

58 • Chartmaking in England and Its Context, 1500–1660

SARAH TYACKE

INTRODUCTION

The introduction of chartmaking was part of the professionalization of English navigation in this period, but the making of charts did not emerge inevitably. Mariners distrusted them, and their reluctance to use charts at all, of any sort, continued until at least the 1580s. Before the 1530s, chartmaking in any sense does not seem to have been practiced by the English, or indeed the Scots, Irish, or Welsh.¹ At that time, however, coastal views and plans in connection with the defense of the country began to be made and, at the same time, measured land surveys were introduced into England by the Italians and others.² This lack of domestic production does not mean that charts and other navigational aids were unknown, but that they and the Spanish chartmakers themselves were imported in the fifteenth and in the first half of the sixteenth century. For example, the portolan charts of the Mediterranean and the charts of the Spaniards, Portuguese, Italian, and Dieppe chartmakers were known at least in court circles. The chartmaking trade that later grew up on the Thames in London, and nowhere else in the British Isles, was part of this European chartmaking tradition and shows both foreign influence and domestic innovation.

From the mid-sixteenth century the English began to sail regularly beyond the waters of northwest Europe and needed to use some elements of mathematical navigation, written and illustrated sailing directions, and charts. This use did not come about naturally. They were forced to do so. For England, the period after 1509 was a time of lost continental glories: the loss of France, particularly of Calais in 1558, and the diminution of the English kingdom. Rodger dramatically describes the situation: “A shrunken, post-imperial England faced an uncertain and vulnerable future on the margins of a Europe now dominated by the great powers.”³ Thus the English had to consider the sea as a means to conduct foreign, military, and commercial policy more generally, not merely for sailing coastal waters and to the fishing grounds of Newfoundland.

This trend was further reinforced by their wars with Spain in the late sixteenth century, and later, in the seventeenth century, knowledge of the oceans and coastlines

was necessary to challenge the Dutch carrying trade. In this transitional period, charts were an additional tool for the navigator, who continued to use his own experience, written notes, rutters, and human pilots when he could acquire them, sometimes by force. Where the navigators could not obtain up-to-date or even basic chart information from foreign sources, they had to make charts themselves. Consequently, by the 1590s, a number of shipmasters and other practitioners had begun to make and sell hand-drawn charts in London.

In this chapter the focus is on charts as artifacts and not on navigational methods and instruments.⁴ We are

I acknowledge the assistance of Catherine Delano-Smith, Francis Herbert, Tony Campbell, Andrew Cook, and Peter Barber, who have kindly commented on the text and provided references and corrections. Other acknowledgments are noted in the footnotes.

Abbreviations used in this chapter include: *Purchas Handbook* for Loren Pennington, ed., *The Purchas Handbook: Studies of the Life, Times and Writings of Samuel Purchas, 1577–1626*, 2 vols. (London: Hakluyt Society, 1997); IOR for India Office Records; and TNA for The National Archives of the UK, Kew.

1. I say English because before 1603, when King James VI of Scotland ascended the English throne as James I, notions of being British in any modern sense were absent. In any case, the English view itself might be more accurately described as the London view from about the 1550s onward. It was London that became the center of the chart trade in late Elizabethan England. See the discussion in David Armitage, “Making the Empire British: Scotland in the Atlantic World, 1542–1707,” *Past and Present*, no. 155 (1997): 34–63, and Nicholas P. Canny, “The Origins of Empire: An Introduction,” in *The Oxford History of the British Empire*, ed. William Roger Louis, vol. 1, *The Origins of Empire: British Overseas Enterprise to the Close of the Seventeenth Century*, ed. Nicholas P. Canny (Oxford: Oxford University Press, 1998), 1–33.

2. See P. D. A. Harvey, *Maps in Tudor England* (London: Public Record Office and the British Library, 1993); Peter Barber, “England I: Pageantry, Defense, and Government: Maps at Court to 1550,” in *Monarchs, Ministers, and Maps: The Emergence of Cartography as a Tool of Government in Early Modern Europe*, ed. David Buisseret (Chicago: University of Chicago Press, 1992), 26–56; and Marcus Merriman, “Italian Military Engineers in Britain in the 1540s,” in *English Map-Making, 1500–1650: Historical Essays*, ed. Sarah Tyacke (London: British Library, 1983), 57–67.

3. N. A. M. Rodger, *The Safeguard of the Sea: A Naval History of Britain, 660–1649* (New York: W. W. Norton, 1998), 175.

4. The consideration of maps as texts—that is, not as just geographical artifacts or images, but as objects to be read and explained in a similar but different way to word texts—has been developed by a number of writers. In the book world, the late D. F. McKenzie, *Bibliography and*

concerned here with the production of charts, both manuscript and printed, for and by the English in the period from about 1500 until the 1660s. It is important to recognize that the English not only used foreign chartmakers in England but that their own chartmaking trade derived from other European traditions in terms of style, construction, and sometimes content. The charts described here and their context give us a picture of the English worldview in the same way that the first collector and editor of travels, Richard Hakluyt, does in prose.⁵

CATEGORIES OF CHARTS AND OTHER MARINE REPRESENTATIONS

As we are dealing with a period before the modern view of a “chart,” I have included not only those items that are recognizable in modern terms as navigational charts, but also those that have features more in common with views or land maps—for example, coastal profiles and perspective views. Together these categories may be called collectively “marine representations.” They show various maritime subjects, such as river mouths, coasts, and harbors, as well as large tracts of coastline and ocean. They may be rough sketches, draft surveys, or fair copies of draft surveys or copies of a particular chart, perhaps revised in some way. The use of these categories is an attempt to elucidate the processes of chartmaking and the use of charts at this period rather than developing a strait-jacket typology into which all depictions must fit.⁶

We also need to consider what the sources of marine representations might be if we are to understand their significance. They might be a primary survey, where little or no previous cartographic knowledge was available to the sailor or chartmaker. Other sources could be a compilation of surveys already at hand in the chartmaker’s workshop or merely another chart delivered to the chartmaker to have a copy made. These marine representations often included other information, such as written or oral evidence from local inhabitants or other mariners or travelers. In some cases historical or geographical information and speculation might be included, irrespective of its reliability.

ROLE OF CHARTS IN STUDIES ON EXPLORATION AND NAVIGATION

In the sixteenth and seventeenth centuries, English knowledge about exploration was developed with the works of Richard Hakluyt and his successor Samuel Purchas and in navigation by the work of numerous mathematical practitioners, who included discussions of charts and their construction in their works, sometimes mentioning specific charts or maps by way of illustration. Examples of such works include Martín Cortés’s *Arte of Navigation*

(1561) and such seminal attempts at listing mathematical and hydrographical works as John Dee’s *General and Rare Memorials Pertayning to the Perfect Arte of Navigation* (1577).⁷ Later in the next century there were attempts at maritime bibliographies, and of particular interest is that of Samuel Pepys’s unpublished “*Bibliotheca Nautica*,” based extensively on the work of his bookseller, Richard Mount. It included a list of sea atlases dating from *The Mariners Mirrour* translated by Anthony Ashley (1588) to atlases contemporary to its compilation about 1695.⁸

During the eighteenth century a number of collections of travels were published, including *A Collection of Voyages and Travels*, by the London publishers Awnsham Churchill and John Churchill in 1704 and a rival publica-

the Sociology of Texts (London: British Library, 1986), sought to use the word “text” to embrace not only books but “verbal, visual, oral, and numeric data, in the form of maps, prints, and music” (p. 5). Blake-more and Harley and others have been concerned to advance the idea that the “concept of maps [and of charts by inference] as language offers the most appropriate *underlying structure* for the history of cartography,” Michael J. Blakemore and J. B. Harley, *Concepts in the History of Cartography: A Review Perspective*, Monograph 26, *Cartographica* 17, no. 4 (1980), 87. Here I am using the term in a very wide sense, recognizing that cartographic language is distinctive, like musical and numerical language. Like them it can transcend verbal language barriers: maps and charts are visual, spatial, and can convey information simultaneously as Robinson and Petchenik observed in their seminal work, Arthur Howard Robinson and Barbara Bartz Petchenik, *The Nature of Maps: Essays toward Understanding Maps and Mapping* (Chicago: University of Chicago Press, 1976). See also Sarah Tyacke, “Intersections or Disputed Territory,” *Word & Image* 4 (1988): 571–79, and idem, “Describing Maps,” in *The Book Encompassed: Studies in Twentieth-Century Bibliography*, ed. Peter Hobbly Davison (Cambridge: Cambridge University Press, 1992), 130–41. For obvious reasons, historians have frequently used contemporary charts for the illustration of particular voyages or for works on exploration and discovery. Although some, such as David B. Quinn, have appreciated the charts as historical and cartographic documents requiring analysis in their own right, others have been content to use the charts for illustrations only. See also chapter 59 in this volume.

5. See David B. Quinn, ed., *The Hakluyt Handbook*, 2 vols. (London: Hakluyt Society, 1974).

6. The method for describing manuscript maps and charts varies and has been discussed by, among others, D. Hodson, comp., *Maps of Portsmouth before 1800: A Catalogue* (Portsmouth: City of Portsmouth, 1978).

7. For a full listing of English maritime books, see Thomas Randolph Adams and David Watkin Waters, comps., *English Maritime Books Printed before 1801: Relating to Ships, Their Construction and Their Operation at Sea* (Greenwich: National Maritime Museum, 1995). On Dee, see R. J. Roberts, “John Dee’s Corrections to his ‘Art of Navigation,’” *Book Collector* 24 (1975): 70–75.

8. Samuel Pepys set about making a bibliography of nautical books and atlases by enlisting the support and abilities of Mount. The “*Bibliotheca Nautica*” is in the Pepys Library, Magdalene College, Cambridge (PL 2643). See Robert Latham, ed., *Catalogue of the Pepys Library at Magdalene College, Cambridge*, vol. 4, *Music, Maps, and Calligraphy* (Cambridge: D. S. Brewer, 1989), xv (introduction to maps section by Sarah Tyacke).

tion by John Harris, *Navigantium atque itinerantium bibliotheca*, in 1705, but neither addressed the role of maps or charts in the history of exploration. Another major collection was Thomas Astley's *A New General Collection of Travels* published in 1745–47, which is thought to have been edited by the cartographer John Green (alias Brad-dock Mead). Green had earlier attempted a critique of maps and geography in his *Construction of Maps and Globes* (1717) to which he added an appendix, "wherein the present state of geography is consider'd. Being a seasonable enquiry into maps, books of geography and travel."⁹ Although travel narratives abounded in this period, there was little written about the editors' attitude toward the maps they had available to illustrate the history of exploration.

In the twentieth century, a list of the most important maps used in the volumes issued by the English Hakluyt Society was published in a centenary issue of 1946, but there was no evaluation of their contribution to the history of exploration.¹⁰ By the 1970s, however, *The Hakluyt Handbook* and *The Purchas Handbook* both included chapters on the maps used by editors to illustrate the texts. The recognition of the separate identity of charts and of their own contribution to the field of exploration is the result of the work of Skelton, Wallis, and their contemporaries.¹¹

This does not mean that Hakluyt and Purchas did not appreciate the significance of explorers' maps and charts, which were, after all, modern maps to them and profoundly important as evidence of new discoveries. But subsequent collectors and editors of compendiums of journals usually left these maps out of their historical collections in the eighteenth and nineteenth centuries, preferring general illustrative maps. Even Hakluyt and Purchas did not include many charts or maps in their works. Purchas inserted only six original maps. At least some were omitted for reasons of secrecy. Purchas's readers had to make do with the maps of Jodocus Hondius, which were, as Purchas said, "meane and obscure enough [that is, unlikely to be of any practical help to foreigners], but somewhat more than nothing."¹²

In the nineteenth century, more general collections continued to be published, including John Pinkerton's *General Collection of the Best and Most Interesting Voyages and Travels in All Parts of the World* published between 1808 and 1814 that, unsurprisingly, followed the format of earlier general collections. The genre of general compendiums gradually died out as scholarly standards rose and the era of chronological histories of areas of the world and their discoveries began; the histories of James Burney, Sir John Barrow, and Hugh Murray are notable examples of this new era.¹³

In the twentieth century, two seminal works on the history of navigation and mathematics were published fol-

lowing the earlier tradition of including charts as part of a wider story, namely, Taylor's *Haven-Finding Art* and *Mathematical Practitioners of Tudor and Stuart England*.¹⁴ In both, the lives as well as the works of those engaged in chartmaking were examined as part of the story of the growth of mathematical and navigational sciences in England. At the same time, Waters published the *Art of Navigation in England*, which remains the best comprehensive account of navigational practices in the period and describes chartmaking in its navigational context.¹⁵ More recently, Waters has covered a wider time span and linked the rise of chartmaking to mercantile history.¹⁶ Together with Adams he has also updated and corrected the work

9. John Green, *Construction of Maps and Globes* (London: Printed for T. Horne, 1717), quotation is from the title page. Green was a geographer and cartographer and criticized not only Hakluyt and Purchas for their editorial selection, but also the Churchill and Harris collections of travels. See an evaluation of the Green-Astley collection in G. R. Crone, "John Green: Notes on a Neglected Eighteenth Century Geographer and Cartographer," *Imago Mundi* 6 (1949): 85–91. Much useful comparative work can be found in Carol Louise Urness, "Purchas as Editor," in *Purchas Handbook*, 1:121–44. By the eighteenth century the earlier works of Hakluyt and Purchas were being criticized because they contained so much navigational information that, as another publisher of travels John Knox put it: "none but mere pilots, or seafaring people, can read them without disgust" (quoted in Urness, "Purchas," 1:122). From which we may assume that both Hakluyt and Purchas had a very utilitarian objective in publishing the journals, however the two may be judged now.

10. Edward Lynam, ed., *Richard Hakluyt & His Successors: A Volume Issued to Commemorate the Centenary of the Hakluyt Society* (London: Hakluyt Society, 1946), xxvii–xxxiv.

11. R. A. Skelton, "Hakluyt's Maps," in *The Hakluyt Handbook*, 2 vols., ed. David B. Quinn (London: Hakluyt Society, 1974), 1:48–73, and Helen Wallis, "Purchas's Maps," in *Purchas Handbook*, 1: 145–66.

12. Quoted in Wallis, "Purchas's Maps," 147.

13. The general collections of travels and the later development of the chronological histories of particular areas of the world are discussed in Loren Pennington, "Samuel Purchas: His Reputation and the Uses of His Works," in *Purchas Handbook*, 1:3–118, esp. 25. This is a useful and very informative chapter on the whole field of the history of travel writing, although centered on Purchas.

14. E. G. R. Taylor, *The Haven-Finding Art: A History of Navigation from Odysseus to Captain Cook* (London: Hollis and Carter, 1956 and 1958; new augmented ed., New York: American Elsevier, 1971), and idem, *The Mathematical Practitioners of Tudor & Stuart England* (Cambridge: Cambridge University Press, 1954). See also the obituary and bibliography of her works in *Transactions of the Institute of British Geographers* 45 (1968): 181–86. Many of her articles have not been superseded in their information and insights.

15. David Watkin Waters, *The Art of Navigation in England in Elizabethan and Early Stuart Times* (London: Hollis and Carter, 1958; 2d ed., Greenwich: National Maritime Museum, 1978), and idem, *The Rutters of the Sea: The Sailing Directions of Pierre Garcie: A Study of the First English and French Printed Sailing Directions* (New Haven: Yale University Press, 1967).

16. David Watkin Waters, "The English Pilot: English Sailing Directions and Charts and the Rise of English Shipping, 16th to 18th Centuries," *Journal of the Institute of Navigation* 42 (1989): 317–54.

of Taylor and incorporated the results into a bibliography that includes maritime atlases and sailing directions.¹⁷

THE STUDY OF CHARTS IN A BIBLIOGRAPHICAL
AND ARTIFACTUAL SENSE

The approach of Taylor and Waters may be contrasted with the work of Skelton and Wallis, who focused on maps and charts as artifacts to be described and explained primarily in the carto-bibliographical sense and within their geographical and historical context.¹⁸ The first work to offer a separate history and descriptions of early English charts of the seas around the British Isles was Robinson's *Marine Cartography in Britain*.¹⁹ Subsequently, Eden, and later Bendall, added names of chartmakers to our knowledge for this period.²⁰ For the overseas charting, various studies since the 1960s, in particular those of Smith, Campbell, and Howse and Sanderson, have very considerably improved our knowledge of what has survived but still do not constitute a comprehensive list of the extant charts.²¹

The absence of a census of surviving charts until now has led to underestimation of the English contribution to charting the world, which though small in numbers, was innovative. This contribution has been further obscured by the predominance of other countries' cartographic production and influence. For example, Cortesão and Teixeira da Mota's monumental catalog gives us an immediate and comprehensive view of Portuguese chartmaking from the late fifteenth to the late seventeenth century.²² Its sheer size and world coverage reflect the extent of the Portuguese Empire; some 1600 charts are illustrated and more described, which make the surviving English contribution of some 150 charts and other marine representations up to 1660 fade into numerical insignificance. Furthermore, it is clear that the English owed a great deal to earlier and contemporary continental chartmakers as they established a native manuscript chart trade on the Thames.

The intertwining of several traditions culminated with the hegemony of the Dutch in printed production. Few English charts were printed in the sixteenth and seventeenth centuries, and the English relied on English text versions of Dutch sea atlases for printed charts.²³ Samuel Pepys remarked upon this, with some surprise, even in the 1690s: "Nay more he [Richard Mount] tells me that ye Dutch have such a vent for all their books of navigation & coasting that besides those ones of their Lighting Column etc. which are ordinarily sent over hither & sold here they have printed sev[era]ll other books of navigation even in English which they vend [sell] to our own countrymen coming in there [presumably Amsterdam]." ²⁴ The reasons for this Dutch domination of the English market will become apparent in the story of English chartmaking and its context, 1500–1660.

THE EARLY PERIOD (TO 1560)

MAPPING AND NAVIGATIONAL CONTEXT FOR HOME WATERS AND NORTHWEST EUROPE

As land surveyors began using new techniques to describe sea defenses, the English sailor was also being exposed to new navigational ideas. In 1514 Henry VIII established Trinity House at Deptford on the Thames to regulate and advance navigation and commerce. Hakluyt thought this was in order to copy the Spaniards, who had appointed Amerigo Vespucci as first pilot-major in Seville in 1508, but doubt has been cast on this hypothesis.²⁵ Henry granted similar charters and rights to mariners on the

17. Adams and Waters, *English Maritime Books*.

18. R. A. Skelton, *Maps: A Historical Survey of Their Study and Collecting* (Chicago: University of Chicago Press, 1972), and Terry Kay, "Helen M. Wallis: A Bibliography of Published Works," *Map Collector* 40 (1987): 30–38. Among a number of studies on specific maps, atlases, and globes, see Jean Rotz, *The Maps and Text of the Boke of Idrography Presented by Jean Rotz to Henry VIII*, ed. Helen Wallis (Oxford: Oxford University Press for the Roxburgh Club, 1981), esp. 38–39 by Wallis on the *Boke* in the context of the Dieppe school.

19. Adrian Henry Wardle Robinson, *Marine Cartography in Britain: A History of the Sea Chart to 1855* (Leicester: Leicester University Press, 1962).

20. A. Sarah Bendall, *Dictionary of Land Surveyors and Local Map-Makers of Great Britain and Ireland, 1530–1850*, 2d ed., 2 vols., originally comp. Francis W. Steer and ed. Peter Eden (London: British Library, 1997).

21. Thomas R. Smith, "Manuscript and Printed Sea Charts in Seventeenth-Century London: The Case of the Thames School," in *The Compleat Plattmaker: Essays on Chart, Map, and Globe Making in England in the Seventeenth and Eighteenth Centuries*, ed. Norman J. W. Thrower (Berkeley: University of California Press, 1978), 45–100; Tony Campbell, "The Drapers' Company and Its School of Seventeenth Century Chart-Makers," in *My Head is a Map: Essays & Memoirs in Honour of R. V. Tooley*, ed. Helen Wallis and Sarah Tyacke (London: Francis Edwards and Carta Press, 1973), 81–106; and Derek Howse and Michael W. B. Sanderson, *The Sea Chart: An Historical Survey Based on the Collections in the National Maritime Museum* (Newton Abbot: David and Charles, 1973).

22. Armando Cortesão and A. Teixeira da Mota, *Portugaliae monumenta cartographica*, 6 vols. (Lisbon, 1960; reprint, with an introduction and supplement by Alfredo Pinheiro Marques, Lisbon: Imprensa Nacional-Casa da Moeda, 1987).

23. C. Koeman, *Atlantes Neerlandici: Bibliography of Terrestrial, Maritime, and Celestial Atlases and Pilot Books, Published in the Netherlands up to 1880*, 6 vols. (Amsterdam: Theatrum Orbis Terrarum, 1967–85).

24. On 14 May 1695 Samuel Pepys recorded a conversation with Richard Mount in which the full extent of the Dutch monopoly of sea atlases had finally been revealed to him: "Bibliotheca Nautica," Pepys Library, Magdalene College, Cambridge, 2643, fol. 83.

25. Robinson, *Marine Cartography*, 25, states that "Henry VIII, in his desire to improve the safety of navigation, not only encouraged chart-making but also put plans in hand for training pilots and establishing sea-marks along well-frequented shipping lanes and port approach channels. Organizations charged with regulating pilotage were developed during the first part of the sixteenth century at ports like Kingston-upon-Hull, Newcastle, Bristol, and London." On the founda-

rivers Tyne (1536) and Humber (1541). It is not clear that these grants had any effect on the introduction of chart-making; few charts survive of coastal waters from this early period. However some of the most skillful pilots were members of Trinity House, including John Rut, leader of one of the earliest voyages in search of China.²⁶

Pilots acquired knowledge about local coastal waters—depths, tides, and so on—from older pilots and from their own experience; they likely kept such knowledge secret to protect their jobs. Only when sailors started to journey farther afield was it necessary to make more formal records to demonstrate the route. In the 1560s, under the influence of Stephen Borough, who petitioned for the establishment of the post of chief pilot of the realm, the powers and duties of Trinity House were greatly expanded to issue certificates of competence for the master, wardens, and assistants to mariners. In 1604 James I gave them a new charter that specifically mentioned “the cunning, knowledge, or science of seamen and pilots” as one of its duties.²⁷ Charts, however, were not mentioned.

Thus we may assume that mariners had or made their own oral and written directions. For example, the English shipmaster John à Borough (Aborough), who was engaged in the Newcastle coal trade to England’s French possessions, is recorded in 1533 as having an English rutter that he had compiled himself.²⁸ In 1528 the first woodcut book of sailing directions, or rutter, was published in London; these were for coastal and North Sea waters and the Channel, the normal run for English mariners. Its name “rutter” was a translation of *routier*, written by the French pilot Pierre Garcie, whose work had been first published in French in Rouen about twenty years earlier. Garcie was a shipmaster of St. Gilles sur Vie, and the English publisher and translator Robert Copland explained that the original was brought to him by “a sad [trustworthy] ingenious and circumspect mariner of the City of London” who had obtained it in Bordeaux.²⁹ The rutter covered the bearings, distances, and tides of the coasts (including Ireland) from the Strait of Dover to the Strait of Gibraltar with courses and distances only to the Levant, but with depths shown by soundings.

In the 1550s, presumably because of the growing east-coast collier trade, directions for the coast from Berwick southward by Richard Proude were added. These directions were written in a style already traditional in the fifteenth century, which Proude, who is otherwise unrecorded, edited for inclusion in the Garcie rutter.³⁰ At the same time as printed rutters were introduced in London, a rutter for Scottish waters was prepared by the Scottish pilot Alexander Lindsay to commemorate James V’s sea journey around the Scottish coasts in the summer of 1540. It seems that the English admiral John Dudley, Viscount Lisle, acquired a copy of it. He then went to France in 1546 to ratify the peace with the French and

met Nicolas de Nicolay, sieur d’Arfeuille, a painter who became *géographe du roi* for the French king Henri II about 1552. In 1540, he was persuaded to go to England and was employed in making paintings of all the English ports for the English government. On 7 March 1548 Dr. Nicholas Wooton complained to the Privy Council that “a French painter named Nicolas had taken to

tion of Trinity House at Deptford, see Alwyn A. Ruddock, “The Trinity House at Deptford in the Sixteenth Century,” *English Historical Review* 65 (1950): 458–76. Waters, *Art of Navigation*, describes the expansion of Trinity House’s powers in the reign of Elizabeth I, when Stephen Borough’s petition of 1564 to be made chief pilot of the realm was accepted and then changed. The improvements Stephen Borough sought, which he had seen in Spain, were to be made by the “administrative machinery already at hand” (p. 106). It was Trinity House that was “directly concerned with the navigational competence of the masters and pilots of the Royal Navy” (p. 107).

26. James Alexander Williamson, *Maritime Enterprise, 1485–1558* (Oxford: Clarendon Press, 1913), and Samuel Purchas, *Hakluytus Posthumus; or, Purchas His Pilgrimes: Contayning a History of the World in Sea Voyages and Lande Travells by Englishmen and Others*, 20 vols. (Glasgow: James MacLehose, 1905–7), 14:304–5.

27. Waters, *Art of Navigation*, 112, citing J. Whormby, *An Account of the Corporation of Trinity House of Deptford Strond, and Sea Marks in General* (London, 1746; 1861 ed.).

28. Taylor, *Mathematical Practitioners*, 167.

29. Quoted in E. G. R. Taylor, “French Cosmographers and Navigators in England and Scotland, 1542–1547,” *Scottish Geographical Magazine* 46 (1930): 15–21, esp. 17. See also Waters, *Rutters of the Sea*, 3–4, and W. A. R. Richardson, “Coastal Place-Name Enigmas on Early Charts and in Early Sailing Directions,” *Journal of the English Place-Name Society* 29 (1996–97): 5–61.

30. Taylor, *Mathematical Practitioners*, 311, where she also indicates, although I have not confirmed it, that the text of the directions was available in manuscript; she cites one of about 1400 but does not give the reference. Waters, “English Sailing Directions,” 319, and Taylor, “French Cosmographers,” 17, dated the edition of the Garcie rutter with the directions southward from Berwick to 1541, but Adams and Waters, *English Maritime Books*, 77 (entry 1145), date the edition of the Garcie rutter that included “a rutter of the north” by Richard Proude to 1555. See also Waters, *Rutters of the Sea*, 4–5 and 13–14.

William Ebesham, a late fifteenth-century scribe, described as a gentleman of Westminster (1475–78), copied certain manuscripts for Sir John Paston, including sailing directions around England and to San Sebastián, Spain. See A. I. Doyle, “The Work of a Late Fifteenth-Century English Scribe, William Ebesham,” *Bulletin of the John Rylands Library* 39 (1957): 298–325. See also James Gairdner, ed., *Sailing Directions for the Circumnavigation of England, and for a Voyage to the Straits of Gibraltar (from a 15th Century MS.)* (London: Hakluyt Society, 1889). Another rutter-type work was *Mappa mundi, Othervyse Called the Compasse and Cyrcuet of the World* (London: R. Wyer, [ca. 1550]); Adams and Waters, *English Maritime Books*, 177 (entry 2405). For an account of Italian and Spanish sailing directions relating to the British Isles, see W. A. R. Richardson, “Northampton on the Welsh Coast? Some Fifteenth and Sixteenth-Century Sailing Directions,” *Archaeologia Cambrensis* 144 (1995): 204–23. The rutters discussed are by Bernardino Rizo published in Venice, 1490 (Biblioteca Nazionale di San Marco, Venice), and by A. Alvarez in 1588. The only known printed version is in the Archivo General de Simancas and is annotated by Philip II. A manuscript version is at the BL, Add. MS. 17638. Richardson casts doubt on their usefulness owing to the corruptions introduced by copying.

France plans of all the English ports” and a copy of the Lindsay rutter, copied from the one in Dudley’s possession. Wooton described it as “handwritten in the Scottish language, containing the navigational route of the King of Scotland, James V . . . made around his kingdom . . . together with the marine map made quite large.”³¹

Tide tables, like rutters, became common in England by the middle of the sixteenth century. These were made in manuscript by the Breton almanac makers, notably Jean Troadec and Guillaume Brousson of Conquet, a port on the northwest coast of Brittany. A number survive that also include a small illustrative diagram (a chart to illustrate the tide tables) covering the coasts of Europe from the Strait of Gibraltar to Gdańsk in the Baltic.³² Their early use in England is attested to by the manuscript version copied by John Marshall in about 1550, which he presented to the Earl of Arundel.³³ The earliest surviving English chart was drawn by John à Borough in 1539 (figs. 58.1 and 58.2). This rough sketch of the channel into the Zuiderzee was drawn on the reconnaissance mission by Borough and Richard Couch. The sketch was incorporated into a chart of the southern North Sea, Zuiderzee, and eastern English Channel.³⁴

LONG-DISTANCE CHARTING AND ITS EARLY USE IN ENGLAND

Before the mid-sixteenth century, charts were, from the scant evidence noted below, either not used or they were provided by the French, Venetians, and the Portuguese. The nature of navigation was quite simple even on oceanic voyages. Ocean navigation consisted of latitude sailing, or running along the latitude of a customary landfall. For example, on the run to Europe from the east coast of America the latitude of the tip of the southwest coast of Ireland was first found opposite on the east coast of America and then followed until the Irish cape was sighted. Similarly, the prevailing winds and the currents in the Atlantic were well known, at least to the Portuguese pilots whom the English employed when they could. The use of the cross staff to establish latitudes, the log and line to establish the likely speed and distance covered by the ship, the deep sea line to discover a line of depths off shore to follow safely, knowledge of the compass, and at night the position of the stars and setting a course thereby were the professional tools and skills of the navigator. Charts were another such instrument in the toolkit, but not necessarily regarded as critical to successful navigation. When the English began to make them, they were often an *aide-mémoire* for the route or destination or used to confirm a particular position.

With the exception of voyages in the northwest Atlantic from Bristol and some to Guinea in West Africa, English maritime activity was limited.³⁵ However, some charts

were known in England before 1550. The earliest surviving chart made in England appears to have been drawn by the Venetian galley officer Andrea Bianco while he was in port in London in 1448.³⁶ He is generally thought to have had a chart or information in Lisbon about the Portuguese discoveries of western Africa beyond Cape Bojador. There is no evidence that this was a chart for an English client.

A second reference to a specific chart in England dates from 1488, when Bartholomew Columbus presented a map of the world to Henry VII.³⁷ According to Hakluyt,

31. Taylor, “French Cosmographers,” 15–16; A. B. Taylor, “Name Studies in Sixteenth Century Scottish Maps,” *Imago Mundi* 19 (1965): 81–99; and idem, *Alexander Lindsay, a Rutter of the Scottish Seas, circa 1540*, ed. I. H. Adams and G. Fortune (Greenwich: National Maritime Museum, 1980). The published version is Nicolas de Nicolay, *La navigation du Roy d’Escosse Iaques Cinquiesme du nom, avtour de son royaume . . .* (Paris: Chez Gilles Beys, 1583). For further references to the Lindsay rutter, see Barber, “England I,” 51 n. 81.

32. Louis Dujardin-Troadec, *Les cartographes bretons du Conquet: La navigation en images, 1543–1650* (Brest: Imprimerie Commerciale et Administrative, 1966), esp. 49–52 and 67–72. See also Derek Howse, “Brousson’s Tidal Almanac, 1546: A Brief Introduction to the Text and an Explanation of the Working of the Almanac,” in *Sir Francis Drake’s Nautical Almanack, 1546*, by Guillaume Brousson (London: Nottingham Court Press, 1980), a facsimile of the manuscript in the Pepys Library, Magdalene College, Cambridge (PL1). This particular manuscript once belonged to Francis Drake. See also Derek Howse, “Some Early Tidal Diagrams,” *Mariner’s Mirrour* 79 (1993): 27–43.

33. BL, MS. Royal 17.II.

34. BL, Aug. I.ii.64; Alwyn A. Ruddock, “The Earliest Original English Seaman’s Rutter and Pilot’s Chart,” *Journal of the Institute of Navigation* 14 (1961): 409–31; and Barber, “England I,” 52 n. 102.

35. The story of the early English endeavors is to be found in the works of David B. Quinn, Alwyn A. Ruddock, and Kenneth R. Andrews. For voyages from Bristol westward, see Patrick McGrath, “Bristol and America, 1480–1631,” in *The Westward Enterprise: English Activities in Ireland, the Atlantic, and America, 1480–1650*, ed. Kenneth R. Andrews, Nicholas P. Canny, and P. E. H. Hair (Liverpool: Liverpool University Press, 1978), 81–102; David B. Quinn, ed., *New American World: A Documentary History of North America to 1612*, 5 vols. (New York: Arno Press, 1979), 1:91; and T. F. Reddaway and Alwyn A. Ruddock, “The Accounts of John Balsall, Purser of the *Trinity of Bristol*, 1480–1,” *Camden Miscellany* 23 (1969): 1–28. See also P. E. H. Hair and J. D. Alsop, *English Seamen and Traders in Guinea, 1553–1565: The New Evidence of Their Wills* (Lewiston: Edwin Mellen Press, 1992), 5–7.

36. The original is held in the Biblioteca Ambrosiana, Milan (Bod. F 260 Inf.) A black and white illustration is in Yüsuf Kamāl (Youssef Kamal), *Monumenta cartographica Africae et Aegypti*, 5 vols. (Cairo, 1926–51), 5:1492, reprinted in 6 vols., ed. Fuat Segzin (Frankfurt: Institut für Geschichte der Arabisch-Islamischen Wissenschaften an der Johann Wolfgang Goethe-Universität, 1987), 6:312–13. The signature reads: “Andrea biancho, venician comito di galia mi fexe a londra Mcccc.xxxviiij.” See Cortesão and Teixeira da Mota, *Portugaliae monumenta cartographica*, 6:50–51.

37. The chart or one thought to be like it exists in the BNF, Département des Cartes et Plans, and was first described by Charles de La Roncière, *La carte de Christophe Colomb* (Paris: Les Éditions Historiques, Édouard Champion, 1924). Since then the question about its authorship



FIG. 58.1. JOHN À BOROUGH, ROUGH SKETCH OF THE CHANNEL INTO THE ZUIDERZEE, 1539. This sketch was drawn with east at the top on the reconnaissance voyage by the shipmasters John à Borough and Richard Couch to determine how best to fetch Anne of Cleves to England for her marriage to Henry VIII. From the upper-left corner in a clockwise

direction, the modernized place-names were Zwolle, Kampen, Harderwijk, Amsterdam, Holland, Egmond, Huisduinen, Texel, Vlieland, Vlietstroom (the "fley" identifies a small island at the entrance to IJsselmeer), Urk, Enkhuizen, and Wieringen. Size of the original: ca. 31.9 × 42.2 cm. Photograph courtesy of the BL (Cotton MS. Aug. I.ii.29).

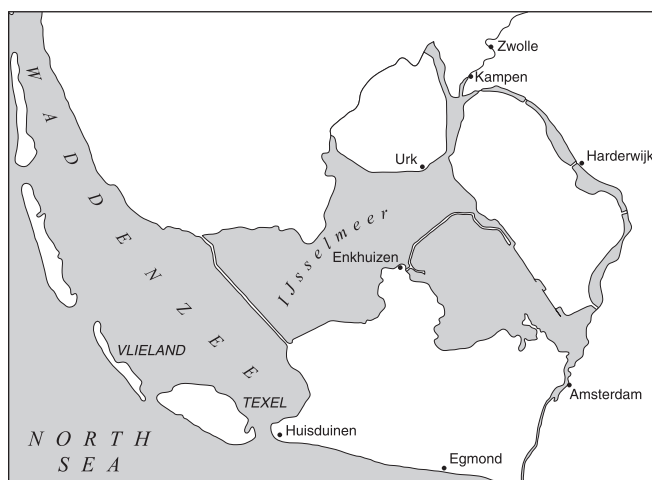
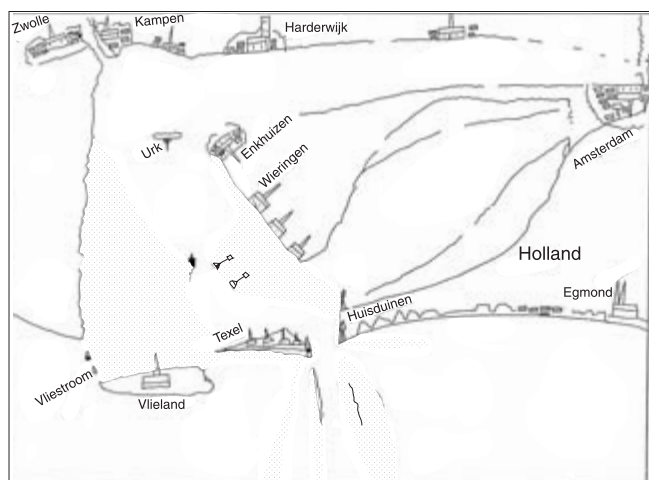


FIG. 58.2. REFERENCE MAPS FOR FIGURE 58.1. Based on the cartography of Julie Snook.

Bartholomew had been sent to see Henry VII to persuade him to back a voyage by the Columbus brothers to the West Indies. Bartholomew was described by Hakluyt as being able to “very wel make sea cards & globes.”³⁸ The third recorded chart is that of Sebastian Cabot, which was said to have shown the Northwest Passage that he claimed to have discovered. It was noted in 1566 by Sir Humphrey Gilbert in the queen’s Privy Gallery at Whitehall.³⁹ These are the sole references to charts made or presented in England before 1500.

There are a few references to card or chartmaking between 1500 and 1550, and some actual charts and world maps from the 1540s have survived.⁴⁰ One such chart fragment is now a binding of a Court Leet Book of Portsmouth, probably drawn well before the book was bound sometime in 1561.⁴¹ It shows the southwestern approaches to the Channel.

Henry VIII encouraged the best technicians from Europe to work for him, especially the French. Taylor surmised that at least some of the plats and views of the British coasts that survive from the period 1544–47 must be by the French employed by Henry, and in particular, Nicolay in 1546.⁴² One of them was Jean Rotz, by origin Scottish, but a native of Dieppe. Rotz seems to have been a sailor and is thought to have been on a voyage to Brazil in 1539. In the atlas he drew for Henry VIII, he recorded the voyages of Parmentier to the Far East (1529). The charts were in the style of the Dieppe school, and the atlas seems to have been compiled about 1534. Rotz was employed by Henry as royal hydrographer until Henry’s death in 1547, when he seems to have returned to France.

There are no signed Rotz plans in English collections, but we know he went to the French ambassador Odet de Selve in 1547 and offered him harbor plans and promised maps of Scotland and England if he could be allowed to return to France on the death of Henry VIII, which meant halving his salary. Barber concludes that the map of the English Channel of about 1542 may be by Rotz.⁴³ As for the Rotz atlas, it does not seem to have emerged into the mainstream of later chartmaking in England, although it was known as an antiquarian item to Samuel Pepys.⁴⁴

De Selve records that there were sixty French pilots and mariners in Henry’s service. Besides Nicolay and Rotz, we know of Jean Ribaut of Dieppe, who fought in the Anglo-Scottish war in 1547 and later went to Florida, and Raulin Secalart (Raoullin le Taillois), a pilot and cosmographer of Honfleur. De Selve writes of him that he was well skilled in his craft and had been associated with the famous João Afonso, a Portuguese cartographer working in France, who helped the sieur de Roberval, Jean-François de La Rocque, to Canada. Henry also employed Jean Maillard, who described himself as calligrapher, cosmographer, and mathematician. In about 1543 Maillard offered his services to Henry, presenting him with a met-

has raged. Although not accepted as being by Bartolomew Columbus by Italian scholars (pp. 175–76, note 12, in this volume), Marcel Destombes (“Une carte interessant les études colombiennes conservée à Modène,” in *Studi colombiani*, 3 vols. [Genoa: S.A.G.A., 1952], 2:479–87) followed more recently by others (for example, Monique Pelletier, “Peut-on encore affirmer que la BN possède la carte de Christophe Colomb?” *Revue de la Bibliothèque Nationale* 45 [1992]: 22–25), continue to argue the case. Quinn put forward the possibility that the map associated with Bartholomew Columbus made for Henry VII may have found its way to Paris at some point after 1488, once Henry had lost interest. See David B. Quinn, *England and the Discovery of America, 1481–1620, From the Bristol Voyages of the Fifteenth Century to the Pilgrim Settlement at Plymouth: The Exploration, Exploitation, and Trial-and-Error Colonization of North America by the English* (London: Alfred A. Knopf, 1974), 69–71, and idem, *New American World*, 480. The most recent examination of the chart that supports Quinn’s hypothesis is Helen Wallis, “Is the Paris Map the Long-Sought Chart of Christopher Columbus?” *Map Collector* 58 (1992): 21–22. And see also David B. Quinn, “Columbus and the North: England, Iceland, and Ireland,” in *European Approaches to North America, 1450–1640*, by David B. Quinn (Aldershot: Ashgate, 1998), 18–40, esp. 27–35.

38. Quoted in Richard Hakluyt, *The Principal Navigations Voyages Traffiques & Discoveries of the English Nation . . .*, 12 vols. (Glasgow: James MacLehose and Sons, 1903–5), 7:137.

39. Humphrey Gilbert, *A Discourse of a Discoverie for a New Passage to Cataia* (London: Henry Middleton, 1576), D.iii, but written ten years earlier. Richard Willes in *The History of Travayle in the West and East Indies* (London: Richard Iugge, 1577), fols. 231b–232, refers to “a table” presumably of latitudes, “which my goode Lorde your father [the Earl of Bedford] hath at Cheynies, and so tryed this last year by your Honours servaunt as hee reporteth, and his carde and compasse doe witnesse.” Cited in James Alexander Williamson, *The Cabot Voyages and Bristol Discovery under Henry VII* (Cambridge: Published for the Hakluyt Society at Cambridge University Press, 1962), 278–79. Hakluyt records that all Cabot’s “mappes & discourses drawne and written by himselfe . . . are in the custodie of the worshipfull master Willi[am] Worthington,” and that he, Hakluyt, was hoping to publish them but he never did, and their fate is unknown. Richard Hakluyt, *Divers Voyages Touching the Disouerie of America, and the Ilands Adiacent unto the Same . . .* (London: T. Woodcocke, 1582), opposite A3 verso. The latest reference to the Cabot charts is given in a list of maps delivered to Samuel Pepys to be kept in the Admiralty Office on 20 April 1688 (Oxford, Bodleian Library, MS. Rawl. A.171, 17r–20v), cited in Helen Wallis, *The Royal Map Collections of England* (Coimbra: Junta de Investigações Científicas do Ultramar, 1981), 467.

40. For example, Sebastian Cabot was paid 26s 8d on 1 May 1512 for making a “carde of Gascoigne and Guyon” in France for Henry VIII. BL, Add. MS. 21481, fol. 92, cited in Barber, “England I,” 27. Cabot left for Spain and did not return to England until 1548, when he was involved in the plans for the voyage of Willoughby and Chancellor to find the Northeast Passage of 1553.

41. Portsmouth, City Records Office, Court Leet Book (1 December 1550–1 December 1561) (L2/1).

42. Taylor, “French Cosmographers,” 17–20. Taylor’s article is the basis for what follows on the French chartmakers. The references to the French in England come from Odet de Selve, *Correspondance de Odet de Selve, ambassadeur de France en Angleterre (1546–1549)* (Paris: Félix Alcan, 1888).

43. Barber, “England I,” 36; BL, Cott. MS. Aug.I.ii.65, 66.

44. Cited in Wallis, *Royal Map Collections*, 463. Pepys comments on the atlas: “examine very well the King’s Library at St James’s, and particularly the hydrographical draughts presented to Henry 8th by John Rotz, a servant of his.” This was part of his “Bibliotheca Nautica” project (see p. 1723, note 8).

rical version of part of the rutter of João Afonso. Maillard made a world map to embellish his rendering.⁴⁵

The French were not the only chartmakers in London in the 1540s. In 1547 Diogo Homem, the son of Lopo Homem, master of the king of Portugal's navigation charts, was living in London. Diogo produced eleven surviving charts and twelve atlases from 1557 until about 1576, but he had been making charts since the 1540s.⁴⁶ After he left London, he is recorded in Venice in 1568, where he seems to have remained at least until 1576. The first London references to Diogo are both for the year 1547, when he arrived in London, having been banished from Lisbon for allegedly killing one Antonio Fernandes in Lisbon in 1544. According to the record in the High Court of Admiralty in London to whom Diogo had applied, he had agreed to make a chart for a Venetian called Aloisius Blancus at his own expense, but when he finished the chart, presumably a world chart in atlas or sheet form, the Venetian had refused to pay. The documentation also reveals the general lack of cartographic skills in England in that one of the witnesses on Diogo's side said the chart was worth eighty ducats as "having respect to the want and lack of expert lernyed men in that faculte of making of cartes or mappes and the scaryte and price of suche cartes witheyn this realme of England."⁴⁷ Although some allowance must be made for special pleading, the comment seems to corroborate the true state of cartographic affairs. The chart does not survive.

André Homem, perhaps a cousin of Diogo, was also exiled from Portugal. In 1567 he was in London with another Portuguese, Antão Luís, offering to give to Queen Elizabeth I "one hundred and fifty leagues on the coast of Ethiopa [i.e., West Africa]" if she would send a fleet under their command and make them governors of the land.⁴⁸ This unreasonable offer was not accepted, and André went back to Paris, where he reentered the service of the French king. As late as 1586, Hakluyt, then in Paris, referred to him in a letter to Sir Walter Raleigh. Homem was supposed to be drawing a chart of the voyage of Antonio de Espejo to New Mexico in 1582 but had not done so. He writes: "Yor mape answerable unto the Spanish voyage of Antonio de Espejo, uppon occasion of business unlooked for, hath bin hitherto differred [deferred] by andrew Home the Portingale, the prince of the Cosmographers of this age."⁴⁹

The English continued to use foreign chartmakers throughout the sixteenth century. Another Portuguese pilot and chartmaker in the service of the English was Simão Fernandes, who visited John Dee on 20 November 1580 with a chart of the world that was copied at Dee's house and showed place-names on the Atlantic coast of Central and North America.⁵⁰ An Italian, Battista Testa Rossa, made a chart in London in 1557,⁵¹ and the Irish-Italians Edmond Doran and his son Hercules worked in London in 1585–86. Hercules then moved on to Mar-

seilles in 1592.⁵² The best chartmakers of whatever nationality were sought after as purveyors of technical drawing skills and, of course, geographical knowledge. Such knowledge was sometimes equated with secrets in Spain, Portugal, France, England, and the Low Countries, as competition, both military and commercial, increased among the countries bordering the English Channel. Until the uneasy peace with Spain in 1603, Spanish charts, for example, were acquired by the English government by whatever methods available to gain intelligence of Spanish activities.⁵³ The same was true of Spain, which acquired charts of the English Channel coasts in the 1590s from an English Catholic pilot. He was called "N. Lambert" and offered the charts and his services to Philip II via an intermediary, the English Jesuit exile Robert Parsons, with a view to possible Spanish raids on English

45. BL, Royal MS. 20.B.xii, facing fol. 5 is a colored map of the world in hemispheres.

46. See Cortesão and Teixeira da Mota, *Portugaliae monumenta cartographica*, 2:3–10. For the reference to Diogo's time in London, see also John W. Blake, "New Light on Diogo Homem, Portuguese Cartographer," *Mariner's Mirror* 28 (1942): 148–60.

47. The witnesses in the High Court of Admiralty case (TNA, HCA 19 April 1547, no. 72) for Diogo were "Ferdynande Gonsaluez, shypmaster, being lernyd in cosmographye" and the Corsican "Petur Poll, beyng experte in shypman's occupacyion."

48. Quoted in Cortesão and Teixeira da Mota, *Portugaliae monumenta cartographica*, 2:67–69; refers to a letter in BL, Cotton MS. Nero B I, fol. 154. André Homem avoided the fate of Luís, who was hanged by the Portuguese as a traitor, but an attempt was made on his life in Paris, and he was subsequently arrested in 1567 when he landed in Bilbao. He somehow survived and returned to Paris.

49. E. G. R. Taylor, ed., *The Original Writings & Correspondence of the Two Richard Hakluyts*, 2 vols. (London: Hakluyt Society, 1935), 2:355.

50. See David B. Quinn, "Simão Fernandes, a Portuguese Pilot in the English Service, circa 1573–1588," in *Actas* (Congresso International de Historia dos Descobrimientos), 6 vols. (Lisbon: Comissão Executiva das Comemorações do V Centenário da Morte do Infante D. Henrique, 1961), 3:449–65. See Cortesão and Teixeira da Mota, *Portugaliae monumenta cartographica*, 2:129–31; the chart is reproduced as pl. 240. The original is at the BL, Cotton Roll. XIII.48. The inscription on the chart reads: "The cownterfet of Mr Fernando Simon his sea carte which he lent unto my master at Mortlake [generally considered to be John Dee] Ao 1580. Novemb.20 The same Fernando Simon is a Portugale, and borne in Tercera beyng one of the iles called Azores."

51. The chart Baptista Testa Rossa made is in the Royal Geographical Society, London, RGS Library: 265.c.16, and was drawn to my attention by the map curator, Francis Herbert. We know the chart was made in London in 1557 because fol. 1 verso of the accompanying manuscript text includes the place and date "de Londra lano 1557."

52. See appendix 58.1 for the works of the Dorans in London in 1586.

53. Additional charting available to the English government in the late sixteenth century as distinct from that which was produced for it in London by foreign practitioners is described in Wallis, *Royal Map Collections*, and idem, *Material on Nautical Cartography in the British Library, 1550–1650* (Lisbon: Instituto de Investigação Científica Tropical, 1984), 196, where she cites the Atlantic chart of 1596 by the Portuguese cartographer Cipriano Sanches Vilaviciêncio (BL, Cotton Roll. XIII.46).

coasts after the failure of the Armada in 1588. Similarly, an English chart showing the intended activities of Walter Raleigh in Guiana in 1618 was sent to Spain via a French spy.⁵⁴ The absence of English chartmaking in England was thus clearly related to the small number of English voyages beyond Europe and to the predominance in England of the Italians, Portuguese, and French chartmakers.

ENGLISH-MADE OVERSEAS CHARTS AND THEIR SURVIVAL RATES (1560–1660)

The relatively abrupt beginnings of English overseas chartmaking dates to the 1560s. Among the 150 or so English marine representations and manuscript charts surviving from 1560–1660 (see appendix 58.1)⁵⁵ there are a number relating to areas first explored by the Dutch, English, French, and Scandinavians. In the case of the Northeast and Northwest Passages and for parts of the Americas, such as New England, Guiana, and the Amazon basin, English charting was based almost entirely on their own surveys. For other areas of the world the evolution of the cartographic view was more complex. There was little point, for example, in making charts of areas like West Africa or the East Indies when such charts were available from the Portuguese. In the East Indies, both the Dutch and the English, who entered the area a century after the Portuguese and the Spaniards, copied and revised Portuguese and Spanish charts and, when that process proved inadequate, made new surveys.

SURVIVAL AND COVERAGE OF THE CHARTS

For the period 1551–70, only two English marine representations survive, although others were mentioned by contemporaries, notably by the mathematician and geographer John Dee.⁵⁶ Both the depictions are by William Borough and show the coastline from Norway to Novaya Zemlya; they are associated with the exploration of the Northeast Passage to China. For the next decade, six charts survive reflecting the exploration into the North Atlantic, the continuing attempts to find a northeast passage, the trading voyages into the Baltic and White seas, and a concern with the navigational hazards of the southwestern approaches to the English Channel (fig. 58.3). In the 1580s, chartmaking seems to have gathered momentum—twenty-eight representations survive. These reflect widening geographical coverage, again more associated with exploration than trade but, as might be expected in this decade, the war with Spain is heavily represented. There are ten coastal sketches and charts of Spanish waters. The charts of the American coast from Cape Florida to Chesapeake Bay, drawn by the English artist John White, date from this period, as well as the charts of the South Atlantic and the Pacific associated with Francis Drake's and

Thomas Cavendish's expeditions of 1586–88 and 1591–92 respectively. In the 1590s the number of charts surviving remained similar but with additional coverage of the Caribbean and northern South America, reflecting English privateering activities and exploration in these regions.

At the turn of the century the earliest English copy of a Portuguese sea atlas, comprised of seventeen charts showing the route to the East Indies via the Cape of Good Hope and the Indian Ocean, was drawn by Martin Llewellyn, later steward of St. Bartholomew's Hospital. From 1600 to 1610 interest in Arctic waters reemerged; this time centered around the exploration of Spitsbergen and Greenland. From 1611 to 1620 the number of surviving charts rises to eighteen and includes general charts of the Mediterranean and Atlantic as well as charts relating to the exploration of Guiana, the Amazon, Spitsbergen, Hudson Bay, and the Arctic. The most notable item from this period is the atlas of the East Indies (ca. 1620) by the chartmaker Gabriel Tatton. In the 1630s fourteen charts survive. Even if the number of surviving charts is small, by the end of the 1630s all of the known world's seas and coasts had been charted by the English: the Mediterranean, the North and South Atlantic, the Caribbean, Western European waters, northern European and Arctic waters, and, insofar as they had been explored, the Northwest and Northeast Passages, the Pacific Ocean, the Indian Ocean, and the China Sea. In manuscript chart coverage, the English were now self-sufficient for the voyages they undertook (fig. 58.4).

Most of the surviving representations are fair copies of surveys or copy charts and may well have been preserved by being presented to the backers of various enterprises and then acquired by public collections in the nineteenth and twentieth centuries. A substantial number are rough sketches of coastal features taken at the time by the shipmaster himself. Increasingly in the seventeenth century such drafts were taken to a chartmaker to make a professional copy chart.

The reasons for the small number of charts that survive and the gaps in coverage over the period are difficult to explain. Part of the reason must be that certainly before 1600 few were made. We may assume they were passed on and just wore out. This reason for loss may have been compounded by the practice of using secondhand vellum

54. W. A. R. Richardson, "An Elizabethan Pilot's Charts (1594): Spanish Intelligence Regarding the Coasts of England and Wales at the End of the XVIth Century," *Journal of Navigation* 53 (2000): 313–27. The chart of Guiana is in Spain, Archivo General de Simancas (M.P.y D., IV–56) and was probably drawn by Gabriel Tatton about 1617.

55. The analysis in this section is based on my unpublished catalog of overseas charts and marine representations drawn in England from 1550 to 1660. No doubt more charts or references to them will emerge, so the numbers presented here are no more than indicative.

56. John Dee, "Famous and Rare Discoveries," BL, Cotton MS. Vitellius CVII, fols. 68v, 70, 71v.

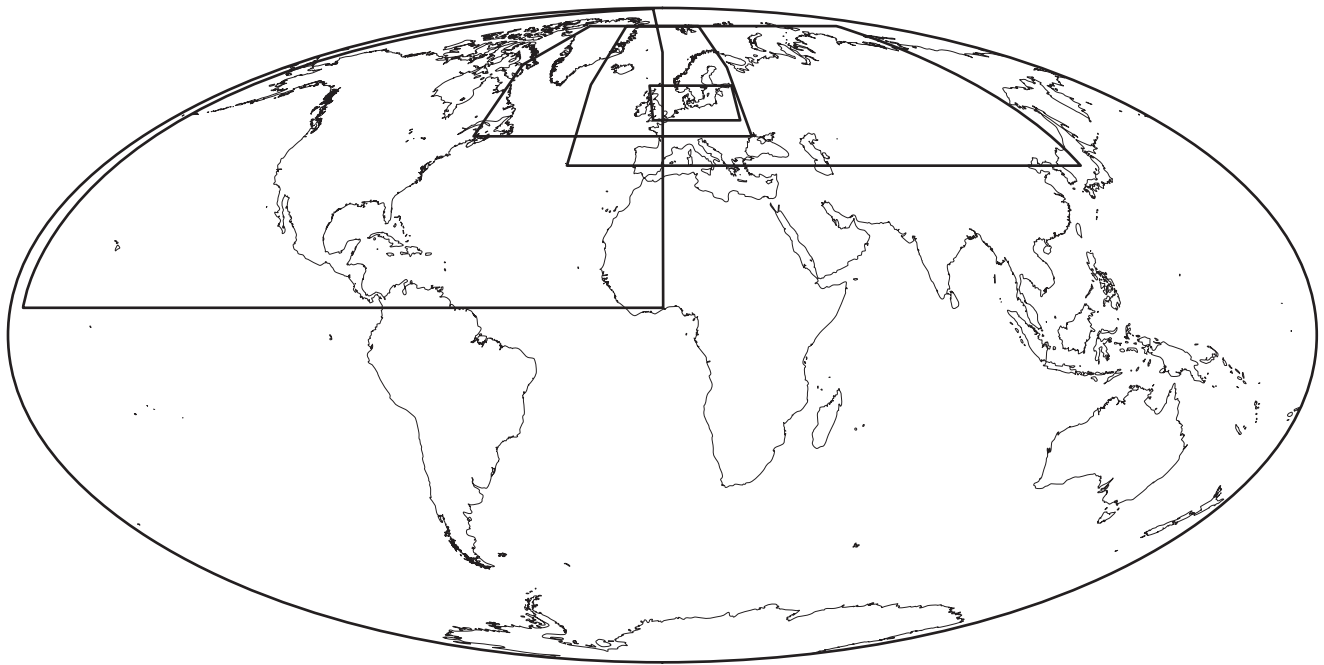


FIG. 58.3. COVERAGE OF CHARTS DRAWN BY THE ENGLISH, 1560–80. Note the predominance of the Northeast

and Northwest Passages charting that survives. Based on the cartography of Julie Snook.

to make bindings, on which a number of fragments of charts have been found.⁵⁷ Outdated charts on vellum remained valuable for the vellum itself.

The type of collections that survive may also imply that certain sorts of charts survived rather than others. Most collections now existing are connected with royalty or government, which probably favored the survival of charts recording exploratory voyages important to the crown rather than those for use on commercial sailings by the trading companies. The best collections are the Royal collections (now in the BL), those owned by Sir William Cecil, and those acquired or copied by the antiquary Sir Robert Cotton, also in the BL.⁵⁸ Later in the seventeenth century the collections of those members of the aristocracy who backed ventures or who were part of the government also contain charts, and their records often mention charts no longer extant.

Even at this aristocratic level of collection, the anecdotal evidence of the existence of charts now lost implies that many more charts were once available. For example, ten charts were made for the Earl of Denby, Charles I's ambassador to Persia in 1625; this number would add substantially to the present total of twenty-five listed in appendix 58.1 for the period 1620–30 (including the Tutton atlas of seventeen charts). Three of the charts were by John Daniel, the first of the Drapers' Company of chart-makers (see below), for whom at this period only four signed charts are known. The Daniel charts owned by Denby were of the Thames Estuary, covering the coasts of Norfolk, Suffolk, Essex, and Kent (1625), the North At-

lantic (1626), and the Mediterranean (1625). A further set of seven charts on paper "fasten'd to Pastboard, written and designed by a worse hand than the former" covering northwestern Europe and the Mediterranean, the North Atlantic, the route to the Far East, and China and Japan are also mentioned.⁵⁹ These may be by Daniel's ap-

57. Five fragments so used have been identified. Alfredo Pinheiro Marques, in discussing the scarcity of Portuguese charts from the fifteenth and the early sixteenth century, also believes that the use of out-of-date charts as secondhand vellum for bindings has meant that many charts are lost to this practice and those that survive are presentation charts, that is, those for reference or for hanging decoratively on walls. See Marques in Cortesão and Teixeira da Mota, *Portugaliae monumenta cartographica*, 6:45. If true then it is probably the case that even for later periods the loss of charts to use as bindings continued in England until the 1630s (BL, IOR, MS. Journal of John Maestnells 1633–37 is bound by a fragment of a chart [cat. no. 96]).

58. Wallis, *Royal Map Collections*, vcxli. See also Barber, "England I," and idem, "England II: Monarchs, Ministers, and Maps, 1550–1625," in *Monarchs, Ministers, and Maps: The Emergence of Cartography as a Tool of Government in Early Modern Europe*, ed. David Buisseret (Chicago: University of Chicago Press, 1992), 57–98.

59. See Edward Bernard, *Catalogi librorum manuscriptorum Angliae et Hiberniae in unum collecti, cum indice alphabetico*, 2 vols. (Oxford: Fitz-Herb. Adams, 1697), bk. 2, pt. 1, 39. The annotated version in the BL, Manuscripts Department, indicates that two of the charts listed were acquired by the British Museum from the earl in 1851. They are of the Indian Ocean (1630) and the coasts of Ireland, Britain, France, Spain, and Barbary (1626) (Add. MS. 18664.A and B, respectively) and were described in 1697 as "very well written, Painted and Gilded, on Parchment, and fixed to Wooden Cases. By John Daniel of St. Katharine's near London." The other three charts listed by Daniel do not seem to be recorded in Smith, "Manuscript and Printed Sea Charts."

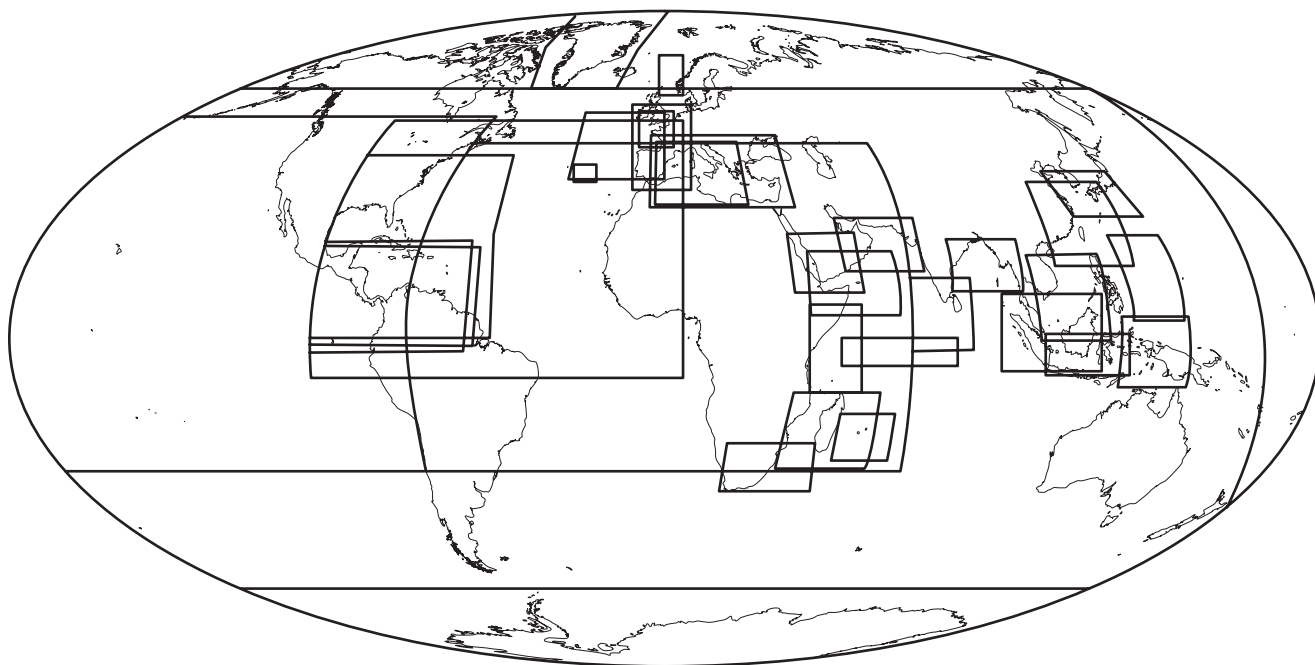


FIG. 58.4. COVERAGE OF CHARTS DRAWN BY THE ENGLISH, 1600–20. Note the almost complete coverage of the known world's oceans and seas by the end of this period. Although the production was still limited, in comparison the dif-

ference between the earliest period of English chartmaking (pre-1580) and the first decades of the seventeenth century is striking.

Based on the cartography of Julie Snook.

prentice Nicholas Comberford. All of these charts existed in 1851 and may yet be identified.

Another way of gauging how many charts were available is to consider what a chartmaker's output may have been. The first possible subject for this exercise is Daniel, who is known to have made charts from 1612 to 1642. Like Tatton, this was probably his main source of livelihood; in the records he is called a "platmaker" or chartmaker rather than by some other trade. Some of his charts were no doubt the work or partially the work of his apprentices,⁶⁰ but if one assumes it took him and them three weeks to make a chart⁶¹ then he could have produced between twelve to fifteen charts a year, which over twenty-eight years could have meant 336 charts or so; only fourteen survive. This rough calculation begs many questions but gives at least a view of the possible upper limit of his production.

Other charts survived by being presented to the backers of the exploratory or privateering voyages concerned. For example, charts are in what now survives of the collections of Sir Robert Dudley, who himself collected contemporary charts to compile his own sea atlas, the *Arcano del mare*, published in 1646.⁶² Similarly, charts belonging to Sir Walter Raleigh and his associate Henry Percy, Earl of Northumberland, survive.

Whether these particular charts were better in quality and decoration than those taken on board is unclear. A few decorated charts survive, which seem to demonstrate

that they were used to record the way at sea, as well as a number of pen and ink charts that can be identified as being used at sea.⁶³ These latter charts and coastal sketches are normally found in contemporary correspondence among the various classes of state papers at TNA, in the

60. See Campbell, "Drapers' Company," 93–94.

61. Smith, "Manuscript and Printed Sea Charts," 91–92.

62. Dudley's preparatory manuscript material for the *Arcano* and more material, some never published, is in the Bayerische Staatsbibliothek, Munich. Part of Dudley's own chart collection is in the Biblioteca Nazionale Centrale, Florence. The three manuscript volumes of the *Arcano* (the first two dated 1610) are referred to in Philip Lee Philips, *A List of the Geographical Atlases in the Library of Congress*, 9 vols. (Washington, D.C.: Government Printing Office, 1909–92), 1:206, as being in the Specola or Museo di Storia Naturale at Florence, but they could not be found by Josef Franz Schütte in 1968. When David Woodward made enquiries again in 1978, the director of the Museo di Storia della Scienza at the time, Maria Luisa Righini Bonelli, told him that the Dudley manuscripts were indeed in the Specola as Philips reported but that at some time before the Second World War had been lost. She had looked for the manuscripts for many years without success (letter to John Goss from David Woodward, 13 April 1978); and see figures 31.13–31.15 in this volume. See also Vaughan Thomas, *The Italian Biography of Sir Robert Dudley, Knt . . .* (Oxford: Baxter, 1861); and more particularly for the maps in Munich, Edward Everett Hale, "Early Maps in Munich," *Proceedings of the American Antiquarian Society* (1874): 83–96; and Josef Franz Schütte, "Japanese Cartography at the Court of Florence: Robert Dudley's Maps of Japan, 1606–1636," *Imago Mundi* 23 (1969): 29–58.

63. For example the chart of the route from the Shetlands to north Norway (TNA, E 163/28/12).

IOR, or in journals in the BL. A recently discovered pen and ink plot is of the route from the Shetland Isles to the Norwegian coast, ca. 1600 (fig. 58.5).

The only early charts (up to 1600) specifically connected with trading routes or the navigation of home waters are the charts of the Baltic route (1585) by William Borough, another of the Baltic (which was in the possession of Thomas Layton, a Baltic merchant in about 1588), a chart by Robert Norman of the southwestern approaches to the Channel (1581), and one by Richard Poulter of the Thames Estuary (1584). In the case of the charts of the Channel and the Thames, they were probably made as much for defense as for navigation. For the Mediterranean, where the English had traded for many years, no English-made charts survive until about 1600. Again this paucity may be a natural consequence of the availability of charts, Italian or otherwise, that the English bought for their voyages. By 1621 the presence of sufficient numbers of English ships using London as a home port meant that making charts could become a viable trade.⁶⁴

Among commercial outfits, where it might be expected that marine representations and charts survive in the records, the loss continued. Before their destruction in the Great Fire of London in 1666, the Russia Company records may have contained charts;⁶⁵ and the assumed dispersal of the corpus of East India Company charts probably means that many more English-made charts were lost. We also know that the English East India Company attempted to make copies systematically after its establishment in 1600. This effort was in spite of the common practice of shipmasters and other senior crewmen at that time on company ships keeping their own instruments and charts rather than presenting them to the company on return.⁶⁶ The mathematician Edward Wright was appointed hydrographer to the East India Company in 1614. Unfortunately, he died in 1615, and it is unclear who, if anyone, took over the task.⁶⁷

In 1619, however, Adam Bowen, clerk to the East India Company counting house, was employed to draw up sailing directions from the ships' journals deposited with the company and prepare fair copies of the charts. In the same year, William Baffin, a master's mate on the *Anne*, was paid by the directors for his pains and "good art" in drawing out certain plots (charts) of the coast of Persia and the Red Sea. Adam Bowen was to make copies of these plots "for the benefit of such as shall be employed in those parts." As far as can be gleaned from the company minute books, Bowen was employed from 1619 until at least 1626 on these and other duties. It is unclear what happened afterward, although we know that official responsibility rested with the treasurer from 1621, and the pilots, masters, and mates were ordered to hand over to the company fair copies of their journals concerning navigation.⁶⁸

These charts apparently did not survive; they are not

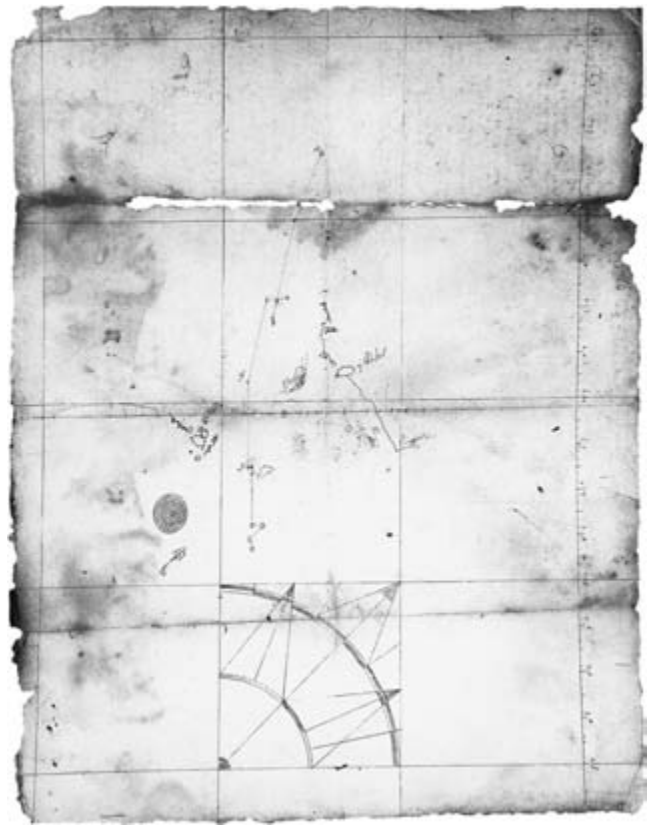


FIG. 58.5. ANONYMOUS, PLOT OF A ROUTE FROM THE SHETLANDS TO THE NORWEGIAN COAST ON SQUARED PAPER WITH A LATITUDE SCALE IN PEN AND INK, CA. 1600.

Size of the original: 58 × 45 cm. Photograph courtesy of TNA (E 163/28/12[2]).

in the collections of the Naval Historical Library (now in the Hydrographic Department, Taunton) nor in the Admiralty Library or Naval Historical Branch (Office of the Hydrographer), both in Portsmouth, where they might have been expected to be found. Having looked through all the journals for the first half of the seventeenth century held in the IOR, I have only found a number of coastal sketches and a fragment of a John Daniel chart drawn before 1637

64. See Waters, "English Pilot," 332–33.

65. Thomas Stuart Willan, *The Early History of the Russia Company, 1553–1603* (Manchester: Manchester University Press, 1956), v.

66. See p. 1767 in this volume.

67. For Edward Wright, see E. J. S. Parsons and W. F. Morris, "Edward Wright and His Work," *Imago Mundi* 3 (1939): 61–71.

68. East India Company Minute Books: Court Minutes 9 March 1619, "a gratuity to Adam Bowen for drawing 13 several plots of Surat, Jask and other parts in the East Indies and writing 3 journals of Captain Pring [presumably copying them]" (BL, IOR, B/6, p. 309); 1 Oct 1619 "William Baffyn a master's mate in the *Anne* to have a gratuity for his pains and good art in drawing out certain plots of the coast of Persia and the Red Sea. . . . some to be drawn out by Adam Bowen for the benefit of such as shall be employed in those parts" (BL, IOR, 316, p. 417).

covering the Azores and the west coast of Africa used as a binding for a journal. References to making charts, however, are quite common. In 1606, John Knight, for example, set out to discover the passage between Greenland and America. On Thursday 26 June 1606, “hee and Edward Gorrell his Mate, and his brother, and three more of our Company tooke the Boate . . . to goe over to a great Iland, which was not above a mile from our ship. . . . Also he carried an Equinoctiall Diall with him, and paper to make a Draught of the Land.”⁶⁹ They were not heard from again.

The relationship between the East India Company and the Thameside chartmakers is unclear, although we may surmise there was one: certainly both Daniel’s and Tatton’s charts are mentioned by the company’s shipmasters, but neither of them was ever employed by the company. Rather, they worked for individual shipmasters, for aristocratic and other backers of enterprises, and for particular clients like Denby on ambassadorial or other government business. Occasionally, the relationship between shipmaster and chartmaker is recorded on the chart. For example, we find Nicholas Reynolds making a specific chart for Captain William Man of Ratcliff in 1599, Gabriel Tatton making one for Captain Matthew Morton in 1615, and Nicholas Comberford working for Captain John Gibbins in 1626 (see appendix 58.1).

CONTEMPORARY EVIDENCE FOR THE USE OF CHARTS

It is necessary to distinguish here between coastal navigation and long ocean voyages. For the former, charts were not deemed necessary in the mid-sixteenth century; rutters, notes on coastal landmarks, soundings, and a description of the sea bottom were the shipmaster’s way of reckoning where he was and where he was going. For the coasts of the British Isles and France a few coastal charts, coastal profiles, and defense plans survive from the first half of the sixteenth century, drawn by such engineers as Richard Lee, but apparently none survive from farther afield than the channel coasts.⁷⁰ The way of navigation for coastal waters then and later is epitomized by the advice of the gunner and surveyor William Bourne in his 1596 edition of *A Regiment for the Sea*: he advised shipmasters to commit to memory the soundings and nature of the sea bottom when coming into the southwestern approaches of the English Channel. This knowledge was indeed necessary to avoid the island of Ushant or, more particularly, the treacherous Scilly Isles: “If you be towards the bank of Silley, you shall haue soundings at 86 or 90 fadame [fathoms], & you shall finde in the tallow [animal grease put in the depression at the bottom of the sounding lead] stonie ground, and shall be well shot towards [very close to or about to run aground] the bank of Silley.”⁷¹

For navigation on longer or oceanic voyages, charts were used but evidence is hard to come by: it is either from

the wills of sailors or from their surviving journals, which, although rarely mentioning charts, seem to indicate that they were commonly used. The chart was part of the shipmaster’s personal collection of navigational instruments, and was normally kept, as one might expect, in his chest with his other belongings. Hair and Alsop’s recent work on the first Guinea voyages from 1553 to 1565 illustrates this point. Notices of “cardes,” or sea charts, appear in the wills of some of the seamen who died. It seems ordinary seamen had sea charts as well as the masters, mates, and the agents or merchants on board. Thomas Wilford, master of the *Moon*, who made his will in April 1554, records that he “geue to William Gardner my greate carde. Item I geue my other carde to the boteswayne. Item I gyve to ether of them of my longe staves one and I gyve my whystle and chayne to my wyff.” He also had a “Balostella” (cross staff) and an “Estrolabye” (astrolabe), which he gave to “the scholemaster at home” and a “deapsand lyne” (for taking soundings), which he gave to the boatswain.⁷² A later will, that of John Grebby, boatswain on the *Primrose* in 1562, mentioned one “Carde with compasses.”⁷³ William Rutter, the agent on the 1564 voyage of the *John the Baptist*, also had a sea chart, and Richard Hakluyt records that another agent (William Towerson) on the 1555–56 voyage to Guinea had a sea chart, apparently a standard Portuguese one, which “to the southwarde I [Towerson] haue approued to be very trewe.”⁷⁴ Thirty years later the tradition of having the chart as part of the mariner’s personal tools of the trade continued. Richard Hawkins setting out on his voyage for the West Indies in 1591 took two days to round up his ship’s company at Plymouth and was forced to pay for one of his mariner’s charts, which the unfortunate man had apparently given up for security on a loan.⁷⁵

Foreign charts were not always viewed uncritically. In 1585, William Borough warned that it was inadvisable to be “tied to the Portugale, or Spanish Marine Plats, which are made by the Card makers of those Countries, men that are no trauailers themselues, but doe all things therein, by information, and vppon the credite of others.” Presumably this admonition indicates that English mariners were indeed using Portuguese and Spanish charts,

69. Purchas, *Hakluytus Posthumus*, 14:360

70. Robinson, *Marine Cartography*, 15–33.

71. William Bourne, *A Regiment for the Sea . . .*, ed. Thomas Hood (London: T. Este, 1596), 67.

72. Hair and Alsop, *English Seamen*, 214–16, esp. 215.

73. Hair and Alsop, *English Seamen*, 283.

74. Hair and Alsop, *English Seamen*, 330; and Hakluyt, *Divers Voyages*, 101.

75. Clement R. Markham, ed., *The Hawkins Voyages during the Reigns of Henry VIII, Queen Elizabeth, and James I* (London: Hakluyt Society, 1878), 108. Hawkins says of his crew: “others, to be indebted to their hostes, and forced me to ransome them . . . another, his carde and instruments for sea.”

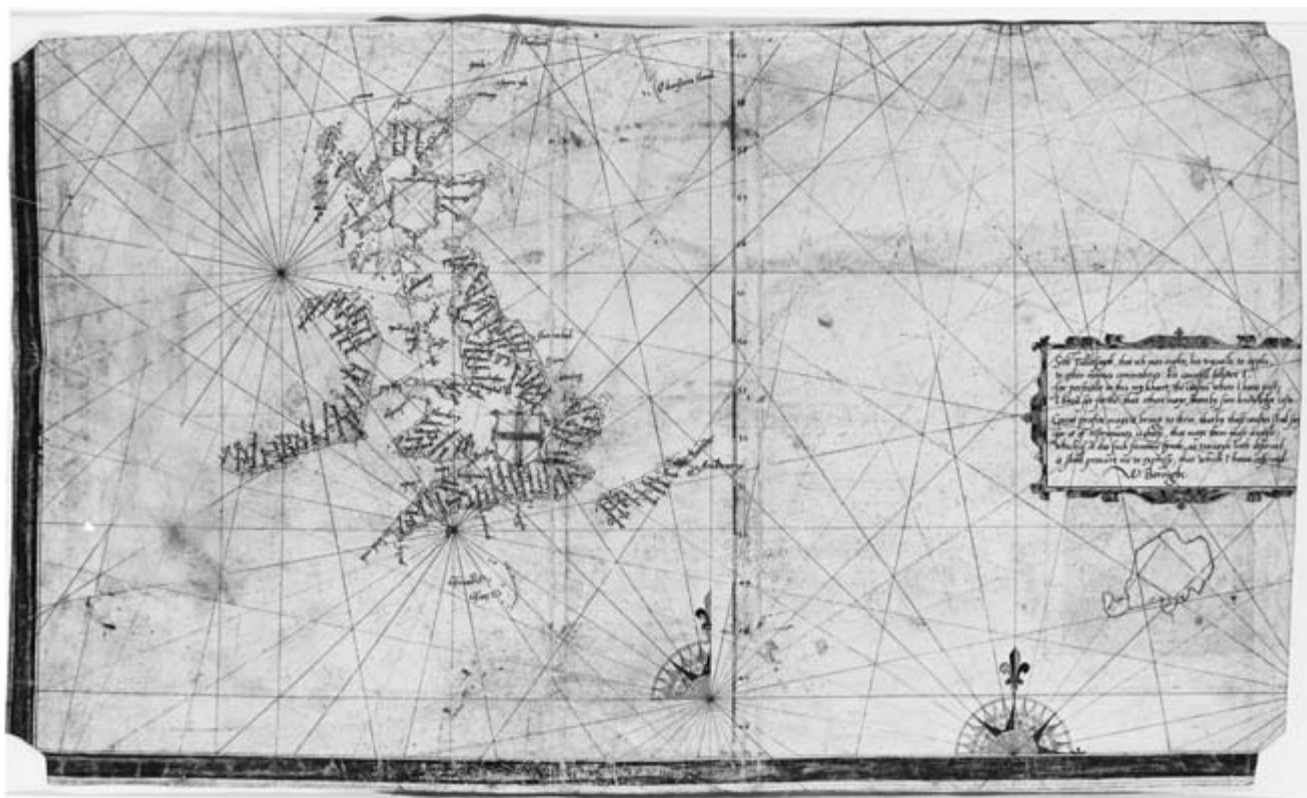


FIG. 58.6. WILLIAM BOROUGH, CHART OF THE NORTHEAST ATLANTIC, CA. 1580. This fragment, showing only the British Isles, was part of a larger chart probably covering the route to the Northeast Passage. By means of a

verse on the chart, Borough exhorted his fellow seamen to use the still-novel chart.

Size of the original: 30.9 × 51.6 cm. Photograph courtesy The Board of Trinity College Dublin (MS. 1209/23* recto).



FIG. 58.7. BINDING MADE FROM BOROUGH'S CHART. See figure 58.6. The spine lettering reads: "Jo Campanis Opere.E.8.2." The work was listed in a catalog of books owned by Archbishop James Ussher and acquired by Trinity College in 1661. Thus the Borough chart is a good example of a surviving cut-down piece of vellum used in book binding once the chart ceased to have value to its owner. The original, judging from the extent of the hidden circle's supposed circumference, probably covered the northeast Atlantic and Arctic waters off the coasts of Russia.

Photograph courtesy The Board of Trinity College Dublin (MS. 1209/23* verso).

rather than making their own. He advocated that "Marine plats ought to be described by such as can give reason and shew observation of everie perticularitie contained in the same, as well as the latitude of places."⁷⁶ His advocacy of the best way to make charts is immortalized in the verse he wrote on a chart of the British Isles and of the Northeast Passage about 1580 (figs. 58.6 and 58.7):

Sith Tullie sayth, that ech man ought his travails to
 applie
 to other mennes commodities: his counsell follow I
 for perfect lie in this my Khart, the coastes where I have
 past
 I have set forthe that others maye, thereby some
 knowledge taste.
 Great profite maye it bring to them, that by those
 coastes shal sayle
 For it of instruments is cheefe, that may them most
 avayle
 Which if it doo such favore fynde as travayle hath
 deserved
 It shall procure me to expresse that which I have
 reservd.

76. William Borough, *A Discourse of the Variation of the Cumpas, or Magneticall Needle* . . . (London, 1585), Aiiij.

Although it is not a particularly felicitous rhyme, it is plain enough to understand: Borough was saying that the chart in question was the result of his direct observations and that if mariners and others found it useful (and presumably would pay him for it), he would make some others, showing more coasts. It was also an explicit propaganda piece for the use of charts: “For it [the chart] of instruments is cheefe.”

Although charts were evidently carried on board English ships in the 1550s, at least when going to Guinea, Richard Eden in 1561 records in the preface to the English translation of Martín Cortés’s *Arte of Navigation* that there were “suche excellent Pylottes as are able without any Rutter or Carde of Navigation, not onely to attempte longe and farre viages, but also to discouer unknowne landes.”⁷⁷ Presumably Eden is here referring to the voyages of discovery to the Northeast Passage in the 1550s. Thirteen years after the publication of Cortés’s book, in 1574, William Bourne found it necessary to remind his readers that “he that taketh charge for long voyages, ought to haue knowledge in plats or cardes.”⁷⁸ In the 1596 edition, Thomas Hood remarked that he has “knowne within this 20 yeeres that them that wer auncient masters of shippes hath derided and mocked them that haue [been] occupied [with] their cardes and plattes.”⁷⁹ By the 1590s, however, masters using charts no longer seemed to be an object of mockery. Thomas Maynarde, who sailed with Drake on his last voyage to the West Indies in 1595, asserted, when off the Nicaraguan coast, that “cards and mappes muste bee our cheefest directors [for] he [Drake] beinge in these partes [is] at the furthest limit of his knowledge.”⁸⁰ Evidently old traditions died very hard, and the introduction of charts, let alone English-made ones, was slow.

It is clear, however, that the practice of using Spanish, Portuguese, and presumably French charts for those coasts where the English were not first-comers continued until at least the second decade of the seventeenth century. In 1587, Bourne made it clear that for a voyage to the East Indies by the Cape of Good Hope route there were “no Charts or Plats Hydrographicall that doth shew the true courses and distances” as “I do suppose that no English man hath seene any true Charte or Plat of all the East India.”⁸¹ This statement was an exaggeration, for the results of Sir Francis Drake’s circumnavigation had been published in a general world map, but no doubt in practical navigational terms it was the case and remained so for a considerable time—probably until after the publication of the English edition of Jan Huygen van Linschoten’s *Itinerario* (1598). The first English copies of Portuguese charts were made by Martin Llewellyn in about 1600.

In the second decade of the seventeenth century, Edward Dodsworth, agent on board the *New Yeeres Gift*, recorded in a memorial of a voyage to the East Indies in

1614–15 that the channel between the island of Madagascar and the mainland was laid down erroneously by the Portuguese: “for that in our plattes, laide downe by the Portingalls, the sands [lie] thirtye leagues from the shoare.” He further remarked when sailing through the Maldives that “we founde manie shoaldes and ilandes laide in the plattes most false and eronious, which, as we maie conjecture, is lade downe by the Portingalls to make those seas seme more daingerous unto us.”⁸² Eventually, like the Dutch, the English made their own surveys and then employed chartmakers to make copies of them.

ENGLISH CHARTMAKERS, 1560–1660

From 1550 to the 1590s, chartmaking was not a trade in the sense it later became. Nor were there a sufficient number of trading and other voyages to sustain any professionals full time. In this early period, the impetus for making charts came from either the government, the city companies trading overseas, or both. The practitioners, however, were a mixed group of mariners, engineers, scholars, and artists: amateurs or individuals employed to make drawings on voyages of exploration, a practice that continued until the advent of the camera. For example, Thomas Hood, Fellow of Trinity College, Cambridge, and member of the Merchant Taylors Company, was also a mathematician and practicing London physician. He gave the first mathematical lectures in London in 1588 under the patronage of Sir Thomas Smith, later governor of the East India Company.⁸³ Sketching at sea was done by anyone interested in doing so: Richard Madox, Fellow of All Souls Oxford and chaplain on Captain Edward Fenton’s voyage to the East Indies by way of Cape Horn in 1582, made a couple of sketch surveys. He was not trained in any sense, but had informally acquired some

77. Martín Cortés, *The Arte of Nauigation . . .*, trans. Richard Eden (London: R. Juge, 1561), CC.1.

78. William Bourne, *A Regiment for the Sea . . .* (London: Thomas Hacket, 1574), 7.

79. Bourne, *Regiment* (1596), Bii. He remarked that “cards [charts] be most cōmonly made in Lishborne in Portugal, in Spaine, or else in Fraunce” (p. 44).

80. Quoted in Kenneth R. Andrews, ed., *The Last Voyage of Drake & Hawkins* (Cambridge: Cambridge University Press, 1972), 99.

81. William Bourne, *A Regiment for the Sea . . .* (London: Thomas East, 1587), 71 verso and 73 verso.

82. William Foster, ed., *The Voyage of Nicholas Downton to the East Indies, 1614–15: As Recorded in Contemporary Narratives and Letters* (London: Hakluyt Society, 1939), 73–74. Edward Dodsworth sailed with Nicholas Downton on the East India Company’s voyage to the East Indies (1614–15). He was apparently a kinsman of Downton and was one of the factors in the fleet (pp. 123–24).

83. H. K. Higton, “Hood, Thomas (*bap.* 1556, *d.* 1620),” in *Oxford Dictionary of National Biography*, 60 vols. (Oxford: Oxford University Press, 2004), 27:938–93.

ability in drawing and evidently some skills in measuring and observing points at sea.

THE EARLIEST PRACTITIONERS

The beginnings of what may be called a trade of chart-making probably rest with the work of the Borough family and in particular William Borough, who came from Northam, north Devon. William Borough's first surviving chart dates from about 1568 and his last from 1587. Borough was successively chief pilot of the Muscovy Company, treasurer of the queen's ships (1582), and master of Trinity House (1585). He died in 1599 and was a man of considerable wealth; he bequeathed a dinner to the company of Trinity House, a common expression of personal distinction, wealth, and generosity.⁸⁴

An earlier relation, John à Borough, made the earliest surviving chart in 1539 for Henry VIII. John à Borough was skilled in navigation and active in the Levant trade. In 1533 he is recorded in a High Court of Admiralty case as owning, among other navigational instruments and rutters, "two Spanish compasses (*carakaka*) and two other compasses, a loadstone and running-glass, a balestilha (cross-staff) and quadrant," a chart serving for "all Levant [eastern Mediterranean] and another map, together valued at over £5." As Taylor remarks, these possessions imply that he had mastered the art of navigation, including the use of charts as taught in Spain.⁸⁵

William's elder brother Stephen sailed with Richard Chancellor on the first voyage in 1553 to discover the Northeast Passage. That first voyage had to be conducted using local Norwegian pilots or relying on the Mercator globe of 1541. Upon his return, Stephen Borough was invited to visit the Casa de la Contratación in Seville and saw the navigational training being done there.⁸⁶ Subsequently, Stephen was joined by his younger brother William on the Northeast Passage voyages. Thus it seems likely that the origins of English overseas chartmaking probably derived from the need to make charts for the Northeast Passage, which was done by the Boroughs and by William in particular.

Although the Boroughs recorded their voyages on charts in the 1550s, none survives from that date. Stephen Borough says, for example, off the west coast of Norway that "we followed the shoare or land, which lieth North-northwest, North and by West, and Northwest by North as it doth appeare by the plat."⁸⁷ John Dee also recorded in his "Famous and Rare Discoveries" (ca. 1577) that "Mr. Stephen Borough of his search and veue of these seas exhibited to me upon his return."⁸⁸ Dee later mentioned another chart William Borough had showed him in 1572 of the route to St. Nicholas (now Archangel) in the White Sea. William refers to the charts in 1581: "In our voiaiges from hence Eastwardes to S. Nicholas in Russia, and to the Narue in Liuania [the Baltic route] the Ma-



FIG. 58.8. SKETCH OF THE MOUTH OF THE RIVER OB, 1568. With Russian place-names probably drawn by William Borough on the basis of his own observations and the reports of the local inhabitants of the way to the Ob. Size of the original: ca. 8.6 × 21 cm. Photograph courtesy of the BL (Lansdowne MS. 10.f.133).

rine Plattes of the coastes are described by our common sailing Cumpas, with consideration of the variation of diuers places."⁸⁹ In particular he makes it clear that he provided Anthony Jenkinson with his information about the coastline from Wardhouse to the river Ob for his map of 1562, subsequently published by Abraham Ortelius in his *Theatrum orbis terrarum* in 1570 (see figs. 57.6 and 62.3). Referring to the map he says that he himself had "placed that border of the Sea coast," that is from Wardhouse to the river Ob (fig. 58.8).⁹⁰

84. Robert C. D. Baldwin, "Borough, Stephen (1525–1584)," in *Oxford Dictionary of National Biography*, 60 vols. (Oxford: Oxford University Press, 2004), 6:668–70, and Joyce A. Youings, "Three Devon-born Tudor Navigators," in *The New Maritime History of Devon*, 2 vols., ed. Michael Duffy et al. (London: Conway Maritime Press in association with the University of Exeter, 1992–94), 1:32–34. The will of William Borough is at TNA, PROB11/92/229. The charts and other marine drawings by or attributed to William Borough are: Norway to Novaya Zemlya (ca. 1568), BL, Lansd. 10, f.133; Norway to Novaya Zemlya (1568), BL, MS. 18.D.III, f.124; North Atlantic and British Isles (1576), Hatfield House, CPM.I.69; British Isles and northwestern European coasts (originally showing the Northeast Passage) (1580), Dublin, Trinity College, MS. 1209.23; North Sea and Baltic Sea (1580), London, National Maritime Museum, N.51-4/G-215; and "The Plotte of Cales" [Cádiz] (1587), TNA, MPF 318.

85. Taylor, *Mathematical Practitioners*, 167.

86. Waters, *Art of Navigation*, 542, cites Hakluyt's dedicatory epistle to Sir Phillip Sydney from Hakluyt's *Divers Voyages* (1582): "Master Steven Borrows, nowe one of the foure masters of the Queene's nauie, told me that, newly after his returne from the discouery of Moscouie by the North in Queene Maries daies, the Spaniards hauing intelligence that he was master in that discouerie, tooke him into their c[on]tractation house at their making and admitting of masters and pilots, giuing him great honour, and presented him with a payre of perfumed gloues, woorth fiue or six Ducates."

87. Hakluyt, *Principal Navigations*, 2:323.

88. John Dee, "Famous and Rare Discoveries," BL, Cotton MS. Vitellius CVII, fol. 68v–71v.

89. William Borough, *A Discovrs of the Variation of the Cumpas . . .*, F.ij ver., pt. 2 of Robert Norman, *The Neue Attractiue: Containing a Short Discourse of the Magnes or Lodestone . . .* (London: Ihon Kyngston, 1581).

90. Borough, *Variation of the Cumpas* (1581), F.ijj ver.

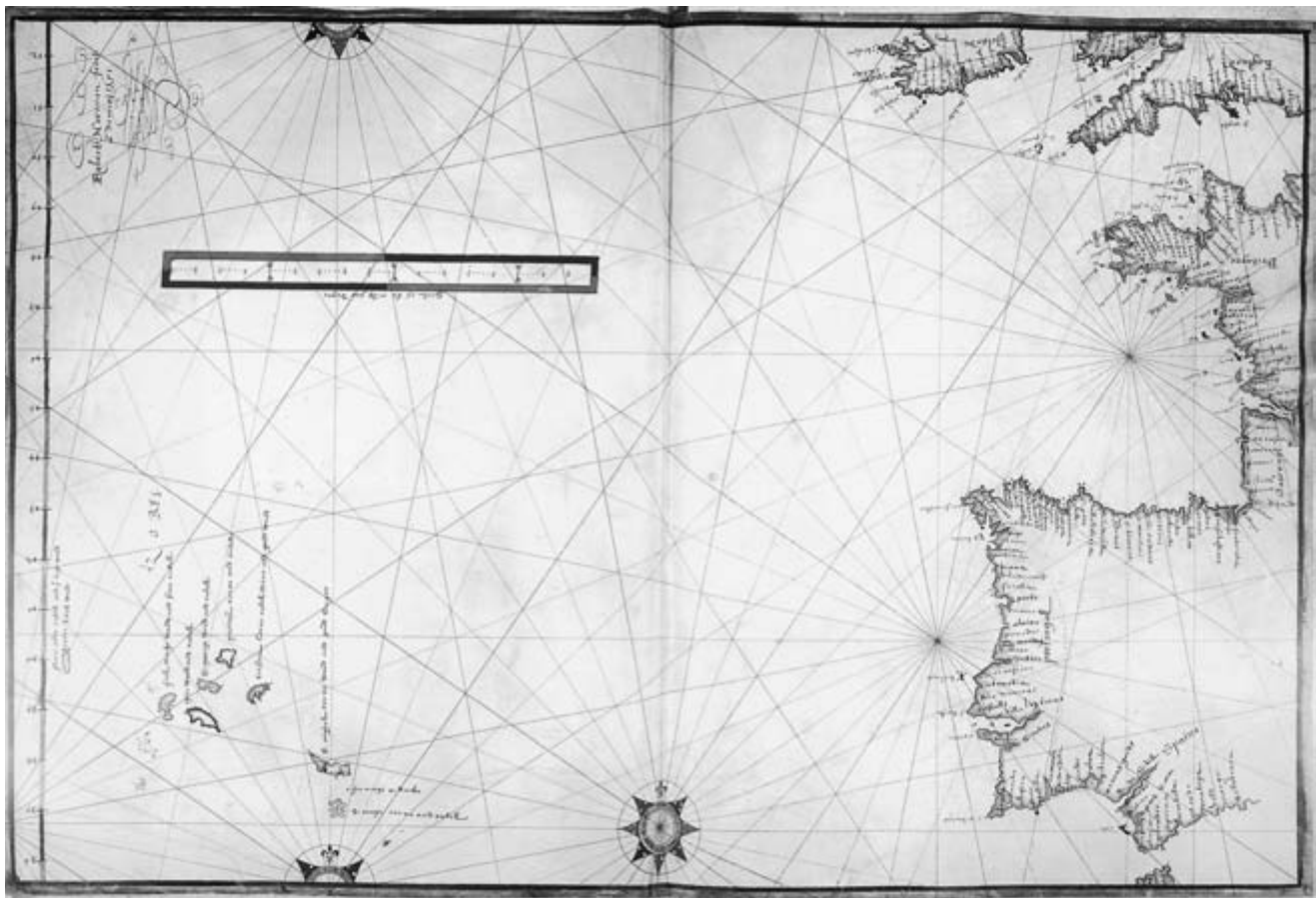


FIG. 58.9. ROBERT NORMAN, CHART OF THE AZORES TO BEACHY HEAD, 1581. Shown with north at the top. Size of the original: ca. 33.7 × 48.9 cm. Photograph courtesy

of the BL. By permission of the Burghley House Collection, Stamford, Lincolnshire.

William encouraged another instrumentmaker and chartmaker, Robert Norman, in his work on the magnetic variation of the compass, and I have already noted his exhortation to others to describe their voyages in charts. Norman was a shipmaster who had been in the employ of the Merchant Adventurers Company for twenty years before he set up as a compassmaker and chartmaker in Ratcliff by the Thames. He was rightly famous for his experiments on the variation of the compass at different degrees of longitude, the results of which he published in *The Neue Attractiue* in 1581. He made Borough's own instruments of variation for him, and when he died in 1583, Richard Poulter, who followed Borough as Master of Trinity House in 1599, referred to the great loss to seamen his death would cause.⁹¹ Only two charts signed by Norman survive: one of the Thames estuary of 1580 and the other of the southwestern approaches to the Channel (fig. 58.9).⁹²

The Boroughs and Norman were not the only people who made charts. For example, Richard Cavendish of Trimley, Suffolk, a master of ordnance, also drew a chart of the Thames Estuary in addition to a harbor plan of

Dover. He was the uncle of the circumnavigator Thomas Cavendish and father-in-law of the younger Hakluyt. His niece married Robert Dudley, who compiled the *Arcano del mare* in 1646. Similarly, besides being the surveyor of the queen's buildings, Robert Adams also drew charts of the British Isles and is well known for his engraved charts of the Spanish Armada. The artists Baptista Boazio and John White also made charts, but again there is no obvious relationship between their work and that of Norman, Borough, or Hood. The shipmasters William Baffin and James Beare made charts, and so did the inventor of the backstaff, John Davis. They probably knew one another, as this world was both small and geographically close in London (fig. 58.10).

91. Richard Poulter, *The Pathway to Perfect Sayling* (London: E. Allde for I. Tappe, 1605), Diii.

92. Robert Norman, Thames estuary, 1580, Hatfield House, CPM.II.37a; Robert Norman, Azores to Beachy Head (southwestern approaches to the Channel), 1581, Burghley House, Stamford; and [Robert Norman?], Southwest coast of Ireland, ca. 1580 and before 1583, BL, Cotton Aug.I.ii.27.



FIG. 58.10. DETAIL FROM JOHN NORDEN'S MAP OF LONDON. Published in London by Peter Stent, 1653. The area around the Tower of London on the banks of the Thames is where the chartmakers worked in the late sixteenth and seventeenth century.

Size of the original: ca. 22.8 × 24.1 cm; detail: ca. 8.9 × 5.9 cm. Photograph courtesy of the BL (Maps Crace Port.I.33).

By the 1590s, Thomas Hood was designing mathematical instruments and charts and selling them, including Robert Norman's compasses after the latter's death, from his house in Abchurch Lane. He had an apprentice, one Francis Cooke, an instrumentmaker and engraver living in Mark Lane, who sold the cross staffs designed by his master.⁹³ In 1592, Hood recorded that he "had to doe a long time with divers of your profession [mariners] . . . for the making of Sea Cardes."⁹⁴ This comment suggests at the very least his acquaintance with William Borough, Richard Poulter, and their contemporaries, perhaps as a teacher of chartmaking and certainly as a chartmaker. At the same time the mathematician Edward Wright, fellow of Caius College, Cambridge, who lived in Limestreet, began his work on the explanation of the Mercator projection and again was well known to the shipmasters.

Gabriel Tatton was responsible for seven surviving charts and an atlas of seventeen charts of the coasts of the East Indies between 1600 and 1621 (fig. 58.11). Two of his charts were engraved in the Netherlands and he was described as a celebrated hydrographer.⁹⁵ His is by far the

most prolific output surviving in the first two decades of 1600, and his work was evidently thought worth publishing by the Amsterdam chart publisher Cornelis Claesz.⁹⁶ He also seems to be the link between the earlier chartmakers on the Thames and those in the Drapers' Company. He seems to have had a style similar to that of Robert Norman with respect to the simple compass roses he used throughout his career. Norman, Tatton, and later Daniel also shared a distinctive scale bar with trefoil terminal leaves at either end of the bar on some of their charts, which again may be indicative of the direct or indirect influence of Norman on Tatton's, and then Tatton on Daniel's, style. They and other chartmakers all lived on the banks of the Thames in the parishes of Limehouse, Ratcliff, Shadwell, and Wapping, the center of the shipbuilding and maritime communities, and it seems reasonable to assume that they knew one another. Tatton lived "att the Signe of the Goulden Gunn att the Weste ende of Ratclyff" and Daniel, the first chartmaker in the Drapers' Company, lived at the Iron Gate in St. Katherines, a mile upstream near the Tower.⁹⁷

THE CHARTMAKERS OF THE DRAPERS' COMPANY

There are direct links between a group of chartmakers in the master-apprenticeship relationships of the chartmakers of the Drapers' Company. The first Draper chartmaker was John Daniel, who was made free of the company in 1590 and was thus allowed to practice as a compassmaker and chartmaker.⁹⁸ Daniel was apprenticed to a James Walsh, who had been a sailor and was described as a compassmaker living at the Irongate tower at the Tower of

93. I have looked at the records of the haberdashers, drapers, merchant taylors, painter stainers, grocers, mercers, and goldsmiths for the period 1580–1640 but with no further success in identifying the other chartmakers with a company structure.

94. Thomas Hood, *The Marriner's Guide*, supplement to *A Regiment for the Sea . . .*, by William Bourne, ed. Thomas Hood (London: Thomas Est, 1592), Aiii.

95. There are a number of examples of the two states of this chart, dated 1600 and 1616. The chart describes Tatton as the celebrated hydrographer is "Noua et rece Terraum et regnarum Californiae, nouae Hispaiae, Mexicanae, et Peruviae . . . delinatio a M. Tattonus celebrem sydrogeographō," BL, Maps C.2.a.3 (1) 1600 altered to 1616. Another copy is in the John Carter Brown Library, Providence, R.I., and has had its date similarly altered to 1616.

96. This is noted in K. Zandvliet, *Mapping for Money: Maps, Plans and Topographic Paintings and Their Role in Dutch Overseas Expansion during the 16th and 17th Centuries* (Amsterdam: Batavian Lion International, 1998), 35, n. 19, where Günter Schilder is cited as stating that he has evidence that Tatton and Wright were working for Claesz.

97. Borough lived at Limehouse, Robert Norman at Ratcliff, Richard Poulter within the Tower of London precincts, Nicholas Reynolds and Gabriel Tatton at Ratcliff, and Thomas Hood in the Minorities. Smith, "Manuscript and Printed Sea Charts," 57.

98. Smith, "Manuscript and Printed Sea Charts," and Campbell, "Drapers' Company," are the basis for the next section.

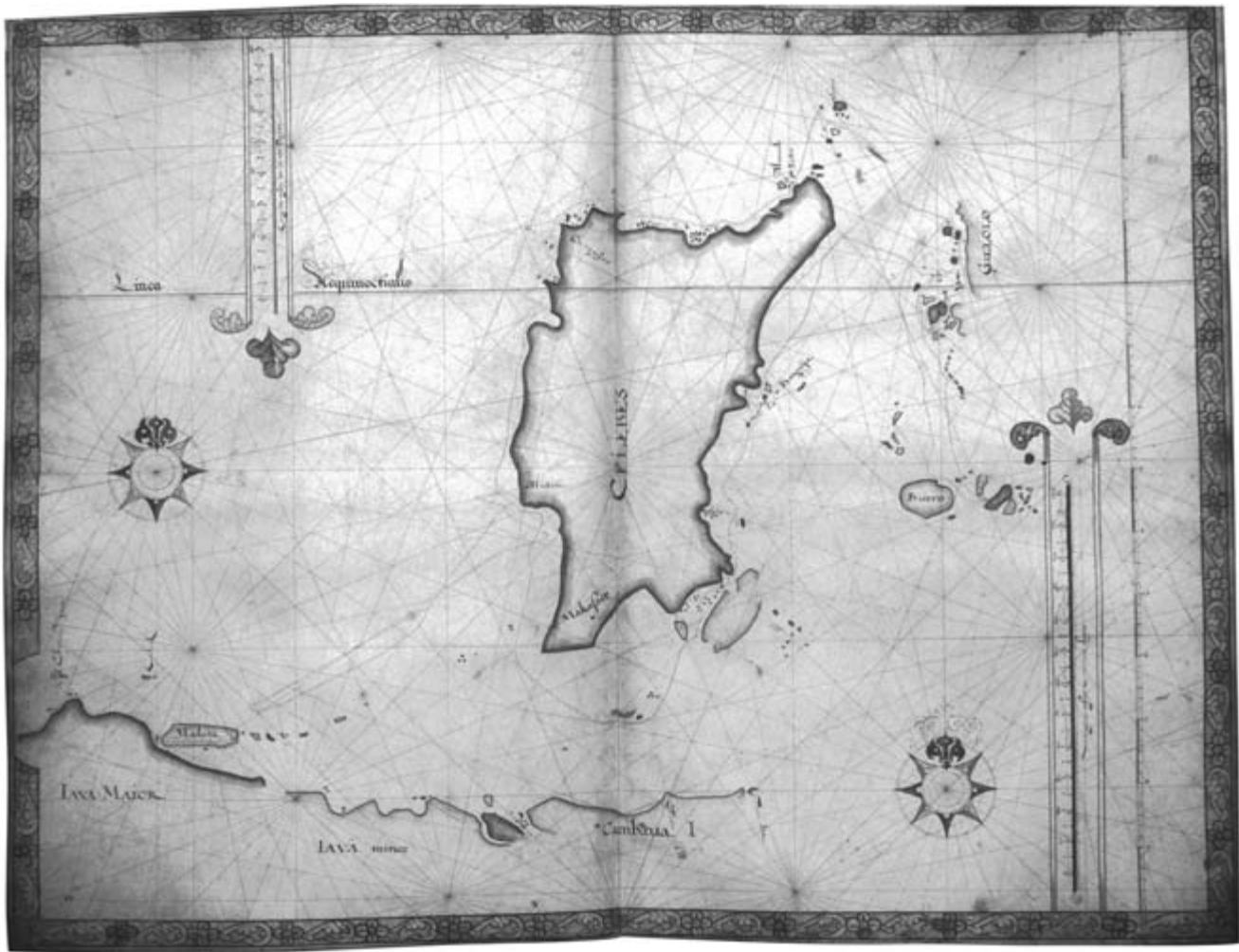


FIG. 58.11. CELEBES IN GABRIEL TATTON'S ATLAS OF SEA CHARTS, CA. 1619. From an atlas of seventeen charts of the East Indies.

Size of the original: 47 × 63 cm. Photograph courtesy of the Royal Naval Museum, Portsmouth (VA 32).

London. Daniel's own apprentices included Nicholas Comberford, who in turn had as his apprentices John Burston and Andrew Welch. The success of the school, represented by the numbers of surviving charts, is impressive. From Daniel's first dated charts of the Mediterranean and of the South Atlantic in 1614 to the last surviving chart by Robert Friend of 1719 there are more than 550 extant charts. Most, however, fall into the second half of the seventeenth century, when English shipping and trade increased. From 1614 to 1660, Daniel, Comberford, and Burston were responsible for twenty-three surviving charts. Daniel was clearly being used by shipmasters to make copy charts of their surveys, as was his older contemporary Tatton. With the death of Gabriel Tatton in 1621, the Drapers monopolized chart production until 1719.

Of their working practices, little is known except from the evidence of the charts themselves, but in 1655 a

William Dobbins visited Nicholas Comberford in his poor dwelling in Wapping and left a record.⁹⁹ Of interest is the price Comberford quoted for the cheapest chart, twenty-five shillings, the information that he and his son Thomas Comberford (freed from the Drapers' Company in 1655) would take three weeks to make a chart, and that they worked for some influential sea captains. He also had ready-made charts for sale at his house. His remark about sea captains confirms that it was still the practice in 1655, as it had been a century earlier, for charts to be the personal property of the shipmasters and thus for the chartmakers to make a living by having a group of clients for whom they made copy charts or drew new ones from their clients' own surveys.

Samuel Pepys also visited Comberford in 1663 and was impressed by his "fine and laborious work." On 18 Feb-

99. Smith, "Manuscript and Printed Sea Charts," 91.

ruary 1665 he ordered from Comberford's former apprentice John Burston three copies of a draft of the harbor of Portsmouth, apparently drawn by (or at the behest of) the Earl of Sandwich for Charles II, Sandwich, and Pepys himself. The copy charts were ready on 12 March, and Pepys and Sandwich "did look over his plat, which Burston hath brought him today." It took Burston about three weeks to make the three copy charts. This and other charts were probably hanging in Pepys's office as on 14 May 1666, Pepys records in his diary, "he had cleaned his closet in his office and . . . set up my Platts again" after taking them down to avoid the Great Fire of London.¹⁰⁰ Contrary to Smith's assertion that Pepys was little "concerned with their charts and availed himself of their services only as copyists,"¹⁰¹ it is evident he had charts made by Burston on his walls in his office and that he valued Burston, precisely because he was a chartmaker who could make fine charts from original drafts.

GABRIEL TATTON AND THE DUTCH CONNECTION

Smith remarked that the history of the Thames School (that is, the Drapers) of chartmakers could be "traced rather fully except for the identification of the prototypes of the earliest Thames charts made in the 1590s."¹⁰² He thought that the style was well developed in the charts of Thomas Hood, Gabriel Tatton, Nicholas Reynolds, and Thomas Lupo. He recognized the sudden emergence of the Drapers' style and in particular the stylistic connection of Tatton's chart of the Mediterranean (ca. 1600) and those produced later by the Drapers, but he erroneously included Hood, Reynolds, and Lupo on unconvincing stylistic grounds.

Ostensibly, John Daniel learned his trade from his master James Walsh. Walsh may have made charts too, but if so, none of his charts are recorded. Thus we cannot tell what influence he had on Daniel's chartmaking. Indeed, as the earliest chartmaking activity by Daniel is in 1612 (see below), some twenty-two years after his freedom, it seems unlikely that the master had any influence. Instead it may be that his older contemporary Gabriel Tatton is a better candidate. Tatton was in the employ of shipmasters working for Sir Thomas Roe and Sir Walter Raleigh. Like Daniel, he also worked for shipmasters in the employ of the new East India Company, and he was demonstrably influenced by the Dutch manuscript chartmakers of the North Holland School; a style that Daniel also followed. At the very least, both Daniel and Tatton were influenced by the Dutch style that Tatton's charts introduced into England from 1600.

How can this connection be demonstrated? In all, twenty-nine examples of the North Holland School survive dating from 1589 to 1622.¹⁰³ The earliest representative of the school seems to have been Cornelis Doetsz.,

who drew charts of the European coasts, the Indian Ocean, the East Indies, and the Atlantic Ocean. Working at the same time were Jan Dircksz. Rijckemans, Evert Gijbsbertsz., Joris Carolus, and the brothers Harmen and Marten Jansz.

By comparing the styles of the particular decorative elements, such as compass roses and scale bars, it is possible to see the common use of some of the elements and to show that Tatton also shared these elements. Of his surviving work drawn between about 1600 and 1621, there are three charts that exhibit North Holland School characteristics. These are the charts of the Mediterranean (formerly thought to be of 1596, but now more likely to be from about 1600), the Pacific (1600), and the Atlantic (1602) (see appendix 58.1). All his later work is far simpler in style and cannot be attributed specifically to the North Holland School influence. Tatton's chart of the Mediterranean bears four compass roses; the two most ornate show the same characteristics as those by Cornelis Doetsz. on his chart of the Indian Ocean (1600) and as those by Harmen and Marten Jansz. on their chart of Europe (ca. 1609). The compass roses are characterized by dots, and the scale bars are laden with fruit and flowers.

An even stronger link to the North Holland School can be made from the specific pictorial elements on Tatton's chart of the East Indies and the Pacific Ocean of 1600. It shows an Amazon on an armadillo representing America (plate 72). This Dutch figure of the Amazon on an armadillo as a symbol of America is also drawn on the manuscript world maps by Harmen and Marten Jansz. of 1606 and of 1610 (fig. 58.12). The original drawing for this figure is that by Maerten de Vos in 1589 and was engraved as a print entitled "America" by Adriaen Collaert (fig. 58.13).¹⁰⁴

The influence of the North Holland School on Tatton is further corroborated by the signature on the chart. He writes (in Dutch): "By me Gabriel Tatton from London,

100. Samuel Pepys, *The Diary of Samuel Pepys*, 10 vols., ed. Robert Latham and William Matthews (Berkeley: University of California Press, 1970–83), diary entries for 18 February 1665 (6:38), 12 March 1666 (6:55), and 14 May 1666 (7:124).

101. Smith, "Manuscript and Printed Sea Charts," 93.

102. Smith, "Manuscript and Printed Sea Charts," 96.

103. Günter Schilder, "De Noordhollandse cartografenschol," in *Lucas Jansz. Waghenaer van Enckhuysen: De maritieme cartografie in de Nederlanden in de zestiende en het begin van de zeventiende eeuw* (Enkhuizen: Vereniging "Vrienden van het Zuiderzeemuseum," 1984), 47–72; the North Holland School is discussed in chapter 45 in this volume.

104. Communicated to me by Dr. Schatborn of the Rijksmuseum, Amsterdam. The drawing, in Darmstadt, Inv. nr. AE 441, is by De Vos and is preparatory to the print "America" by Adriaen Collaert. The drawing bears the date 1589. Similarly the figure of the Great Khan on the portion showing China on Tatton's map of the Pacific (1602) is copied from the same Collaert series, the "Gross Furst in der Moscow."



FIG. 58.12. FRAGMENT FROM HARMEN AND MARTEN JANSZ.'S CHART OF THE WORLD, 1606. Showing the Amazon on an armadillo as in plate 72. Size of the original: ca. 17.6 × 25.2 cm. Photograph © National Maritime Museum, London (G201:1/16A).

Englishman.” He was, we may assume, in Holland. The only clue as to where he was is provided by the work of the English engraver Benjamin Wright, who was in Holland and engraved parts of Tatton’s manuscript maps of the Pacific and of the Atlantic to make a map of America and another of the Pacific, which he issued in 1600.¹⁰⁵ Wright was in Holland between 1599 and 1602 doing hack work for Barent Langenes’s *Caert-thresoor*. The engraved map of Central America based on Tatton is described as being drawn by “M Tattonus,” whereas the chart of the Pacific has the inscription “G Tattonus Auct.” The Tatton chart of the Mediterranean—again in the style of the North Holland School—was made by him in London around 1600. As we do not know when Tatton was born and the first firmly dated chart by him is in the North Holland style (of the Pacific drawn when he was in Holland in 1600), it seems probable he learned his skill there and brought the style back to London where Daniel and his successors copied it.

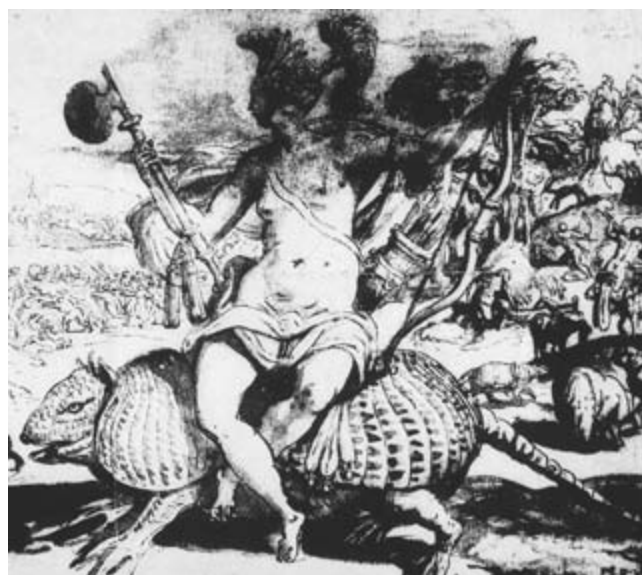


FIG. 58.13. DRAWING BY MAERTEN DE VOS, 1589. The probable source for the North Holland School’s and Gabriel Tatton’s use of the Amazon on an armadillo as the symbol for the Americas. Photograph © Rijksmuseum, Amsterdam (Darmstadt, inv nr AE 441).

CONSTRUCTION OF CHARTS

Smith described the way in which the charts were drawn on vellum and then often mounted on wooden hinged boards that could fold shut, with the vellum surfaces protected between the boards. Smith also discussed the actual method of drawing, whereby a circle was described in the center of the vellum with just the points of drawing compasses, from which the compass directions radiated in lines along the points of the compass; these were called rhumb lines. The charts at this period also included equidistant degrees of latitude and a scale bar. They were not usually made on Mercator’s projection, in which the distance between lines of latitude increase proportionally the farther they are from the equator (to give a true direction on the chart for the ship to follow), but were constructed on the plane projection. This common projection merely divided the chart into lines of latitude evenly spaced above or below the equator.

Such charts for crossing oceans were clearly liable to cause erroneous landfalls on either side of the Atlantic, but the seamen in the late sixteenth and at least until the mid-seventeenth century were used to them and seem to have made allowances. William Barlow in the *Navigators*

105. For Benjamin Wright, see Arthur Mayger Hind, *Engraving in England in the Sixteenth & Seventeenth Centuries: A Descriptive Catalogue with Introductions*, 3 vols. (Cambridge: Cambridge University Press, 1952–64), 2:212–20.

Supply (1597) stated that charts on the plane projection were the only ones in ordinary use with sailors. Of the Mercator charts he remarked that “this manner of Carde hath beene publicly extant in print these thirtie yeares at least but a cloude (as it were) and thicke myste of ignorance doth keepe it hitherto concealed.” He further asserted that “men of good knowledge” had done what they could “to disgrace it.”¹⁰⁶

Edward Wright succeeded in explaining the mathematical basis for the Mercator charts in his *Certaine Errors of Navigation* (1599), but even so his work does not seem to have influenced the emerging chartmaking trade as he, and indeed the East India Company, would have liked. With the exception of one world chart, probably by John Daniel (ca. 1617), which looks like a chart on the Mercator projection and one possibly by Edward Wright himself of the Azores to Portsmouth (ca. 1595), there are no others using this projection (see appendix 58.1). In view of the scarcity of surviving charts using the Mercator projection, it is likely that the original proposal by Waters that “the navigators of the chartered companies of the Jacobean era [1603–21] reveals that the chart projections they used were generally scientifically accurate ones, either circumpolar charts or charts on Mercator’s projection” may need to be modified.¹⁰⁷

All the more so if the somewhat damning views of the shipmasters themselves when they used the new Mercator charts are taken into account. Walter Payton, for example, recorded in 1615 that the “Plats of Daniel (of Mercator’s projection), proved false about seventie leagues in distance of longitude betwixt the land of Æthiopa, Cape Bona Speranza [Cape of Good Hope], and the Ile of Saint Laurence [Madagascar], as the same protracted into Plano of Tottens [Tatton’s] making doe manifest.”¹⁰⁸ Anthony Hippon, on the *Globe*, which left London in February 1611 (1612 new style), complained from Bantam on 25 May 1612 to the company about Daniel’s chart. “Your worships shall understand ther ar certaine platts made by John Daniell dwellinge near the Iron gate [near the Tower of London] in which plats Cape Comorin and the wester part of Zelon are very falcelly projected, for I dare avowe upon my life that Poynt de Gallia is within 10 minutes of 6 degrees, (latitude).” He went further and said that “I would advise your worships that charge is given unto all such mariners as ar entertained in your service not to buy any orf those erronious maps.” The clear evidence of a critical stance being taken about the charts available on the Thames, whether Mercator or in plano, to which the company’s men had to repair is obvious. Also clear is the very obvious connection between Tatton, Daniel, and the company, even though the chartmakers were not employed directly by the company.¹⁰⁹ Thomas Bonner in 1616 made a similar complaint about Daniel’s charts (although they may not have been on the Mercator projec-

tion) on a voyage to the East Indies. When off the coast of Sumatra, he says: “By our plats which [were made by] John Danyell we were 90 leags short: but by an ould plat which we had in our ship of Cabrell Tattons makinge our reckninge fell out very perfitt: I wonder John Danyell hath no better direktions.”¹¹⁰

These references prove that Daniel was making charts on Wright’s or Mercator’s projection for the company’s shipmasters, and we may infer, therefore, that he was probably instructed by Wright himself (who else was there?), who was employed by the East India Company. However, the charts were evidently not acceptable to the company’s shipmasters. The company’s court minutes of March 1614 make clear that the company wished “to tye him [Wright] to their service to peruse the Journalls of their people that shall retourne, whereby they shall gaine a double benefitt as well to cause their men to be more carefull and exact in their obseruacons [observations] and shall like wise reape the benefitt of them for the betteringe of the people knowledge in these partes. Also to examine their maryners and *p[er]fect their plotts*” (my emphasis). It is unclear that he ever did what was required; the court minutes of July 1614 record that the governor and deputy were “to putt him in remembrance thereof.” From the same entry we learn that the company had a number of journals and “letters of intelligence” in its hands and had it in mind to employ someone else to copy them into books of reference, and that he, Wright, was to be the person to compare the “Jornalls and plotts’ wth such as have beene formerlie made by the Portingalls and others to distinguish the errors that were purposely or ignorantlie sett downe in them.”¹¹¹

106. William Barlow, *The Navigators Supply: Containing Many Things of Principall Importance Belonging to Nauigation, with the Description and Vse of Diuerse Instruments . . .* (London: G. Bishop, 1597), k4.

107. Waters, *Art of Navigation*, 294.

108. Purchas, *Purchas His Pilgrimes*, 4:291.

109. I am indebted to Anthony Farrington for this reference to BL, IOR, 6/40/25(1), 72–79.

110. Michael Strachan and Boies Penrose, eds., *The East India Company Journals of Captain William Keeling and Master Thomas Bonner, 1615–17* (Minneapolis: University of Minnesota Press, 1971), 207–8.

111. Minutes of the proceedings of the court of directors of the East India Company, 1613–1615 IOR:B/5, p. 60. “A letter from Captne Downton on behalfe of Mr. Wright.” Calendared in *Calendar of State Papers, Colonial Series, East Indies, China and Japan, 1513–1616*, ed. W. N. Sainsbury (London: Longman, Green, Longman, and Roberts, 1862), 284 and 306. See also *The Lawes or Standing Orders of the East India Company* (1621; reprinted Farnborough, Eng.: Gregg International, 1968). For the East India Company, see K. N. Chaudhuri, “The East India Company and the Organisation of Its Shipping in the Early Seventeenth Century,” *Mariner’s Mirror* 39 (1963): 27–41; with respect to its development of an official hydrographic office, see Andrew S. Cook, “Establishing the Sea Routes to India and China: Stages in the Development of Hydrographical Knowledge,” in *Worlds of the East In-*

As Wright died in 1615, it is hardly surprising that his improved form of chart on the Mercator or Wright projection was apparently little used: he had little time to instruct the mariners after his appointment in 1614, and many remained unconvinced. Richard Norwood in the *Seaman's Practice* (1637) writes in the dedication to the reader that “considering that this particular experiment was proposed above 30 yeares since, by our Country man Mr. Edw. Wright, to invite some to the tryall of it, as a thing which he would have done himselfe, if he had found such furtherance and opportunity as he desired, which it seemes he did not, nor any other since that time.” He then goes on to say that reckonings of the ships way “are still kept upon the Plaine or Common *Sea-chart*, which makes a degree in any parallel equal to a degree in the Equinoctiall.” The Mercator chart’s construction and use seem to have caused practical difficulties and misunderstandings. Wright had explained the mathematical principle and provided tables giving the value of the secant for every ten minutes of every degree of latitude from the equator to 80°N, but the graphical difficulty of measuring the distance traveled seems to have remained. In 1659, while still complaining of the neglect and want of the Mercator charts, Norwood then explained why: “you must often alter your *Scale*, because the degr. of Latit. on this Chart are not equall but grow greater and greater towards the Poles.”¹¹² The need therefore to compute the distance north or south rather than read it off the scale bar, which was composed of equal length units, was an added complication.

In many cases the practical problems of the waxing latitude values when moving away from the equator could be avoided quite safely. Speaking of plane sailing, Peter Perkins stated, “supposing the Earth and Sea to be a plain flat, and each parallel equal to the Equator, yet by breaking a long Voyage into many short ones, a Voyage may pretty well be performed thereby, near the same meridian [meaning only a little east or west of a meridian going north to south or vice versa].” He also asserted that the plane chart would “serve in the longest Voyages so a man return in or near the opposite Rumb [line of direction] he went by.”¹¹³

These views were generally accepted. Cotter has described this method of sailing as latitude sailing—that is, running north or south until the latitude of the ship’s destination was reached and then sailing east or west, depending on the known prevailing winds and currents.¹¹⁴ Although this is a gross oversimplification, it is easy to see how a plane chart, which incorporated a latitude scale divided into units of not normally less than ten minutes, or a sixth of a degree, could be used adequately. Longitude remained a problem with whatever chart was used.

By the 1630s this resistance to the use of Mercator charts was beginning to change. Mercator charts of the

Atlantic had been introduced by the Dutch hydrographer and publisher Willem Jansz. Blaeu in 1619. These were printed on vellum at small scale and we may assume were as available to English shipmasters as they were to the Dutch. Not until the 1630s did the Mercator charts, as explained by Wright, begin to have any effect in terms of oceanic use. Charles Saltonstall, in a voyage to the West Indies in the 1630s, had a wager with the Dutch and English masters in the fleet that the plane chart that some were using would not be correct in keeping their reckoning. He won and triumphantly claimed that the “plaine chart, which you see apparently hath need of Crutches, being lame in all his Linements.”¹¹⁵

Even at the end of the seventeenth century not every seaman was convinced. Edmond Halley was still trying to persuade sailors of the merits of Mercator charts: he wrote to Pepys in despair in 1696, complaining of their obstinate use of the “common plaine chart as if the earth were a flat” and their “absurd way of keeping their reckonings by the plain chart.”¹¹⁶

THE EMERGENCE OF AN ENGLISH PRINTED CHART TRADE

Although the hand-drawn chart became commonplace in London in the seventeenth century, the English also began to import printed charts from the Dutch in the 1580s. The first Dutch import translated into English for the English market was *The Safeguard of Sailors* in 1584, which included woodcut coastal views. The major innovation, however, was the English translation by Anthony Ashley of the Dutch *Spieghel der zeevaerdt*, printed in England as *The Mariners Mirrour* and coming out in 1588, the year of the Spanish Armada. Three of its plates were engraved by Augustine Ryther in London, and he also engraved and seems to have published the charts commemorating the

dia Company, ed. H. V. Bowen, Margarete Lincoln, and Nigel Rigby (London: Boydell Press, 2002), 119–36.

112. Richard Norwood, *The Sea-Mans Practice, Contayning a Fvndamentall Probleme in Navigation, Experimentally Verified: Namely, Touching the Compasse of the Earth and Sea, and the Quantity of a Degree in our English Measures* (London: Printed for George Hurlock, 1637), b2 verso, 3, and 103–4.

113. P. Perkins, *The Seaman's Tutor: Explaining Geometry, Cosmography and Trigonometry . . .* (London, 1682), 78 and 135.

114. Charles H. Cotter, “The Development of the Mariner’s Chart,” *International Hydrographic Review* 54, no. 1 (1977): 119–30, esp. 121.

115. Charles Saltonstall, *The Navigator: Shewing and Explaining all the Chiefe Principles and Parts both Theoricke and Practicke . . .* (London, 1636), 108.

116. Letter from Edmond Halley to Pepys (17 February 1696) in “papers of Mr Halley’s & the learned Mr Grave’s touching on the imperfect Attainments in the Art of Navigation &c.” Pepys Library, Magdalene College, Cambridge, MS. 2185, fol. 6. Copy in BL, Add. MS. 30221, fol. 85.

Armada drawn by Robert Adams in the same year. In 1657 Joseph Moxon used Dutch plates for the London printing of his *Book of Sea-plats . . . Europe*, intended for a popular audience.¹¹⁷ Apart from these three works, the English relied on English text editions of Dutch sea atlases printed in Amsterdam specifically for the English market until the 1670s. Thus English chartmaking until the 1670s was an entirely hand-drawn profession because the printed charts were available from Amsterdam.

Therefore to appreciate the real charting resource available to the English it is necessary to remember the imported sea atlases and charts coming into England throughout this period, sold through booksellers and ships chandlers. After the 1570s, Flemish and later Dutch booksellers in London imported books from Christoffel Plantijn in Antwerp and in the seventeenth century from Blaeu in Amsterdam. The first person who specialized in selling English charts was William Fisher.¹¹⁸ In the early eighteenth century, the hand-drawn chart gradually gave way to the engraved chart, and this trend is epitomized in the career of John Thornton, who had been apprenticed to Burston in the Drapers' Company.¹¹⁹ He described himself as a plat maker and made thirty-three surviving manuscript charts in the period 1667–1701. After 1677 he joined John Seller, another map and chartmaker, in publishing *The English Pilot*, which contained charts covering the Mediterranean. Many of the charts came from his workshop. Thereafter Seller and Fisher continued to compile and issue the *Pilot* and in 1689 issued one for the West Indies. In 1703 Thornton published another *Pilot* for the East Indies.

CONCLUSION

The English, like the Dutch, were late arrivals on the European chartmaking scene. Nevertheless they charted the world's coastlines and from 1600 produced a graphical view of the world derived from their own experiences and from revisions of chart compilations from the Spaniards, Portuguese, French, and Dutch. The amount and coverage of charting done shifted not only according to what was discovered but also according to changing governmental and commercial interests, including colonial ones from the beginning of the seventeenth century.

Before 1550 the English either did not use charts at all, even in oceanic voyages, or they acquired foreign charts and pilots, notably Portuguese ones. In the period 1550–90, however, the English learned rapidly how to use and then to make charts from their experience in exploring the Northeast and Northwest Passages and on their voyages across the Atlantic and in the East Indies. These were plane charts with equidistant degrees of latitude. Norman, Borough, and Hood, as well as others, were active in teaching the government and maritime community

from the 1570s to the 1590s, promoted the use of charts, and made them themselves.

In the beginning of the seventeenth century, Tatton began to make charts that followed the style of the North Holland School. He passed this influence on to his younger contemporary Daniel and his apprentices, forming a trade on the banks of the Thames to meet the charting demand of sailors and others. This nascent group became prominent and organized in the Drapers' Company at least from 1612, the date of the first mention of a Daniel chart. The Drapers, like Tatton, evidently supplied the shipmasters of the East India Company and made copy charts. Their clients were not only shipmasters but aristocratic backers of voyages or those on government missions who required decorative charts. Royal officials also had charts made for their personal delight and reference long after printed charts were available.

At the same time some attempt was made by the East India Company to organize along similar lines to the Dutch East India Company in teaching shipmasters navigation and buying or having copies made of charts, journals, and logs. Edward Wright's seminal work on the Mercator projection, *Certain Errors of Navigation* (1599), together with his own work with the East India Company from 1614 continued this endeavor. He probably instructed John Daniel, whose Mercator charts were mentioned by the company's shipmasters in 1615. Daniel continued to make plane charts of the North Atlantic route well into the 1630s (fig. 58.14). But with Wright's death in 1615, the necessary systematic mathematical instruction ceased. The continuing production and use of plane charts from Tatton and the Drapers' chartmakers for individual shipmasters implies that the company's attempts to collect copies of charts was sporadic, although copies of journals were collected.

English chartmaking remained almost entirely in manuscript form until the late seventeenth century. There was little point in competing with the Dutch publishers. Therefore English charts reached a smaller audience than did the Dutch; that audience included, however, government,

117. BL, Maps K. Mar. I. 41.

118. Sarah Tyacke, *London Map-Sellers, 1660–1720: A Collection of Advertisements for Maps Placed in the London Gazette, 1668–1719, with Biographical Notes on the Map-Sellers* (Tring, Eng.: Map Collector Publications, 1978), 114.

119. For Thornton's career, see especially Andrew S. Cook, "More Manuscript Charts by John Thornton for the Oriental Navigation," *Imago et Mensura Mundi: Atti del IX Congresso Internazionale di Storia della Cartografia*, 3 vols., ed. Carla Clivio Marzoli (Rome: Istituto della Enciclopedia Italiana, [1985]), 1:61–69; Coolie Verner, "Engraved Title Plates for the Folio Atlases of John Seller," in *My Head is a Map: Essays & Memoirs in Honour of R. V. Tooley*, ed. Helen Wallis and Sarah Tyacke (London: Francis Edwards and Carta Press, 1973), 21–52, esp. 23–24; and Tyacke, *London Map-Sellers*, 144.

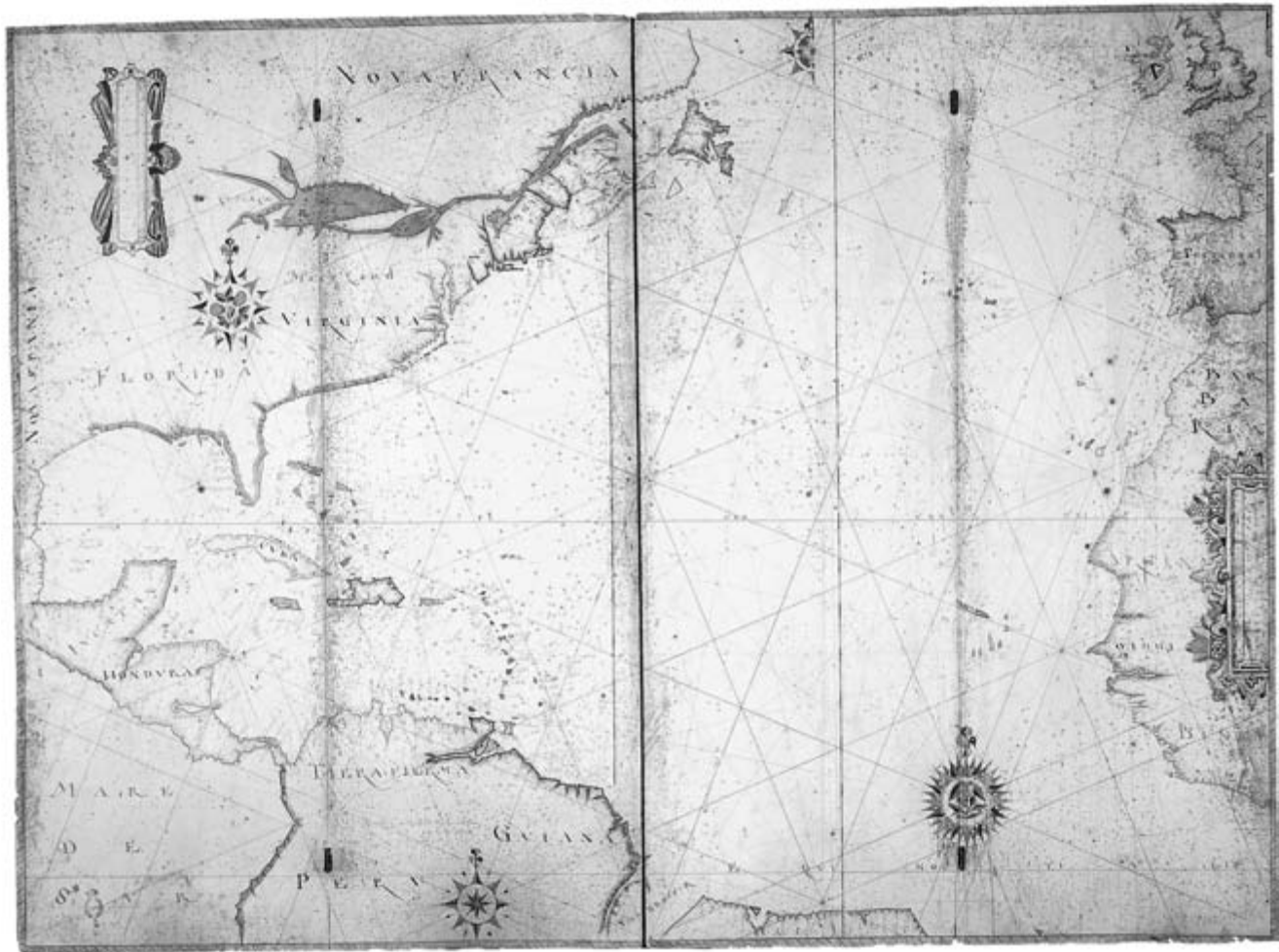


FIG. 58.14. JOHN DANIEL, NORTH ATLANTIC, 1639. Size of the original: 71 × 96 cm. Biblioteca Nazionale Cen-

trale, Florence (Port. 13). By concession of the Ministero per i Beni e le Attività Culturali della Repubblica Italiana.

maritime, and university circles. Furthermore, by the 1630s, charting coverage of known sea routes had been completed, including a coastal series for the East Indies. The general or popular influence of the manuscript tradition was, however, very limited without the power of

publication. These manuscript charts continued to be made well into the eighteenth century, when the printed chart trade took off from the manuscript basis of the Drapers' Company charts and, in particular, those of John Thornton.

APPENDIX 58.1 SURVIVAL OF THE EARLIEST ENGLISH MARINE REPRESENTATIONS AND
CHARTS OF OVERSEAS, CA. 1560–1660, LISTED BY DECADE

The chronological coverage of this list is from the earliest decade of surviving English-made charts, the 1560s—although the Boroughs were making charts before this—to about 1660, at which point the English manuscript chart trade in the Drapers’ Company is represented by greatly increased numbers of surviving charts. This manuscript output is sustained until the mid-eighteenth century. During the 1670s the manuscript chartmakers and copyists John Seller and John Thornton begin to produce engraved and printed charts and the English published chart trade begins.

The geographical coverage of the charts is given, and where a title exists it is given in quotation marks. Attributed authors are given in square brackets. Dates in square brackets are not on the chart and are approximate. Occasionally a month is given by the cartographer as well as the year—in such cases, new and old style years may differ and the former is also given in the list. The addition of charts referred to in the sources would increase the output considerably, and a full exploration of other marine representations, such as sketches of coasts or harbor plans in, for example, the State Papers or other IOR has yet to be completed.

Earlier charts made in England are mentioned in the text. Charts of the British Isles and coastal waters are also mentioned in the text where relevant to the argument and references to them given to descriptions in secondary sources, notably Adrian Henry Wardle Robinson, *Marine Cartography in Britain: A History of the Sea Chart to 1855* (Leicester: Leicester University Press, 1962).

I am indebted to Richard L. Pfleiderer (see his *Catalogue of the Portolan Charts and Atlases in the British Library* [(U.S.A.): author, 2001]), and Peter Barber for their comments on this appendix. Particularly valuable was checking this list against Tony Campbell’s “Indexes to Material of Cartographic Interest in the Department of Manuscripts and to Manuscript Cartographic Items Elsewhere in the British Library” (November 1992), vol. 3, Chronological Index, 711-937 (BL, Maps Ref Z.2.[1]). I am also indebted to Rose Mitchell for checking the references to those items in TNA and to Roger Mason for his list of charts in the Bodleian Library 1660–1741 and for the reference to the chart of British waters probably to accompany “A Note of the Headlands of England . . .” (Steele 1012). Last, Andrew Cook has advised and assisted me in compiling the final standardized version of the appendix and the chronological coverage.

| Item | Description | Location |
|------------------|---|--|
| <i>1561–1570</i> | | |
| 1 | William Borough, Novaya Zemlia to the river Ob, sketch [ca. 1568] | BL, Lansdowne MS. 10, fol. 133 |
| 2 | William Borough, Norway to Novaya Zemlia [ca. 1568] | BL, Royal MS. 18.D.III, fol. 124 |
| 3 | “Booke of the Sea carte” [1560s?] | BL, Add. MS. 37024, fols. 41–48 |
| | 1. Scotland | |
| | 2. East coast of England, Flanders, Holland | |
| | 3. Cardigan Bay, Wales to the Channel, Normandy and Brittany | |
| | 4. Ireland, the Irish Sea and western England | |
| <i>1571–1580</i> | | |
| 4 | William Borough, North Atlantic, 1576 | Hatfield House, CPM.I.69 |
| 5 | [Edward Fenton], Warwick Foreland and the Queen’s Foreland, Canada, 1578 | Cambridge, Magdalene College, Pepys Library, MS. 2133, fol. 16 |
| 6 | Francis Fletcher (copyist John Conyers ca. 1677) | BL, Sloane MS. 61 |
| | 1. River Plate to beyond the Straits of Magellan; “River of Plate” to “Insula Elizabethae” 1577–78 (Henderson Island, 55°36’S) | fol. 19r, and another version, fol. 35 |
| | 2. Elizabeth Island | fol. 39r |
| 7 | John Dee, North Atlantic, English Channel to west coast of America and the Bering Strait, map, 1580 | BL, Cotton MS. Aug. I.i.1 |
| 8 | John Dee, Northern hemisphere, Arctic Ocean to China, “Deo optimo maximo favente, Anglorum ad Cathaicum per Scythicum Oceanum . . . 1580” | Stamford, Lincs., Burghley House |
| 9 | William Borough, British Isles, North Sea and Channel; a fragment of a larger chart probably covering the Norwegian coasts, the Arctic Ocean and possibly as far as the river Ob [ca. 1580] | Dublin, Trinity College, MS. 1209, no. 23* |
| 10 | [Robert Norman?], Southwest coast of Ireland [ca. 1580 and before 1583] | BL, Cotton MS. Aug. I.ii.27 |

APPENDIX 58.1 (*continued*)

| Item | Description | Location |
|------------------|--|---|
| 11 | [Hugh Smith?], Vaygatz and Novaya Zemlia, sketch, 1580 | BL, Cotton MS. Otho E.VIII, fol. 78 |
| <i>1581–1590</i> | | |
| 12 | Robert Norman, Azores to Beachy Head, 1581 | Stamford, Lincs., Burghley House |
| 13 | T. S., Northern hemisphere, Arctic [ca. 1582] | Philadelphia, The Free Public Library |
| 14 | Richard Madox, Santa Catarina, Brazil, called the Bay of Good Comfort by Capt Edward Fenton, sketch [ca. 1582] | BL, Cotton MS. Titus B.VIII, fol. 211 |
| 15 | Richard Madox, Santa Catarina, Brazil; “Santa Catalina,” sketch [ca. 1582] | BL, Cotton MS. Titus B.VIII, fol. 211v |
| 16 | John White, Cape Florida to Chesapeake Bay [ca. 1585] | London, British Museum, Prints and Drawings, 1906-5-9-1(20) |
| 17 | Richard Poulter, San Sebastián, “The discription of saint sebastians in biskye,” 1585 | BL, Cotton MS. Aug. I.i.16 |
| 18 | [Thomas Harriot], Albemarle Sound and Pamlico Sound, sketch [ca. 1585] | TNA, MPG 1/584 |
| 19 | John White, Cape Lookout to Chesapeake Bay [ca. 1585] | London, British Museum, Prints and Drawings, 1906-5-9-1(3) |
| 20 | [Baptista Boazio], Santiago, Cape Verde Islands, view [ca. 1585] | BL, Egerton MS. 2579 |
| 21 | John White, Dominica, Virgin Islands, “The Risinge of the Ilande of Dominica,” coastal profile [ca. 1585] | London, British Museum, Prints and Drawings, 1906-5-9-1(36) |
| 22 | John White, St. Croix, Virgin Islands, “The Risinge of the Ilande of Santicruse,” coastal profile [ca. 1585] | London, British Museum, Prints and Drawings, 1906-5-9-1(36) |
| 23 | [William Borough?], East coast of England, North Sea to the Baltic Sea [ca. 1585] | London, National Maritime Museum, N.51-4/G-215:1/5 |
| 24 | [Christopher Carleill?], Bayonne and Vigo, Spain [1585] | TNA, MPF 1/13 |
| 25 | Edmond Doran, Mediterranean, and north European coasts from Denmark to the Canaries, 1586 | New Haven, Conn., Yale University, Beinecke Library, Rare Book and Manuscript Department, Portolan chart 30 |
| 26 | [William Borough?], Cádiz, Spain, sketch, 1587 | TNA, MPF 1/132 |
| 27 | Hercules Doran, Mediterranean Sea and Black Sea, 1586 [1587 new style] | Hatfield House, CPM.I.68 |
| 28 | [Anonymous], North Pole and Arctic [after 1586] | Florence, Biblioteca Nazionale Centrale, Port. 20 |
| 29 | William Borough, Cádiz, Spain, harbor plan, 1587 | TNA, MPF 1/318 |
| 30 | [Baptista Boazio?], world map, “Vera descriptio expeditonis nauticae Francisci Draci . . .” [after 1587] | New Haven, Yale Center for British Art, Paul Mellon Collection |
| 31 | [Anonymous or Thomas Layton?], Baltic, 1588 | Private collection (Dr. Tomasz Niewodniczański) |
| 32 | [Thomas Hood?], Pacific, Magellan Strait, and West Indies, 1588 | The Hague, Nationaal Archief, Leupe 733 |
| 33 | Thomas Lupo, Mediterranean Sea and Black Sea [ca. 1588] | BL, Add. MS. 10041 |
| 34 | R. B., Atlantic, Africa, and South America [after 1588] | Florence, Biblioteca Nazionale Centrale, Port. 30 |
| 35 | James Beare, Santander, Spain [ca. 1589] | Washington, D.C., Library of Congress, George Legg Collection, 23 |
| 36 | James Beare, La Coruña and El Ferrol, Spain [ca. 1589] | Washington, D.C., Library of Congress, George Legg Collection, 23 |
| 37 | [Anonymous], Cape Prior to La Coruña, Spain [ca. 1589] | TNA, MPF 1/217(1) |
| 38 | [Anonymous], Cape Prior and El Ferrol, Spain, harbor plan [1589] | TNA, MPF 1/217(2) |
| 39 | [Anonymous], Ria de Betanzos, Coruna province, Spain [ca. 1589] | TNA, MPF 1/217(3) |
| 40 | [Anonymous], Sanlucaro de Barrameda to Seville, Spain [ca. 1589] | TNA, MPF 1/217(4) |
| 41 | [Anonymous], Kinsale, Ireland [ca. 1590] | TNA, MPF 1/314 |

APPENDIX 58.1 (*continued*)

| Item | Description | Location |
|------------------|---|--|
| 42 | [Richard Poulter?], River Gironde, Royan to Bordeaux, France [ca. 1590] | BL, Cotton MS. Aug. I.ii.80 |
| <i>1591–1600</i> | | |
| 43 | Thomas Hood, North Atlantic, West Indies, and South America, 1592 | Munich, Bayerische Staatsbibliothek, Cod. Icon.140, 84 |
| 44 | Martin Frobisher, Crozon, Brest, Brittany, 1594 | Hatfield House, CPM.141/67 |
| 45 | [Thomas Hood?], North Atlantic, east coast of North America, and South America, English Channel, and Bay of Biscay [ca. 1594] | BL, Add. MS. 17938B |
| 46 | [Edward Wright or Thomas Hood?], Azores to Portsmouth [ca. 1595] | Hatfield House, CPM.II.52 |
| 47 | [Walter Raleigh?], coast of South America [ca. 1595] | BL, Add. MS. 17940A |
| 48 | [Drake's artist], navigational journal of Drake's last voyage to West Indies, 1595-96 | BNF, MS. Anglais 51 |
| 49 | Thomas Hood, English Channel, Irish Channel, and Bay of Biscay, 1596 | London, National Maritime Museum, G.224/1/2 |
| 50 | [Anonymous], northern coast of South America [ca. 1596] | Private collection |
| 51 | Baptista Boazio, Azores, 1597 | BL, Add. MS. 18109H |
| 52 | Nicholas Reynolds, coast of Ireland, 1598 [1599 new style] | Dublin, Trinity College, MS. 1209/6 |
| 53 | Gabriel Tatton, Pacific [ca. 1600] | Florence, Biblioteca Nazionale Centrale, Port. 33 |
| 54 | Martin Llewellyn, atlas [ca. 1600] | Christchurch, Oxford (west table a.3), now in the Bodleian Library |
| | 1. East coast of Africa | |
| | 2. East coast of Africa | |
| | 3. East coast of Africa | |
| | 4. Indian Ocean | |
| | 5. Indian Ocean | |
| | 6. Mecca to Red Sea | |
| | 7. Persian Gulf | |
| | 8. Arabia Felix to Bisnagar | |
| | 9. Maldives? to Bisnagar | |
| | 10. Narsingharh to Siam | |
| | 11. Sumatra to Celebes | |
| | 12. Siam to Mindanao | |
| | 13. Quanci to Zima | |
| | 14. Chinnæ to Japan | |
| | 15. Mindanao to Philippines | |
| | 16. Sumatra to Timor | |
| | 17. Comia to Nova Guinia | |
| 55 | Gabriel Tatton, Mediterranean Sea, Black Sea, and Aegean Sea [ca. 1600] | Chicago, Newberry Library, Ayer MS. map 22 |
| 56 | [Anonymous], North Sea and Biscay [ca. 1600] | Hatfield House, CPM.I.70 |
| 57 | [Anonymous], North Sea and Norwegian coast [ca. 1600] | TNA, E 163/28/12 (2) |
| 58 | [Anonymous], Ulster [ca. 1600] | Dublin, Trinity College, MS. 1209/18 |
| 59 | [Anonymous], rough pencil sketch of Isle of Margarita, W Indies, [ca. 1600–16?] | BL, Egerton MS., fols. 1v–2v |
| 60 | John Hearne and William Finche, coastal views in their journal to Surat, 1606–8 | BL, IOR, L/MAR/A/V, fols. 4, 6v, 14, 17v, 21, 21v, 22v, 23 |

APPENDIX 58.1 (*continued*)

| Item | Description | Location |
|------------------|--|--|
| <i>1601–1610</i> | | |
| 61 | Gabriel Tatton, North Atlantic and coasts of North America [1602?] | Florence, Biblioteca Nazionale Centrale, Port. 21 |
| 62 | [James Hall], journal [1605] | BL, Royal MS. 17.A.XLVIII |
| | 1. Greenland, Itivdleq Fijord, King Christian's Forde | fol. 7v |
| | 2. Greenland, Cuningham's Forde | fol. 8v |
| | 3. Brade Ranson's Forde | fol. 9v |
| | 4. Coast of Greenland from Disko Bugt to Itivdleq Fijord | fol. 10v |
| 63 | Robert Tindall, Chesapeake Bay, James River and Prince Henry River, Virginia, 1608 | BL, Cotton MS. Aug. I.ii.46 |
| 64 | [Anonymous], China, East Indies, and Japan, 1609 | BL, Cotton MS. Aug. I.ii.45 |
| 65 | [Anonymous], Greenland to Novaya Zemlia [ca. 1610] | BL, Cotton MS. Aug. I.i.10 |
| 66 | Thomas Love, sketches and pen and ink drawings of coasts and of the island of "Moyella," and on the end boards a pen and ink tracing of part of a Portuguese? chart of the Bay of Bengal, in his journal to the East Indies, 1610–11 | BL, IOR, L/MAR/A/X fols. 11v, 12v, 14, 24, 24v, 29 |
| <i>1611–1620</i> | | |
| 67 | John Saris, Journal, 1611–13 | BL, IOR, L/MAR/A/XIV |
| | 1. Harbor plan | fols. 18–19 |
| | 2. Coastal views | fols. 24, 27, 30 |
| 68 | [Robert Tindall?], North America [1611] | Archivo General de Simancas, M. P. y D., I-1. Estado, leg. 2588-25 |
| 69 | Nicholas Reynolds, Mediterranean Sea [ca. 1612] | Florence, Biblioteca Nazionale Centrale, Port. 11 |
| 70 | [Robert Fotherby?], Spitsbergen [ca. 1613 or later] | Worcester, Mass., American Antiquarian Society |
| 71 | Gabriel Tatton, Guiana [ca. 1613] | BL, Add. MS. 34240N |
| 72 | Gabriel Tatton, Guiana Pars [ca. 1613], inset to 71 | BL, Add. MS. 34240N |
| 73 | [John Daniel?], North Atlantic [ca. 1614?] | New York Public Library, Phelps Stokes c.1606-08-C-8 |
| 74 | John Daniel, Mediterranean Sea and Black Sea [1614?] | BL, Maps *975(4) |
| 75 | John Daniel, Atlantic, the Channel, Cape of Good Hope, Brazil, 1614 [1615 new style] | BL, Add. 5415 C.1 |
| 76 | Gabriel Tatton, Amazon River, 1615 | Duke of Northumberland's collection, Alnwick, Northumberland |
| 77 | [Ralph Coppinghall?], sketches in a journal from Patani to Japan and thence to Bantam, 1615 | BL, IOR, L/MAR/A/XXIII, fols. 15–20v |
| 78 | William Baffin, Journal [ca. 1615] | BL, Add. MS. 12206 |
| | 1. Hudson's Bay | fols. 6–7 |
| | 2. Resolution Bay, west coast of Resolution Island | fol. 9 |
| 79 | [after Gabriel Tatton], Guiana, 1617 | Archivo General de Simancas, M. P. y D., VI- 56. |
| 80 | [John Daniel?], world [after ca. 1617] | BL, Add. MS. 70640A |
| 81 | [Anonymous], North Atlantic east [after ca. 1620] | San Marino, Calif., Huntington Library, HM 2098 |
| 82 | [John Daniel?], copy of James Beare, Santander, Spain [ca. 1620] | Washington, D.C., Library of Congress, Drake 50 |
| 83 | [John Daniel?], copy of James Beare, La Coruña and El Ferrol, Spain [ca. 1620] | Washington, D.C., Library of Congress, Drake 50B |

APPENDIX 58.1 (*continued*)

| Item | Description | Location |
|------------------|--|---|
| 84 | Robert Norton, Algiers and Mediterranean Sea, 1620 | London, National Maritime Museum, G.231:13/3 |
| <i>1621–1630</i> | | |
| 85 | Gabriel Tatton, atlas [before 1621] 1. Northwest Java, Sumatra, and Bangka 2. East Bangka and Lingga I 3. Lingga, Bintan, and Malaya 4. Malaya 5. Malaya 6. Malaya, Pattani, and Songkhla 7. Borneo and northeast 8. Poulo Condor and Camboiem 9. Vietnam 10. China and Macao 11. Mindoro and Calamian Islands 12. Mindanao 13. Java, Madura, Celebes, and Buru 14. Celebes and Helmehera 15. Northern coast of Celebes 16. Southwest coast of Celebes 17. Celebes and east coast of Bungai | Portsmouth, Admiralty Library, Va32 |
| 86 | Andrew Symms, coastal views in a journal to the East Indies and back, 1622/3 | BL, IOR, L/MAR/A/ XXXVII, fols. 14, 18–23 |
| 87 | John Daniel, British Isles to North Africa, 1626 | BL, Add. MS. 18664B |
| 88 | Nicholas Comberford, Mediterranean Sea, 1626 | Dudley Barnes's collection |
| 89 | [David Davis], sketch of Bombay Bay in journal, 1626 | BL, IOR, L/MAR/A/XLIV, fol. 14v |
| 90 | [David Davis], sketches and coastal views and a draught of the Bay of Oman and Strait of Hormuz in journal, 1626 | BL, IOR, L/MAR/A/XLIV, fols. 17r, 17v, 18r, 18v, 19v–20r |
| 91 | [Nicholas Comberford?], Amazon River [after ca. 1626] | BNF, Pf. 166, Div. 1, pièce 4 |
| 92 | [John Wells?], Baffin Bay? [ca. 1627] | Cambridge, Magdalene College, Pepys Library, MS. 2820 |
| 93 | John Daniel, Indian Ocean, Persia, and Java Maior, 1630 | BL, Add. MS. 18664A |
| 94 | John Daniel, Coast of China, East Indies, Japan and West Pacific [ca. 1620s] | BL, Add. MS. 5415.I.1 |
| <i>1631–1640</i> | | |
| 95 | [Thomas James or later copyist?], Atlantic and Hudson Bay, 1631 | BL, Add. MS. 5415 G.1 |
| 96 | [John Daniel?], Northeast Atlantic covering Azores and west coast of Africa? [before 1637] | BL, IOR, L/MAR/A/LXI (binding for John Maestnell's journal 1633–37) |
| 97 | John Daniel, Indian Ocean to Sumatra and Java, 1637 | Florence, Biblioteca Nazionale Centrale, Port. 10 |
| 98 | John Daniel, Europe, British Isles, Africa, and Brazil, 1637 | Florence, Biblioteca Nazionale Centrale, Port. 8 |
| 99 | John Daniel, East Indies, Korea, Japan, and New Guinea, 1637 | Florence, Biblioteca Nazionale Centrale, Port. 12 |
| 100 | John Daniel, Northern Europe, Greenland to the River Ob, 1637 | Florence, Biblioteca Nazionale Centrale, Port. 14 |
| 101 | John Burston, Mediterranean, 1638 | London, National Maritime Museum, G.230:1/15 |

APPENDIX 58.1 (*continued*)

| Item | Description | Location |
|------------------|--|---|
| 102 | Nicholas Comberford, North Atlantic coasts, 1638 | Lincoln, Lincoln Cathedral |
| 103 | John Daniel, Pacific, west coast of America, 1639 | Florence, Biblioteca Nazionale Centrale, Port. 23 |
| 104 | John Daniel, Pacific, China, Celebes, New Guinea, and California, 1639 | Florence, Biblioteca Nazionale Centrale, Port. 24 |
| 105 | John Daniel, Atlantic, east coast of America, west coast of Europe, 1639 | Florence, Biblioteca Nazionale Centrale, Port. 13 |
| <i>1641–1650</i> | | |
| 106 | John Burston, Mediterranean, 1640 | BL, Add. MS. 19916 |
| 107 | Nicholas Comberford, southwestern approaches (Biscay to the Channel), 1641 | Lawrence, University of Kansas, Spencer Research Library, Summerfield MS. J 7:2 |
| 108 | John Daniel, Mediterranean, 1642 | Mantua, Bibl. Governativa, MS. A.U.6 n 136 |
| 109 | John Daniel, Mediterranean, 1642 | Dublin, Trinity College, MS. 1209/ 81 |
| 110 | John Burston, Mediterranean, 1640s? | BL, Maps C 21.e 2 |
| 111 | Nicholas Comberford, North Atlantic, Canada to British Isles, Gulf of Mexico and coast of Guinea, 1646 | Florence, Biblioteca Nazionale Centrale, Port. 25 |
| 112 | Nicholas Comberford, Mediterranean, 1647 | New Haven, Conn., Yale University, Stirling Memorial Library, Map Room |
| 113 | Nicholas Comberford, South Atlantic, 1647 | BL, Add. MS. 31320B |
| 114 | Nicholas Comberford, North Atlantic, 1650 | London, National Maritime Museum, G.213:2/2 |
| <i>1651–1660</i> | | |
| 115 | Nicholas Comberford, Indian Ocean [ca. 1650?] | BL, Add. MS. 5414.11 |
| 116 | Nicholas Comberford, Northern Europe, 1651 | London, National Maritime Museum, G.213:3/1 |
| 117 | Nicholas Comberford, Mediterranean Sea, 1657 | BL, Add. MS. 5415 C.2 |
| 118 | Nicholas Comberford, North Atlantic Ocean, 1657 | BL, Add. MS. 5414.13 |
| 119 | Nicholas Comberford, Mediterranean Sea, 1657 | Hanover, N. H., Dartmouth College, Baker Library |
| 120 | John Burston, Mediterranean Sea, 1658 | London, National Maritime Museum, G.230:1/5 |
| 121 | John Burston, Mediterranean Sea, 1659 | London, National Maritime Museum, G.230:1/13 |
| 122 | Nicholas Comberford, North America—Caribbean, 1659 | Cambridge, Mass., Harvard University, Houghton Library, 51-308 |
| 123 | John Burston, Azores Channel, 1660 | Oxford, Bodleian Library, MS.Additional E.10 |