

Looking at an Early Map

R. A. SKELTON

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TOWARDS THE END of the 16th century Richard Hakluyt lectured on geography in the University of Oxford. To illustrate his lectures (as he tells us) he “produced and showed both the olde imperfectly composed, and the new lately reformed Mappes, Globes, Spheares, and other instruments of this Art . . . to the singular pleasure, and generall contentment of my auditory.” I cannot hope to make the same impact on my auditory as Hakluyt—perhaps a little smugly—claims to have made on his; but this account of his teaching methods entitles me to cite him as a forerunner in the comparative study of earlier cartography. Such a study was in fact no novelty even in Hakluyt’s day. Throughout the 16th century editors of Ptolemy’s *Geographia* printed side by side the maps of the Ptolemaic world, derived from those in Byzantine manuscripts, and ‘modern’ maps incorporating the latest geographical information or hypotheses. Earlier still, Andrea Bianco had added to his atlas of portolan charts, drawn at Venice in 1436,¹ a circular mappamundi of traditional type and a Ptolemaic world map—thus presenting in juxtaposition the old world picture and the new, the geographical lore of the Christian Middle Ages and the lately discovered geography of Ptolemy.

It is a liberal interpretation of Books and Bibliography that gives me the privilege of delivering a lecture in this distinguished series on a theme not obviously related to either. Mr. Buckman and I can perhaps claim some justification by analogy. As Mr. Bowers showed here four years ago,² some problems of the literary student or the historian may, indeed must, be solved by consideration of the construction and characteristics of a book as a

physical or tangible object. We may see a similar relationship between the analysis of form and that of content in extracting the testimony of an early map. As bibliography to literary criticism, or as diplomatic to the interpretation of mediaeval documents, so is the technical analysis of early maps to the studies which they serve. This analysis, like the parallel process of analytical bibliography, must be applied in a historical context.

I

The modern map is a graphic document based upon processes of measurement and computation. Its vocabulary of expression is, in great part, not of recent origin; some of the symbols employed today came into use in the 15th and 16th centuries, others were developed in the 18th and early 19th, and the conventions of colouring go back certainly to the Middle Ages and very probably to Roman cartography. The construction of the map, on the other hand, has evolved steadily—though not without check and even retrogression—with advances in geographical knowledge, in the techniques of geodesy and survey, and in critical sense. In studying an early map we have to allow for this evolution. If we fail to do so, if (for instance) we expect to find in it, as in the modern map, such structural features as a regular projection, a network of geographical meridians and parallels, overall uniformity of scale, we shall certainly be misled in our interpretation of its geographical content.

In my paper I propose to discuss the critical controls which must govern our study of early maps and our inferences from them. That such controls need to be strictly applied is made plain by two factors. The first is the

positive character with which an early map makes its unqualified statements of geographical fact; no 'reliability diagrams' are to be expected here. You will recall the Bellman's map in *The Hunting of the Snark*:

"He had bought a large map representing the sea,
Without the least vestige of land:
And the crew were much pleased when they found it to be
A map they could all understand . . .

'Other maps are such shapes, with their islands and capes!
But we've got our brave Captain to thank'
(So the crew would protest) 'that he's bought *us* the best—
A perfect and absolute blank!' "

Lewis Carroll was (let us remember) a mathematician and student of logic. May we here discern his subliminal protest against cartographic statements which, despite their illusory appearance of confidence, often defy logical standards of proof?

The second factor imposing caution on the student of an early map is the ease with which a heavy structure of theory can be built on foundations which are too narrow to support it. Some recent map studies bring to mind Edward Lear's limerick:

"There was an Old Man who said 'Hush!
I perceive a young bird in this bush!'
When they said—'Is it small?'
He replied—'Not at all!
It is four times as big as the bush!' "

I shall quote some cautionary instances of such excesses in the course of my paper. It is not surprising that historians mistrust reconstructions of historical events founded on

cartographic evidence alone, without documentary support. This scepticism has been expressed by a distinguished modern historian: "Maps are a dangerous type of evidence; too much study of them saps a man's critical faculty. Henry Harrisse knew as much as any man of the Renaissance maps, and one may see from his works that as his learning increased his judgment deteriorated."³

We need disagree with only one sentence of this pronouncement. It is as a rule not 'too much study' but insufficient study that prevents a student from extracting from an early map the authentic kernel of fact that lies in it, and no more. The historian just quoted has also written: "It is impossible to be dogmatic about the evidence of maps unless we know more than we commonly do about the intention and circumstances of those who drew them."⁴ A map is a linear design accompanied by geographical names and legends. Visual inspection—"taking a look" at it—is the first stage in its study, and also the last. In between, a good deal of homework has to be done. For the early map under our eyes is the end-product of a complex series of processes—assembly of information from various sources and in different forms, both graphic and textual; assimilation to the mapmaker's geographical ideas, to transmitted cartographic patterns, or to his political interest; and the resultant stages of compilation, control, adjustment, and copying. Only after study of this background can we look over the mapmaker's shoulder and begin to perceive why he drew this outline or made that identification or associated certain place names with a particular feature.

Let me quote a few examples of the fallibility of pure-

ly visual impressions, even when supported by thorough analysis of sources.

In 1424 the Dane Claudius Clavus arrived in Rome, and while in Italy he compiled two descriptions of the North. Of the maps prepared to illustrate them, the earlier has survived but the original draft of the later is lost. They exercised (in Nansen's words) "a decisive influence on the representation of Scandinavia and to some extent of Greenland"; and they introduced into European cartography the concept of Greenland as lying to the west, and not the north, of Scandinavia. We do not know whether Clavus himself drew these maps or whether they were drawn at his direction by an Italian cartographer. The Danish scholar A. A. Björnbo, who in 1909 published a penetrating study of Clavus's work and its sources, considered his delineation of Greenland to be "marvellously correct," thought that it could not have been drawn from written materials only, and even deduced a visit to Greenland by Clavus.⁵ This structure of hypothesis was demolished two years later by Fridtjof Nansen, who demonstrated that Clavus's outline of Greenland was copied from the representation of Scandinavia in the manuscript atlas known as the Medici Atlas, drawn in 1351.⁶ It is no longer possible to suppose that "the first native cartographer of the North" (as Björnbo called Clavus) brought any maps with him to Italy, or had ever drawn a map before his arrival in Rome, or had seen a map drawn in Northern Europe.

Maps drawn in Iceland and Denmark at the turn of the 16th and 17th centuries were the first to depict the Norse discovery of America from the ancient Icelandic records (Fig. 1.) In attempting to identify the landfalls of



1. Sigurdur Stefánsson, map of the North, c. 1590.—
Royal Library, Copenhagen.

the Norsemen, G. M. Gathorne-Hardy in 1921 held that these cartographers delineated Helleland, Markland and Vinland with “a striking resemblance to the actual form of Baffin Land and northern Labrador” and that they believed their maps to represent these coasts; and he inferred that the maps provided “evidence of voyages to America subsequent to those of which we have any record.”⁷ This is a heavy load of theory to base on a visual impression; but, while we may admit the “striking resemblance” noted by Gathorne-Hardy, the maps themselves provide explicit evidence that the cartographers conceived the coasts represented by their outlines to

extend far south of Baffin Land into the latitudes of the St. Lawrence estuary.⁸

It is an uncomfortable fact—to be faced in a study which I am preparing—that the validity of these Icelandic maps as original testimony to the Norse discoveries must rest, in the final analysis, on a visual judgment. But the similarities of outline from which Gathorne-Hardy, like Björnbo, deduced the knowledge and intention of an early cartographer were illusory, and must be classed (in Nansen's words) among "those accidental coincidences that sometimes occur, and that warn us to be careful not to draw too many conclusions from evidence of this nature."⁹

Pitfalls of a different kind may be illustrated by more recent examples. The manuscript chart of the North Atlantic by the Portuguese cartographer Pedro Reinel, known as *Kunstmann I* (Fig. 6) and drawn after 1504,¹⁰ is the first to give a detailed nomenclature (of 18 names) for the coast of Newfoundland and Labrador. These names have generally been associated with the *Corte Real* voyages of 1501-2; but an English student (writing in 1955) has used them as evidence for the course of John Cabot's last voyage, in 1498, which he identifies as the expedition to the north-west described by Sebastian Cabot to Peter Martyr in or before 1515.¹¹ This author cited seven names of saints or festivals to establish a chronological sequence, from June to December, for the track of the expedition which bestowed these names and which therefore presumably wintered on this coast; yet—as the documents tell us—the *Corte Real* expeditions were back in Lisbon by October. It is nevertheless impossible to accept that the nomenclature derives from

an English discovery. The names include that of a saint (Santa Eiria) whose cult was confined to Portugal—and there to only a few dioceses; other early maps, such as Vesconte Maggiolo's planisphere of 1516, which draw on the same stock as Pedro Reinel, have names borrowed from the *padrones* (the stone pillars set up by Portuguese explorers); and it is extremely improbable that a Portuguese cartographer would have preferred names from an English source, even if he had them. We are left with only two possible conclusions. Either we must agree with W. F. Ganong (who mistrusted the so-called 'liturgical test') that "there are surely reasons for the occurrence of saints' names on early maps besides dates of discovery";¹² or we must ascribe the names placed on this coast by Reinel to a Portuguese expedition which wintered there.

In 1961 Dr. Bernard G. Hoffman published a detailed study of the early cartography of the same region.¹³ He rightly chastised the facile assumptions "that the maps [of the early 16th century] are based upon sound geographical information . . . and that they are valid representations of a cartographical sequence." Such a 'tenuous framework' of hypothesis (as he points out) is no adequate substitute for the careful preliminary studies which alone will enable us to visualize the working techniques of the Renaissance mapmakers, their compilation processes, and the pressures to which they were subject. This critic himself does not succeed in keeping consistently on the course thus marked out. Let us take a look at one of the bunkers into which he falls. He superimposes on the modern outline of Labrador-Newfoundland the outline in the anonymous Portuguese chart known as Kunstmann III (Fig. 7), by a diagram.¹⁴ Kunstmann III has

a scale of latitudes, and the author points to the apparent accuracy of its latitude-determinations for specific configurations which he equates in the two outlines. In all this (as in other such diagrams) he has overlooked a vital feature of the early chartmaker's work: the meridians are magnetic, not geographical, and the outlines, established by compass observations, are uncorrected for magnetic declination, which in the Newfoundland-Labrador region in the early 16th century was about two points, or some 22 degrees, west. To make a valid comparison with the modern chart of the region, we must rotate the magnetic meridian of Kunstmann III anti-clockwise through this angle, and with it the geographical outlines. The equivalence of latitudes will then appear somewhat less evident, and the correlation of details different from that inferred.

Here the historian of cartography may see the justification for his studies. They alone provide the necessary controls which will enable historians to look at an early map with an informed eye, to compare its delineations with the actual geography, and to form correct and cautious judgments on the sequence and chronology of events—tracks and discoveries, settlement and trade routes, contacts between peoples—from the evidence furnished by the cartographer. Along this road the student of early maps will also learn something about the ideas and processes of thought of their makers and about the transmission and diffusion of these ideas. In a more constructive spirit, I propose now to discuss certain groups of maps which exemplify special aspects of our problem. I shall consider in turn the Atlantic in mediaeval cartography; the discovery of North America as reflected in

contemporary maps; and the world map of the Renaissance.

II

Properly speaking, no chart of the Atlantic, as an ocean delimited by lands to east and west, could be made before the discoveries of Columbus and John Cabot. The American landfalls of the Norsemen did not pass into the general stock of European ideas and failed to create a common image of the ocean. The discovery of America at the end of the 15th century was therefore a discovery—or a rediscovery—of the Atlantic. Yet from the 14th century onward Europeans had visualized the ocean increasingly as a way of access to lands lying within or beyond it. “The common mind ran upon islands, not continents”;¹⁵ and these aspirations are reflected in the representations of Atlantic islands and archipelagos which cartographers of the 13th, 14th and 15th centuries scattered over their maps.

We are here in a twilight of the mind, in which are fused images from classical tradition, from legendary lore of the Irish and other peoples of Western Europe, from folk-memories of navigations undocumented by any surviving record, from the systematic cosmography of the Christian Middle Ages, from accounts of islands in the East, and from the experience of more recent voyages. These images, of various origin, are combined and fitted into the pattern of the map in accordance with the critical judgment or fancy of the cartographer.

From about the middle of the 14th century, Italian and Catalan maps showed the Canaries—the ‘Fortunate Isles’ of antiquity—which had been rediscovered in 1336,

together with the Madeira group, probably sighted at the same time and first settled by the Portuguese in 1418. Northward from Madeira, and in about the latitudes of the west coast of Spain and Portugal, the mapmakers laid down a string of eight or nine named islands. These have been cited as evidence for a 14th-century discovery of the Azores, and Sir Raymond Beazley even asserted that in the Medici atlas of 1351 "the whole group is mapped . . . with the accuracy and precision of a pilot-chart."¹⁶ His claim has—quite rightly—not gone unchallenged; but, from the time when Portuguese colonization began in 1427, the real Azores disclosed by experience were identified by cartographers with the 'supposed' Azores laid down in maps since 1351, and the older representation held its own until nearly the end of the 15th century, long after the correct shape and position of the group had been established. Here we see the early cartographer depicting geographical facts verified by experience but in a form handed down from an earlier period and prompted by mere speculation or vague hearsay information.

A similar pattern of thought and association doubtless lies behind the name *Insulae Sancti Brandani* (or variants)—the Islands of St. Brendan—attached to the 'supposed' Azores in maps of the 14th and 15th centuries. As Mr. Geoffrey Ashe observes in his recent study of the westerly voyages ascribed to St. Brendan,¹⁷ it is in the late-mediaeval maps that "the notions of Atlantic islands spread by Irish literature are chiefly preserved." Mr. Ashe has made a serious case for considering the 10th-century *Navigatio Sancti Brendani*, if not as a record of the experiences of the saint himself, at least as a possible

repository of Irish knowledge or opinion about voyages across the Atlantic—to Iceland, Greenland and North America—earlier in date than the Norse discoveries. As he notes, however, “the St. Brendan’s Isle of maps . . . is not portrayed as the continent of the *Navigatio*, but simply as another island.”¹⁸ The mediaeval Latin world picture, in which the tripartite world was conceived as surrounded by ocean, did not readily admit the idea of another continent; and so lands newly discovered, or suspected to exist ‘out beyond,’ were commonly described or depicted as islands in the ocean sea. Not less characteristic of the mediaeval cartographer is his transference of St. Brendan’s Islands from the higher latitudes where the *Navigatio* placed the Saint’s voyagings to the vicinity of the islands of classical antiquity; and their identification with the Fortunate Isles is explicitly made in 15th-century charts.¹⁹

The two large islands of Antillia and Satanaxio, laid down west of the Azores in charts from 1424 (Fig. 2), were creations of the mapmakers, and their origin constitutes one of the unsolved riddles of cartographic history. They take their place among other testimony to a vague, if ill-defined, belief, in the early 15th century, that out in the ocean there was land waiting to be discovered. Whether they reflect an earlier Portuguese voyage to America or arise from an onomastic misconception by cartographers, is a question which we need not consider here.²⁰ Two aspects of their delineation in maps deserve our notice, Antillia is always drawn in somewhat schematic form, as a rectangle lying north-south. A very similar shape is ascribed in 15th-century maps to other islands whose existence was suspected or conjectured, notably

Greenland and Cipangu or Japan. The suggestion²¹ that this outline for Antillia is "derived from a border around an inscription" is plausible; but to concede that the delineation is conventional does not justify us in dismissing, for this reason, the hypothesis that its presence on the map may spring from hearsay information of an actual discovery in the west—perhaps only imperfectly reported or even no more than vaguely rumoured. To belief in Antillia also, as in the Azores, encouragement was given by genuine discoveries; and so we find map-makers from 1435 onward writing against the Antillia group the legend "Islands newly discovered."²²

The island of Brasil, consistently drawn from its first appearance in a chart of 1330, is a special case of Irish influence on the mediaeval cartographers of Southern Europe. The name itself does not occur in Irish literature but it is etymologically perhaps the Irish *breas-ail* (blessed) and so to be connected with the Fortunate Isles.²³ It seems doubtful whether the delineation of the island can claim any more foundation in experience than the numerous other imaginary islands of the mediaeval maps, or as much as St. Brendan's and Antillia. The location off the south-west coast of Ireland, regularly given to it by the mapmakers, doubtless explains why it became the objective for the westerly voyages undertaken by the Bristol seamen who made a landfall in North America some years before John Cabot.

The hypothetical stages through which the mediaeval delineations of islands in the Atlantic evolved may be summarized (in Mr. G. R. Crone's words) as "representation of the classical islands; identification of St. Brendan's islands with them; insertion of further islands owing to

the popularity of islands in accounts of the East; appearance of Antillia . . . ; impetus to belief in these islands given by actual discoveries."²⁴ In accepting this sequence we do not need to go beyond the visible evidence of the maps themselves or to overstep the bounds of probability in seeking their sources. We may note in it two behaviour-patterns which pervade the work of early mapmakers: first, the willingness to admit geographical representations, often conventional in form, derived from hypothesis, conjecture or mere rumour; and second, the tendency towards inertia in the continued use of cartographic images, whose life was often extended long after they could have been corrected or removed in the light of experience. Sir Walter Raleigh remarked ironically on the tendency of "Geographers in their Maps" to represent features "agreeable to common report, though many times controlled by following experience, and found contrary to truth."²⁵ The island of Brasil remained on the Admiralty charts until 1873, and the no less illusory Mayda re-emerged in the Bay of Biscay as late as 1906, in a map published in America. Hence too the longevity of other geographical myths, to which in fact the printing-press, with its power of fixing visual images on the popular mind, gave an unexpected extension of life.

III

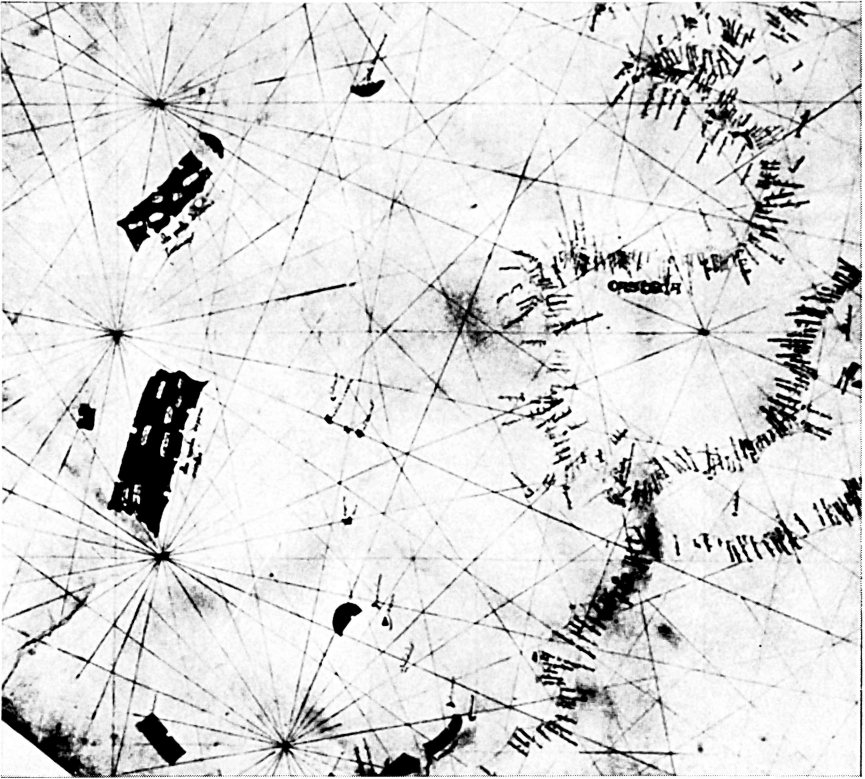
Our next case-history is the group of maps, from the first three decades of the 16th century, which record the discovery of North America before the voyages of Jacques Cartier. The problem here is the correlation of the outlines and associated nomenclature in the surviving maps with the landfalls and coasting of expeditions known from documentary record.

In trying to establish a parallelism we at once come up against some difficulties and paradoxes. Traces of voyages of which the written record is wanting may be found in the maps; and it is equally clear that the maps have suffered a high degree of wastage and loss. In other words, neither the series of voyages, represented by documents, nor the series of maps, represented by extant specimens, is complete. This enjoins an open mind and forbearance from dogmatism in taking the testimony of the maps, where it lacks a documentary control.

Since many of the crucial maps are undated, we cannot confidently arrange them in a chronological series. To group or classify them on a basis of common features (in delineation or nomenclature) is a legitimate exercise, which enables us to isolate characteristic interpretations and geographical concepts. Two warnings are necessary. First, visual impressions suggesting affinity or development of the outline in two maps may be misleading if we do not take into account the licence in drawing or interpretation that the cartographer might allow himself, especially in a small-scale map. Second, density of nomenclature is an unreliable guide to the relationship—chronological or otherwise—between two maps. Of two undated maps, it cannot be assumed that the map with the greater number of names is the later; and if the later maps in a dated series show more names, we are not justified in postulating new sources. Variations, both in nomenclature and in design, as between one map and another may—and often do—reflect only differences in rendering a common source or in selection from a common stock, and not differences of content due to the accretion of new information.

The necessity for such leading lines becomes plain when we examine some of the earliest maps of the North American discoveries and the evidential use made of them by students. The only map which unambiguously illustrates John Cabot's voyage of 1497—and (less certainly) his voyage of 1498—is the world map signed by Juan de La Cosa and dated 1500 (Fig. 4).²⁶ The 'English coast' in this map has been variously identified: as the south coast of Newfoundland with part of Nova Scotia, as the south coast of Labrador, as the east coast of Labrador, even as the coast of Greenland. Such a wide variety in the interpretations does not encourage confidence in the methods by which they were reached. Most of them in fact rest on one of two fallacies: that the whole map is drawn on a uniform scale, derived from the distance between the Equator and the Tropic, and that parallels of latitude can be drawn right across the map and latitudes on opposite sides of the Atlantic correlated. Both these assumptions have been discredited by Mr. Crone's demonstration that the map is drawn in two distinct sections: an earlier model served for the Old World, while the New World is drawn on a larger scale from recent discoveries, supplemented by conjecture.

Attempts have been made to attribute the La Cosa map to a later date—*post*-1508 (Dr. George E. Nunn) or *post*-1524 (Dr. Bernard Hoffman).²⁷ The premisses on which they depend do not persuade me of their validity. Dr. Nunn's hypothesis disregards the possibility of unchronicled exploration. Dr. Hoffman points to a "similarity of configurations" in the La Cosa map and in the Verrazzano map of 1529 depicting the coasting voyage of Verrazzano from Florida to Nova Scotia in 1524; but



2. Zuan Pizzigano, portolan chart, 1424 (detail).—James Ford Bell Collection, Minneapolis.



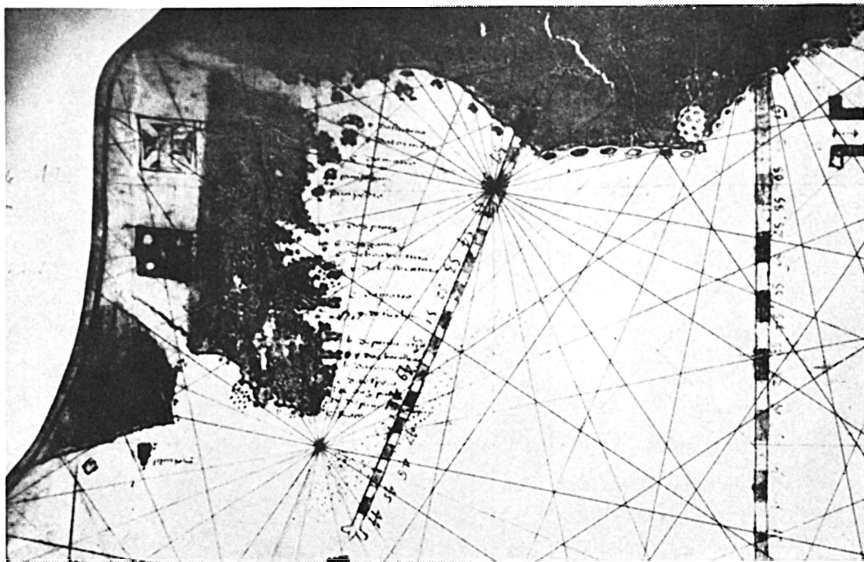
3. Henricus Martellus, world map, c. 1490.—Yale University Library.



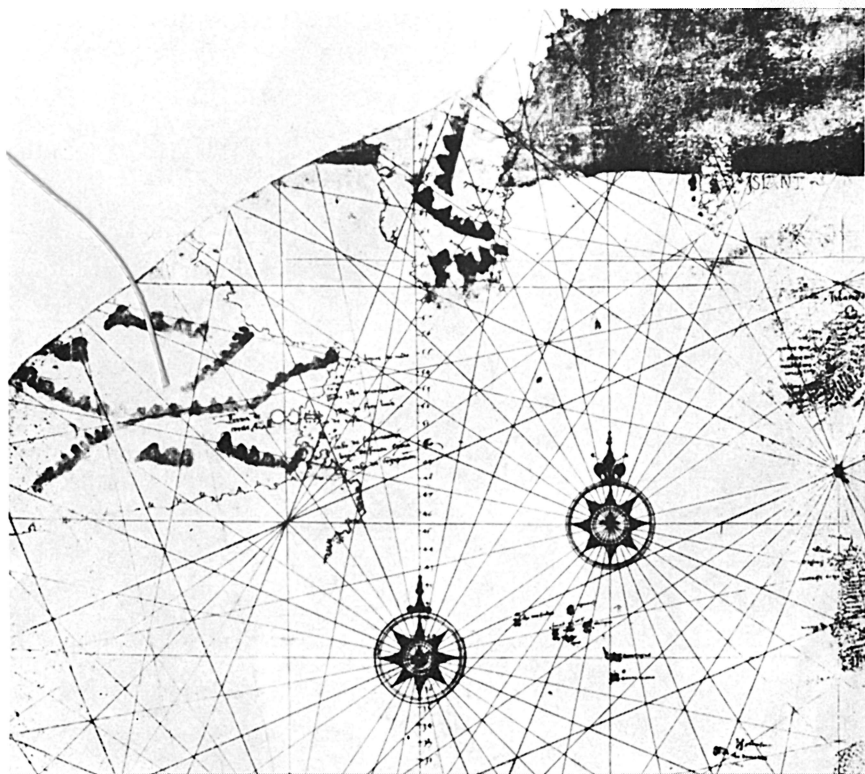
4. Juan de la Cosa, world map, 1500 (detail).—Museo Naval, Madrid.



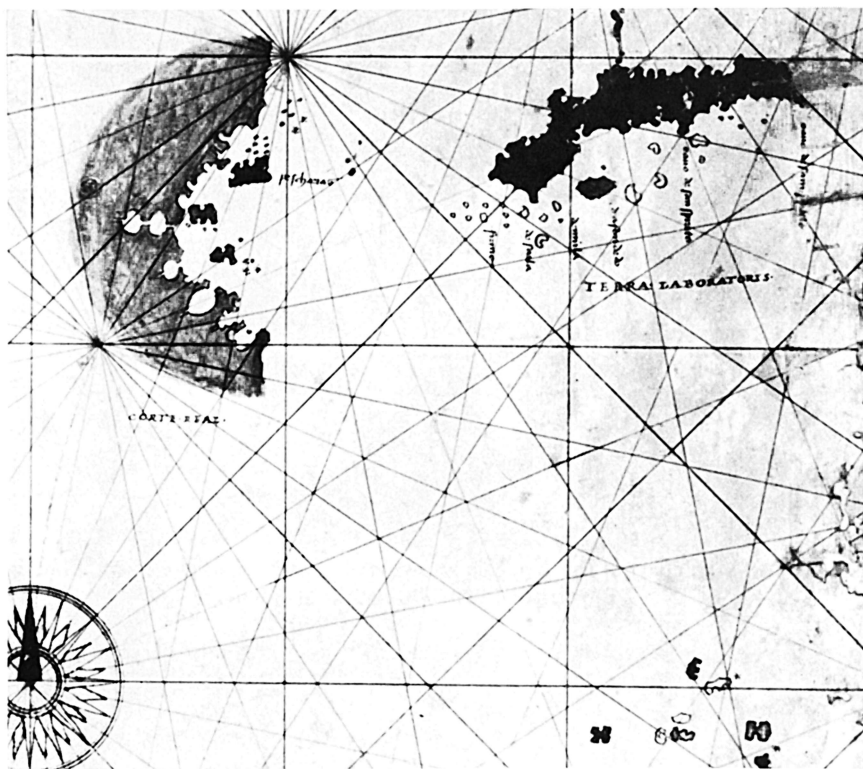
5. G. M. Contarini, world map, engr. Francesco Rosselli, 1506.—British Museum.



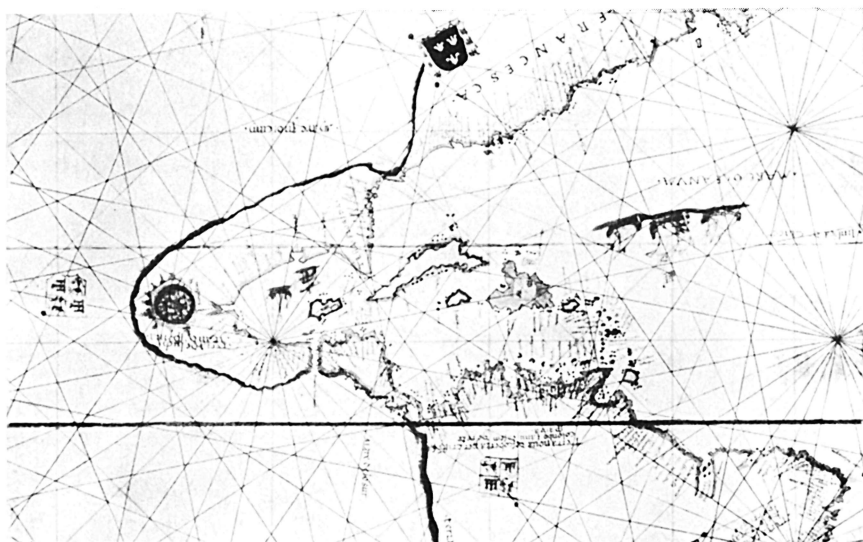
6. Pedro Reinel, chart of the Atlantic known as Kunstmann I, *post*-1503 (detail).
—Bayerische Staatsbibliothek, Munich.



7. Anonymous Portuguese chart of the Atlantic known as Kunstmann III, *post*-1506 (detail).—Bayerische Staatsbibliothek, Munich.



8. Anonymous Italian chart of the North Atlantic, *post*-1503 (detail).—British Museum, Add. MS 31316.



9. Vesconte Maggiolo, world map, 1527 (detail).—Formerly in the Biblioteca Ambrosiana, Milan; destroyed in 1943.

he leaves out of account the obvious alternative explanations, either that La Cosa here illustrates an earlier voyage along this coast (that of John Cabot in 1498 is the likeliest candidate) or that La Cosa's design has influenced Verrazzano's outline. The charge of "extreme myopia" which this author brings against students who persist in using the La Cosa map "in historical reconstruction of early exploration" recoils upon himself.

An attempt to re-date Reinel's map known as *Kunstmann I* (Fig. 6) has gained some currency, but rests on equally insecure foundation.²⁸ This map has, on the east coast of Labrador-Newfoundland, three names—*sam johan*, *sam pedro* and *santa cruz*—also found among those bestowed, at some time before 1521, by the Portuguese Joao Alvares Fagundes, most probably (from the terms of his charter) in the Nova Scotia region. Common sense suggests that these names, of very frequent usage, might have been applied independently by different explorers and are in themselves insufficient reason to upset either the established attribution of Pedro Reinel's map to the first decade of the century or the location of Fagundes' coastal traverse further south, as indicated by the documents.

Comparative study of the surviving manuscript maps, of Portuguese or Italian authorship, throws some light on the circumstances in which information on the voyages reached the cartographers, was used by them, and has come down to us. The Portuguese cartographers drew the Labrador-Newfoundland coast, from the data of the Corte-Real voyages and perhaps other unrecorded Portuguese exploration, with marked conservatism throughout the first half of the 16th century. With two exceptions

—the introduction of Fagundes information from about 1520 and the admission of Belleisle Strait (Cartier's discovery of 1534)—the differences of design lie within the limits of variation, in the sense of interpretation, that the early mapmaker permitted himself; and the place names are selected by the cartographers from a basic original stock. The earlier Portuguese maps incorporate no information from the English voyages.

A version of the Portuguese prototype reached the map-workshops of Naples, Genoa and Ancona, and was copied by Italian chartmakers. The planisphere produced by Vesconte Maggiolo at Naples in 1516²⁹ draws Labrador-Newfoundland from a good Portuguese model; it furnished the coast with 25 names (more than in any previous Portuguese map which has survived), and these—as we have seen—include at least one which must have been conferred by a Portuguese commander claiming discovery. In Maggiolo's map a legend attached to Greenland records discovery by the English; and three earlier Italian maps³⁰ draw Greenland as an island—a concept which was alien to the Portuguese cartographic tradition and which points towards an association of ideas with the Anglo-Portuguese expeditions from Bristol in the years 1501-5 (Fig. 8).

By what channels was such cartographic intelligence transmitted between Portugal, England, the Italian maritime cities and Spain? This question has to be approached from a different direction.

IV

In 1487 Bartolomeu Dias entered the Indian Ocean and so pioneered the seaway to the East. When he anchored in the Tagus in December 1488, Columbus was

on the quay. From Lisbon the news was sent by an unknown informant to Florence, where, within one or two years, it was incorporated into a world map drawn by the cartographer Henricus Martellus Germanus. In the 20 years after Dias' return—no longer than from today back to the beginning of World War II—the oceanic voyages which gave Europeans access to new lands in the East and West had been made, and the discovery of a fourth continent was known.

These events presented a twofold challenge to the mapmakers. On the scientific level, they enforced a radical reassessment of world geography. On the popular level, a new and immensely wider demand for geographical information had to be satisfied. The turn of the 15th and 16th centuries is therefore a watershed in cartographic history; it is also the period in which the professional cartographer grew up alongside the professional printer. If we are to understand how the mapmakers met this double challenge and to appraise their end-products, we must study the techniques and organization of the Renaissance map-workshops.

The word 'workshop' implies a craft industry, with skills transmitted from master to apprentice, sub-division of special arts, and channels for supplying the demands of a regular market or of patronage. Unlike other Renaissance trades, that of the mapmaker is not well documented. We can nevertheless hazard some generalizations. Until the second half of the 15th century, map-making was usually practised in association with, or in subordination to, another craft. The flourishing chart-businesses which had grown up since 1300 (or earlier) in the seaports of Italy and Catalonia were carried on by

men who also dealt in nautical instruments; others, like Andrea Bianco of Venice and Grazioso Benincasa of Ancona, were shipmasters who turned to nautical cartography. In Portugal and Spain the chart industry came under government patronage and control. An official hydrographic office was established at Lisbon by the end of the 15th century and at Seville in 1508. Yet the three nations most actively engaged in overseas discovery at the turn of the century—Portugal, Spain and England—have, by an accident of survival, left a relatively slender cartographic record of their enterprises. With two exceptions, all Portuguese charts of the 15th century have disappeared; after *La Cosa*, there is no other Spanish world map for over 20 years; and from the crucial decade 1500-1510 we have only three or four Portuguese manuscript maps and half-a-dozen of Italian authorship. The Italian maps of the 15th and early 16th centuries have particular significance in filling the gaps and providing a continuous cartographic record. The oceanic discoveries were to be mapped by men who had learnt their craft in drawing pilot-charts of the Mediterranean and the European coasts.

In 15th-century Italy, map-production was more active and more profuse than in any other country of Europe. It is here that professional cartographers emerge, engaged in the copying, decorating and—ultimately—compilation of maps. The artists who took up this work were not originally, or by vocation, geographers; like some of the early printers, they had practised as painters, miniaturists or illuminators. Such were Taddeo Crivelli who had a hand in the first printed atlas, the Bologna edition of Ptolemy published in 1477; Donnus Nicolaus Germanus,

who redrew the Ptolemaic maps on a new projection and with new topographical conventions; Henricus Martellus Germanus whose maps, drawn in or after 1490, form a bridge between the Ptolemaic world picture and that of the Great Discoveries; and Francesco Rosselli, the first specialized map-printer and dealer known to us, whose workshop in Florence has a particular significance in the diffusion of new geographical information.³¹ A characteristic professional cartographer of the next generation is Vesconte Maggiolo, of Genoa, whose span of production embraces no fewer than 19 extant maps and atlases and extends perhaps from 1504 or 1508, certainly from 1511, to 1549.

The world maps drawn about 1490 by Henricus Martellus (who was associated with Rosselli) point back as well as forward.³² In the absence of Portuguese charts, they are the primary cartographic record of the voyages under Diogo Cao in 1485-7 and Bartolomeu Dias in 1487-8. Martellus amended Ptolemy's map of Asia in the light of the Portuguese entry into the Indian Ocean, of Marco Polo's description of the Far East, and of Toscanelli's views on the longitudinal extension of Eurasia and the width of the western ocean. The resulting representation of the Old World and particularly of Asia became the traditional base-map upon which the materials from the discoveries in the east and west were to be grafted. The prototype must have been executed between 1489 and 1492, and its wide diffusion suggests that it was engraved and printed, doubtless in Rosselli's shop. The influence of Martellus's model can be traced in the cosmographical ideas of Columbus and John Cabot, and in the map-production of widely separated workshops—

Portugal, Italy, the Rhineland, Franconia. That it appears in derivatives as late as 1540 illustrates the persistence of a cartographic pattern to which the printing press had given currency.

What kind of a world map was it that came under the eyes of Columbus and Cabot, of Martin Behaim and Waldseemüller, and of the chartmakers of Lisbon and the Italian cities? We can visualize it in the wall-map by Martellus, recently discovered and now in Yale University Library (Fig. 3).³³ This is drawn on the 'pseudo-cordiform' projection used by Waldseemüller in his world map of 1507; it is the earliest known example of this projection. The map, embracing 275 degrees of longitude, is the only non-Ptolemaic world map of the 15th century to be graduated in longitude (apart from Behaim's globe, which plainly derives from a Martellus prototype). Thus it conveys a precise quantitative statement of the width of ocean supposed by its author to separate Europe from East Asia; this agrees closely with the estimates of Columbus and Toscanelli and with Columbus's expectations and identifications of landfalls.

Two prominent features in Martellus's representation evidently caught the eye of contemporary explorers and mapmakers. In south-east Asia, a great horn of land curves south and west; residual from the coast supposed by Ptolemy to close the Indian Ocean on the south, this concept explains the geographical premisses of Columbus's last two voyages. Further north we see, in the conspicuous east-pointing promontory of Mangi, that 'cape of Asia' which Columbus and John Cabot looked for and thought they had found. To the east of it Martellus draws the oblong island of Cipangu.

When information on the discoveries in the west reached the Italian cartographers, it was on such a traditional stock-representation of the Old World that they grafted the new data. Their materials were generally at two or more removes from the original records of a voyage. On the latest discovery a mapmaker in Genoa or Naples doubtless disposed (as a rule) of no more than another secondary chart, sometimes only of a newsletter or of seamen's gossip. The time-lag between a discovery and its record in a surviving map is often great. Nor can a map be communicated by word of mouth; a verbal chain of transmission will explain many of the generalized or formalized delineations found in early maps.

Even if the designer of a world map had access, for a particular region, to first-hand materials resulting from experience—pilots' sketches, log-books or rutters—he still faced many problems of compilation and construction. A sketch-map made on a running survey, like Columbus's of north-west Hispaniola in December 1492,³⁴ might be strikingly correct in outline; but Columbus's drawing, without league-scale or latitude-indications, lacks all the data necessary for relating the coast depicted to other discoveries or for locating them in the framework of a world map. For his drawing of the 'English coast' explored by John Cabot, *La Cosa* no doubt depended on such a sketch-chart, perhaps with a rutter or list of names and distances; and we know how such materials could have come into his hands. The gross exaggeration of scale in this part of his map exemplifies both the cartographer's difficulty in fitting a discontinuous coastal traverse into his geographical design and the fallibility of

commentators who attempt to measure it by a scale derived from other sections of the map.

At this stage of his work the mapmaker has to form an opinion, to be graphically expressed in his map, about the location of a discovered coast on the earth's surface, both absolutely and in relation to other disconnected discoveries or known lands. It is here that he will be guided by cosmographical theory, by traditional cartographic patterns, or by national bias.

This is the process which we see at work when the great discoveries came to be incorporated in the world map. The map drawn by Giovanni Matteo Contarini and engraved by Rosselli in 1506 is the earliest printed map to show the new lands in the west (Fig. 5).³⁵ In the year of Columbus's death, it has in some ways an old-fashioned look. The cartographer appears to be uninformed of Columbus's last voyage, of any voyage to South America after 1500, and of the Portuguese attainment of India. Asia—with one major modification—is drawn precisely after the Martellus model. The author of the map had however heard of the discovery of Labrador-Newfoundland, which he ascribes to the Portuguese; and he interprets this, with Greenland, as the Atlantic coast of a great easterly peninsular projection from North-east Asia. This produces a design for North America basically equivalent to that of La Cosa's map. The process of thought underlying this representation is clear. It is an attempt to reconcile the longitudes of Martellus—and of Toscanelli—with the sailing distances logged by the voyagers, whom the cartographer supposed to have reached the coasts of China. The Portuguese themselves never made this mistake; but the plotting of

the Labrador-Newfoundland coast almost as far east as the longitude of the Azores shows that Contarini was using a map by a Portuguese cartographer who made this easterly displacement to bring the discovered coast to the Portuguese, and not the Spanish, side of the political demarcation line. Hence the immense neck of land, extending over 90 degrees of longitude to form a connection with the mainland of Asia.

The Contarini-Rosselli pattern for the representation of North American discoveries recurs in woodcut derivatives by Rosselli himself; in the world map of Johan Ruysch printed at Rome in 1507; and in two early manuscript atlases by Vesconte Maggiolo, of about 1508 (in the British Museum) and of 1511 (in the John Carter Brown Library). By 1516, as his planisphere in the Huntington Library shows, Maggiolo had reverted to a less speculative delineation, doubtless following the excellent Portuguese source from which he took additional place names; and in this map, unlike his earlier ones, he suspends judgment on the question whether the English and Portuguese discoveries in the north had any land connection with those of the Spanish in the Caribbean.

Verrazzano's voyage of 1524 made it clear that such a connection existed; and Maggiolo's world map of 1527, executed at Genoa, is the earliest cartographic record of his voyage (Fig. 9). Maggiolo's treatment of North America here exposes the early cartographer's problem in adjusting to the framework of a world map a section of newly surveyed coast, and in reconciling the longshore distances estimated by the voyager with the interval available for the explored coast between earlier discoveries. When, as in Maggiolo's map, the assumed latitudes

of the terminal points of reference are erroneous, the plotting of the surveyed coast is distorted. The compensation methods adopted by the cartographer include compression or extension of a section of coast, omission or addition of names, alteration of their order and spacing.

But in 16th-century cartography the outline of the North American littoral drawn from Verrazzano's patient and careful survey was to be eclipsed by the much less satisfactory data from the Spanish expeditions of Estevao Gomes in 1524 and Vázquez de Ayllón in 1521-6. These left void the section from the Hudson River to Cape Cod. In his later works, after 1527, Maggiolo wavered between the Spanish model and the Verrazzano type. A small planisphere inset on his chart of 1535 even harks back to the old discontinuous version of North America as a series of islands. In his atlas of 1548, he presented an outline and nomenclature of Spanish origin, thus disregarding both the good Portuguese material for Labrador-Newfoundland which he had used in 1516 and the Verrazzano information from which he drew the coasts southward in 1527. Yet in his last atlas, drawn only a year later, in 1549, he returned to these models—that for Labrador-Newfoundland in the Atlantic chart, and the Verrazzano representation in the world map.

Maggiolo's professional characteristics, thus exemplified, illustrate the eclecticism of the early armchair cartographer. He was often satisfied with an archaic delineation of a region, many years out-of-date; and his output shows no continuous and progressive evolution of ideas. It is marked (in Professor Caraci's words) by "oscillations and contrasts."⁸⁶ If the cartographer had not had the ex-

cellent habit of dating his works, their geographical content would have been notably misleading in assigning dates to them or in arranging them in chronological order. We have the impression of an eclectic artist experimenting with different designs to assimilate and interpret the materials which came into his hands. This is a factor which we should take into account when we look at early maps or make any comparative study of them.

V

The term 'early map' is a loose one, for which I apologize. I have used it here to mean any map which, through immaturity of knowledge, judgment or expression, is not to be read as a strict record of geographical fact. This definition embraces maps whose statements, at least in part, are constructions of the mind, and not products of experience. Such constructions, and the outlines and place-names associated with them by the cartographer, may be his formulation from various elements: popular tradition, literary source-materials, rumour or hearsay or verbal report, wishful thinking by projectors, or the academic 'spirit of method' criticised by Bougainville.³⁷ They may, no less, result from imperfections in the techniques of observation and recording by which information was gathered and in the critical sense of the cartographer who interpreted and collated it and laid it down in his map.

Our definition will accommodate St. Brendan's Islands and the Earthly Paradise of the mediaeval mappae-mundi, the ideas on the distribution of lands and seas expressed in Renaissance world maps, the representations of America by 16th-century cartographers. But it admits

also the hypothetical geography of the South Pacific and of north-west America found in maps of the 18th century, and that of Central Africa and the Arctic in 19th-century maps.

For every detail in an early map, its author must be assumed to have had some reason, which it is the business of the student to uncover. All the delineations in such a map are not, in equal measure, witnesses of truth; and it is important for the historian to separate fact from fantasy, experience from illusion or guesswork, in sifting their evidence. Yet, in the words of E. A. Freeman, “a legend may not be a record of facts, but the existence of the legend is itself a fact, and requires explanation.”³⁸

In this rambling discussion I have attempted to illustrate some of the lines of thought and practice by which an early cartographer might arrive at the design in his end-product, and some of the principles which should guide us in fathoming his intention. Only by following these lines back to their origin can we strip the design down to its essentials and form an opinion on what—put crudely—it ‘represents.’ The motive that guided the draftsman’s hand may prove to be non-cartographic, something a good deal vaguer than what we see on the paper or vellum, and we must often invoke textual documents; but we should still keep in mind that it is the evolution of a graphic design that we have to trace, and elucidate it so far as possible in graphic terms.

A map often incorporates matter from various horizons of time or intellectual development. The search for the ultimate source may lead us back through many stages of revision or adaptation, derivation or transcrip-

tion, compilation. Here is work for the cartographic bibliographer or historian.

The source may indeed lie a very long way back, for the history of cartography does not tell of continuous forward movement or of the progressive shedding of illusions or errors. It was not only in Raleigh's day that mapmakers failed to profit by experience. The cartography of North America in the 18th century is characterized by repeated revival and re-testing of speculative hypotheses already discredited. The old hope of a navigable passage from the Atlantic to the Pacific could still, nearly 300 years after its birth, blind men's eyes to concrete evidence. The major checks to the progressive advancement of knowledge were, as often before, the vanity of geographers in holding to their theories and the conservative influence of the maps which gave these theories a deceptive appearance of certainty. No period better illustrates the force of geographical myths, or the power of the mapmaker to perpetuate them. He revived old myths—the Strait of Anian, the Strait of Juan de Fuca, an ice-free polar sea; and he added new ones—the fictitious voyage of Admiral de Fonte, the 'Sea of the West' of French cartography, and the ramshackle geography based on misrepresentation of Bering's discoveries.³⁹ The explorers who went on arduous voyages or land journeys in search of such chimeras had bitter comments to make. It is only by analysis of the delineations in the maps that we can appraise the causes and consequences of the misconceptions they embodied, and the historical events they provoked. Such analysis will bring home the potency of the cartographic image, particularly when reproduced by the printing press, in moulding opinion, in

evoking action, and even in arresting thought. It may also show us

“things that come not to the view
Of slippered dons who read a codex through.”⁴⁰

NOTES

1. Biblioteca Marciana, Venice, Ms. It. fondo antico 76.
2. Fredson Bowers, *The Bibliographical Way* (Lawrence, 1959).
3. J. A. Williamson, *The Voyages of John and Sebastian Cabot* (London, 1937), p. 7.
4. J. A. Williamson, *The Voyages of the Cabots* (London, 1929), p. 279.
5. A. A. Björnbo, *Der Däne Claudius Claussön Swart* (Innsbruck, 1909).
6. F. Nansen, *In Northern Mists* (London, 1911), II, pp. 253-76.
7. G. M. Gathorne-Hardy, *The Norse Discoverers of America* (Oxford, 1921), pp. 293, 294.
8. The maps of Sigurdur Stefánsson (c. 1590) and Hans Poulson Resen (1605), in their assignment of latitude and nomenclature, plainly identify Helluland as Baffin Land, Markland as Labrador, and Vinland as Newfoundland.
9. Nansen, II, p. 274.
10. Bayerische Staatsbibliothek, Munich, Cod. icon. 132.
11. Arthur Davies, "The last voyage of John Cabot and the rock at Grates Cove," *Nature*, CLXXVI (1955), pp. 996-8.
12. "Crucial maps in the early cartography and place-nomenclature of the Atlantic coast of Canada," *Trans. Royal Society of Canada*, ser. III, vol. XXIII, p. 159.
13. B. G. Hoffman, *Cabot to Cartier* (Toronto, 1961).
14. *Ibid.*, p. 93.
15. Williamson, *Voyages of the Cabots*, p. 123.
16. C. R. Beazley, *The Dawn of Modern Geography*, III (London, 1906), pp. 422, 454.
17. G. Ashe, *Land to the West* (London, 1961).
18. *Ibid.*, p. 293.
19. E.g. in Andrea Bianco's chart of 1448: *ya fortunat' de sa beati blandan*.
20. For contrasting views, see Armando Cortesao, *The Nautical Chart of 1424* (Lisbon, 1954), and Samuel E. Morison, *Portuguese Voyages to America in the 15th Century* (New York, 1940).
21. G. R. Crone, "The 'mythical' islands of the Atlantic Ocean," *Comptes rendus du Congr. Int. de Géographie . . . 1938* (Leiden, 1938), p. 169.

22. As in Battista Beccaro's chart of 1435: *Insule de nouo r'pte.*
23. T. J. Westropp, "Brasil and the legendary islands of the North Atlantic," *Proc. Royal Irish Academy*, sec. C, vol. XXX (1912), pp. 223-60.
24. Crone, p. 171.
25. Sir Walter Raleigh, *History of the World*, bk. II, ch. xxiii, sec. 4.
26. Museo Naval, Madrid.
27. G. E. Nunn, *The Mappemonde of Juan de la Cosa* (Jenkintown, 1934); Hoffman, pp. 87-97.
28. W. F. Ganong, "Crucial Maps," *Trans. R. S. Canada*, ser. III, vol. XXIV, pp. 137-8; Public Archives of Canada, *Sixteenth Century Maps relating to Canada* (Ottawa, 1956), p. 30; Hoffman, pp. 56-7.
29. Huntington Library, HM 427.
30. The 'King-Hamy' world map, Huntington Library, HM 45; British Museum, Add. MS 31316; and the Atlantic chart, known as Kunstmann II, in the Bayerische Staatsbibliothek, Munich.
31. See R. Almagià, "I mappamondi di Enrico Martello e alcuni concetti geografici di Cristoforo Colombo," *La Bibliofilia*, XLII (1940), 288-311; *idem*, "On the cartographic work of Francesco Rosselli," *Imago Mundi*, VIII (1951), 27-34.
32. Two world maps in Ptolemaic MSS; three world maps in MS *Isolarii*; and a wall map now at Yale (see next note).
33. Reproduced in *Yale University Library Gazette*, vol. 37, no. 1 (July 1962).
34. *Mapas Españoles de América* (Madrid, 1951), pl. I.
35. The only surviving impression is in the British Museum Map Room.
36. G. Caraci, "La produzione cartografica di Vesconte Maggiolo ed il Nuovo Mondo," *Memorie geografiche*, IV (1958), p. 287.
37. L. A. de Bougainville, *Voyage autour du monde* (Paris, 1772), Discours préliminaire.
38. Cited by Ashe, *Land to the West*, p. 49.
39. Cf. Glyndwr Williams, *The British Search for the Northwest Passage in the Eighteenth Century* (London, 1962).
40. J. E. Flecker, "Invitation."

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