as shown on the French Dépôt de la Guerre map of Swabia, 1818.

various map-producing services of the French government, officially approved of the vertical method for maps of a larger scale than 1:100,000.[61]

By all odds the most satisfactory method of representing relief, next to the use of models, is by means of contour lines. This method had been invented and used upon a map showing the bed of a stream as early as 1728.[62] During the eighteenth and early nineteenth centuries contour lines were employed ever more and more frequently upon maps of a very large scale. It was not, however, until at least the middle of the nineteenth century that their general and universal utility even for maps of scales as small as a millionth was recognized, and on none of the maps of the Harrison collection is this device employed.

Maps of Military History

Drawn specifically to illustrate campaigns and battles, the maps of military history for the most part show, besides the permanent and semi-permanent elements of the earth's surface, routes of marches, positions of troop units and of artillery, transport trains or ammunition wagons, in and before battle, entrenchments, fortifications, and similar military features. The practical utility that these maps may have had at the time of publication was educational. Officers and cadets of the period studied them in connection with the history of campaigns for the lessons to be learned from them of the successes and errors of generals of earlier wars.

Most of these maps are comprised in a series of atlases accompanying treatises on military history. Brief mention must suffice of the more interesting.

We have for the Seven Years' War, General Jomini's "Atlas pour le traité des grandes opérations militaires," published in 1818 and consisting of twenty-six battle maps and plans. For the battles of the Seven Years' War in Saxony there is a

[61] Stavenhagen, Skizze, p. 157; Berthaut, *op. cit.*, Vol. 1, pp. 304–305.

[62] For a brief historical sketch of the invention and progress of the use of contour lines see Henri Zondervan: Allgemeine Kartenkunde: Ein abriss ihrer Geschichte und ihrer Methoden, Leipzig, 1901, pp. 53–54.

large topographical map in ten sheets showing troop positions and marches. [63]

The wars of the French Revolution are illustrated in Jomini's "Atlas pour l'histoire critique et militaire des guerres de la Révolution," a volume containing thirty-six maps in all. Some of these are ordinary maps showing the natural and human features only of the various theaters of operations, but others are strictly battle and route maps. The campaigns and combats of the French armies between Jemappes, November 9, 1792, and Novi, August 15, 1799, are displayed on these sheets. The French campaigns in the Alps and northern Italy are depicted on Bacler Dalbe's map, discussed in greater detail above.[64]

For the subsequent campaigns of Napoleon between 1800 and 1807 there is the collection of maps and plans accompanying Mathieu Dumas' "Précis;" for the Austrian campaign of 1809 the "Atlas du précis historique de la guerre entre la France et l'Autriche en 1809" of Count Alexandre Delaborde, Paris, 1823, in twenty-five sheets; and for the Russian campaign of 1812, Colonel Boutourlin's "Atlas des plans, légendes et tableaux d'organisation de l'histoire militaire de la campagne de Russie" (no date). Two small atlases accompanying a French and an English history illustrate the events of the Peninsular War.[65] To the last great campaigns of Napoleon in Germany, France, and Belgium in 1813, 1814, and 1815 are devoted a collection of eleven exquisitely engraved German battle maps on a large scale [66] and an incomplete atlas with commentary.[67]

[63] See above, p. 5, footnote 9.

[64] See above, pp. 30, 32–34, and p. 6, footnote 16.

[65] The atlas to Le Général Foy: Histoire de la guerre de la Peninsule sous Napoleon, Paris, 1827, and "Plates to Jones's War in Spain, Portugal, and the South of France," London (no date).

[66] These are maps of the battles of Gross Görschen, Bautzen, Gross Beeren, the Katzbach, Hagelsberg, Dennewitz, Wartenburg, and Möckern (part of the battle of Leipzig) in 1813, of Laon in 1814, and of La Belle Alliance and Wavre (Waterloo campaign) in 1815.

[67] "Beitrag zu der Geschichte der Feldzüge in Frankreich in den Jahren 1814 und 1815 in besonderer Beziehung auf das Commando des Kronprinzen von Württemberg," edited by the Officers of the Royal Württemberg General Quartermaster's Staff, Stuttgart (no date). Three out of twelve maps are missing in the Harrison collection.

Conclusion

The items of the Harrison collection show that old maps may be of great interest to others than the antiquarian or collector. The student of present day geography may find in them a direct clue to the understanding of many features of the regions which he studies. They enable the military historian to reconstruct in his mind's eye the landscapes in which campaigns of the past were conducted. Finally, for the historian of civilization no documents are better suited to illustrate in graphic form the slow but steady progress of applied science and of technical skill.

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