

38 • Portuguese Cartography in the Renaissance

MARIA FERNANDA ALEGRIA, SUZANNE DAVEAU, JOÃO CARLOS GARCIA,
AND FRANCESC RELAÑO

INTRODUCTION

The study of Portuguese cartography has focused in large part on Portugal's contribution to nautical charting, astronomical navigation at sea, and mapping in support of its vast overseas expansion in the fifteenth and sixteenth centuries. The factors contributing to Portugal's importance in those activities during that period are complex.¹ Portugal's geographical position as the westernmost part of continental Europe facing the North Atlantic, for example, cannot account entirely for its success. Other countries had more and better harbors and a larger proportion of their population engaged in the sea. But Portugal's political unity from the thirteenth century; the support it received from a series of Papal bulls that gave it a monopoly in discovery, conquest, and commerce, as well as gold and slaves from West Africa to pay for these activities; and the technical knowledge of winds and currents in the Atlantic, ship design, chartmaking, and navigation all contributed to Portugal's importance in world trade by the first half of the sixteenth century.

The prestige of Portugal's chartmaking activity has overshadowed the study of sixteenth- and seventeenth-century terrestrial mapping by the Portuguese, both domestically and overseas. In the literature, "nautical" charts often included the surveys and regional and urban maps made in the Portuguese territories overseas. Not many terrestrial maps of Portugal from this period have survived, and most of the few studies of these have been more interested in searching for technical innovations in Portuguese surveying than in explaining the maps' roles as cultural and political documents.

The relative importance of nautical maps is reflected in the magisterial six-volume *Portugaliae monumenta cartographica* (PMC) by Armando Cortesão and A. Teixeira da Mota, published in 1960 on the occasion of the five hundredth anniversary of the death of Prince Henry "the Navigator" (Infante Dom Henrique).² Its copious descriptions, with particular attention to the dating and content of these maps in the context of the Portuguese geographical discoveries, are accompanied by large-format illustrations. It was reprinted in a reduced format in 1987.³ It is the primary source for Portuguese maps from

the fifteenth century to the end of the seventeenth and the most comprehensive guide to any country's cartographic resources in the Renaissance. After dominating the historiography of Portuguese cartography for forty years, some of its interpretations are now being modified, but it still forms the starting point for any detailed work on the subject, and its influence is clearly seen throughout this chapter.⁴

Abbreviations used in this chapter include: *Bartolomeu Dias for Congresso Internacional Bartolomeu Dias e a sua Época: Actas*, 5 vols. (Porto: Universidade do Porto, CNCDP, 1989); IAN/TT for Instituto dos Arquivos Nacionais / Torre do Tombo, Lisbon; PMC for 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); and *Publicações* for *Publicações (Congresso do Mundo Português)*, 19 vols. (Lisbon: Comissão Executiva dos Centenários, 1940–42).

1. C. R. Boxer, *The Portuguese Seaborne Empire, 1415–1825* (New York: Knopf, 1969), 13–14.

2. PMC; there is a geographical index of the work: João Vidago, "Portugalia monumenta cartographica: Sinopse do conteúdo geográfico das estampas," *Boletim da Sociedade de Geografia de Lisboa* 90 (1972): 197–228.

3. With an introduction by Alfredo Pinheiro Marques and the addition of a few supplemental descriptions.

4. The study of Portuguese cartography, particularly for the eighteenth century to the twentieth, is hampered by the paucity of inventories of cartographic material in Portuguese archives and libraries. Rare examples include "Catálogo das cartas [do Arquivo Histórico Militar]," *Boletim do Arquivo Histórico Militar* 43 (1974): 145–320; H. Gabriel Mendes, *Catálogo de cartas antigas da Mapoteca do Instituto Geográfico e Cadastral* (Lisbon: Instituto Geográfico e Cadastral, 1969); and *A Nova Lusitania: Imagens cartográficas do Brasil nas coleções da Biblioteca Nacional (1700–1822): Catálogo* (Lisbon: CNCDP, 2001). On the existence of old globes, see António Estácio dos Reis, "Old Globes in Portugal," *Boletim da Biblioteca da Universidade de Coimbra* 42 (1994): 281–98. Even in the case of the main institutions, it is necessary to resort to manual files, to photocopied volumes with restricted distribution, or, more recently, to computerized databases, such as the Base Nacional de Dados Bibliográficos (PORBASE), which comprises the Catálogo Colectivo das Bibliotecas Portuguesas, coordinated by the Biblioteca Nacional. It contains all the cartographic records, computerized and updated by the project's member institutions, and is accessible on the Internet at <<http://www.porbase.org/>>. Maps are rarely separated out in the general inventories, such as A. Ayres de Carvalho, *Catálogo da colecção de desenhos* (Lisbon: Biblioteca Nacional, 1977); João d'Almeida Allen, *Catálogo de geographia da Bibliotheca*

PMC is part of a long history of organizing publications, exhibits, and symposia around anniversaries of events important to Portuguese cartographic and exploration history. The first large and exclusively cartographic exhibit was organized in 1903 by the Sociedade de Geografia de Lisboa and coordinated by Admiral Ernesto de Vasconcellos, who had been a hydrographer in the Portuguese navy. Its catalog is still an important reference.⁵ In 1940, a double centenary was celebrated (the eight hundredth anniversary of Portuguese independence and the three hundredth anniversary of the restoration of independence) with several academic symposia and an important cartographic exhibit organized by A. Fontoura da Costa, a historian of nautical science.⁶ In 1983, during the XVII Exposição Europeia de Arte, Ciência e Cultura, in Lisbon, various exhibits on Portuguese cultural heritage were presented to the public. Early cartography was present in the Mosteiro dos Jerónimos (in Belém, Lisbon), in the exhibit coordinated by Teixeira da Mota and Luís de Albuquerque.⁷ Between 1988 and 2001, various events were organized by the Comissão Nacional para as Comemorações dos Descobrimientos Portugueses (CNCDP) to mark key occurrences in Portuguese discovery, particularly the voyages of Bartolomeu Dias, Vasco da Gama, and Pedro Álvares Cabral. In 1994, as part of the commemorations of the sixth centenary of the birth of Prince Henry, the first exhibit that exclusively concerned printed cartographic images of Portugal and of the archipelagos of the Azores and Madeira (from the sixteenth and seventeenth centuries) was organized by the Arquivo Histórico Municipal do Porto.⁸ In 1997, as part of the Seventeenth International Conference on the History of Cartography, six exhibits of early cartography were organized in Lisbon and Évora, and their respective catalogs were published by the CNCDP.⁹ In the following year, as part of the International Geographical Union's 1998 Regional Conference "The Atlantic: Past, Present and Future," another large exhibit was organized covering four centuries of Portuguese cartography.¹⁰

Studies of Portuguese cartography have been closely associated with nautical science and the history of geographical exploration. A key scholar in the history of Portuguese astronomical navigation was the mathematician Luís de Albuquerque, who worked in a long tradition of experts, particularly Joaquim Bensaúde, Luciano Pereira da Silva, Duarte Leite, A. Fontoura da Costa, and Gago Coutinho.¹¹ The most important initiatives have been the Reuniões Internacionais de História da Náutica e da Hidrografia, scientific meetings that Albuquerque and Max Justo Guedes initially organized periodically, in Portugal and Brazil, from the end of the 1960s. No journal has been dedicated to early Portuguese cartography. Articles have appeared in university periodicals (*Biblos* and *Revista da Faculdade de Letras*), in publications of

research centers (*Studia* and *Finisterra*), and in journals of public or private institutions (*Cartografia e Cadastro*, *Revista Militar*, *Boletim da Sociedade de Geografia de Lisboa*, *Mare Liberum*, and *Oceanos*). The most important groups of cartographic publications are the series *Separatas* and *Memórias* of the Centro de Estudos de Cartografia Antiga (today the Centro de Estudos de História e Cartografia Antiga) of the Instituto de Investigação Científica Tropical. There have been about 250 *Separatas* since 1961 and more than two dozen *Memórias* since 1963. The Centro de Estudos has functioned with two sections, one in Lisbon and another in Coimbra, directed

Pública Municipal do Porto (Porto: Imprensa Civilização, 1895); and Magalhães Basto, *Catálogo dos manuscritos ultramarinos da Biblioteca Pública Municipal do Porto*, 2 ed. (Porto: Edições Comemorativas dos Descobrimientos Portugueses, 1988).

The only autonomous cartographic department in Portuguese archives and libraries is that of the Biblioteca Nacional in Lisbon. At the other institutions, the manuscript or printed maps can be consulted in the reserve collections; that is the case at the Arquivo Histórico Militar, the Centro de Estudos de História e Cartografia Antiga, the Instituto Geográfico Nacional, the Museu de Marinha, the Academia das Ciências de Lisboa, the Arquivo Histórico Ultramarino, the Biblioteca da Ajuda, the Biblioteca Pública Municipal do Porto, the Biblioteca Geral da Universidade de Coimbra, and the Biblioteca Pública de Évora.

For an assessment of the situation in the main Portuguese cartographic collections, see Maria Joaquina Esteves Feijão, "O acesso aos documentos cartográficos em bibliotecas e arquivos portugueses," in *El documento cartográfico como fuente de información* (Huelva: Diputación Provincial de Huelva, 1995), 153–78, and Maria Helena Dias, "As mapotecas portuguesas e a divulgação do património cartográfico nacional: Algumas reflexões," *Cartografia e Cadastro* 5 (1996): 43–50.

5. Ernesto J. de C. e Vasconcellos, ed., *Exposição de cartographia nacional (1903–1904): Catálogo* (Lisbon: Sociedade de Geographia de Lisboa, 1904).

6. A. Fontoura da Costa, "Catálogo da Exposição de Cartografia," in *Publicações*, 4:387–459.

7. XVII Exposição Europeia de Arte, Ciência e Cultura: Os descobrimientos portugueses e a Europa do Renascimento (Lisbon: Presidência do Conselho de Ministros, 1984).

8. See Maria Teresa Resende, ed., *Cartografia impressa dos séculos XVI e XVII: Imagens de Portugal e ilhas atlânticas*, exhibition catalog (Porto: Câmara Municipal do Porto and CNCDP, 1994).

9. Two of the catalogs are of particular interest with regard to this period: Max Justo Guedes and José Manuel García, *Tesouros da cartografia portuguesa*, exhibition catalog (Lisbon: CNCDP, 1997), and Isabel Cid and Suzanne Daveau, *Lugares e regiões em mapas antigos*, exhibition catalog (Lisbon: CNCDP, 1997).

10. *Quatro séculos de imagens da cartografia portuguesa = Four Centuries of Images from Portuguese Cartography*, 2d ed. (Lisbon: Comissão Nacional de Geografia, Centro de Estudos Geográficos da Universidade de Lisboa, and Instituto Geográfico do Exército, 1999).

11. Armando Cortesão, *History of Portuguese Cartography*, 2 vols. (Coimbra: Junta de Investigações do Ultramar-Lisboa, 1969–71), 1:51–58. Luís de Albuquerque wrote two long chapters on astronomical navigation and instrumentation for the second volume: "Astronomical Navigation" and "Instruments for Measuring Altitude and the Art of Navigation," 2:221–357 and 359–442. A guide to the writings on Portuguese expansion is Alfredo Pinheiro Marques, *Guia de história dos descobrimientos e expansão portuguesa* (Lisbon: Biblioteca Nacional, 1987).

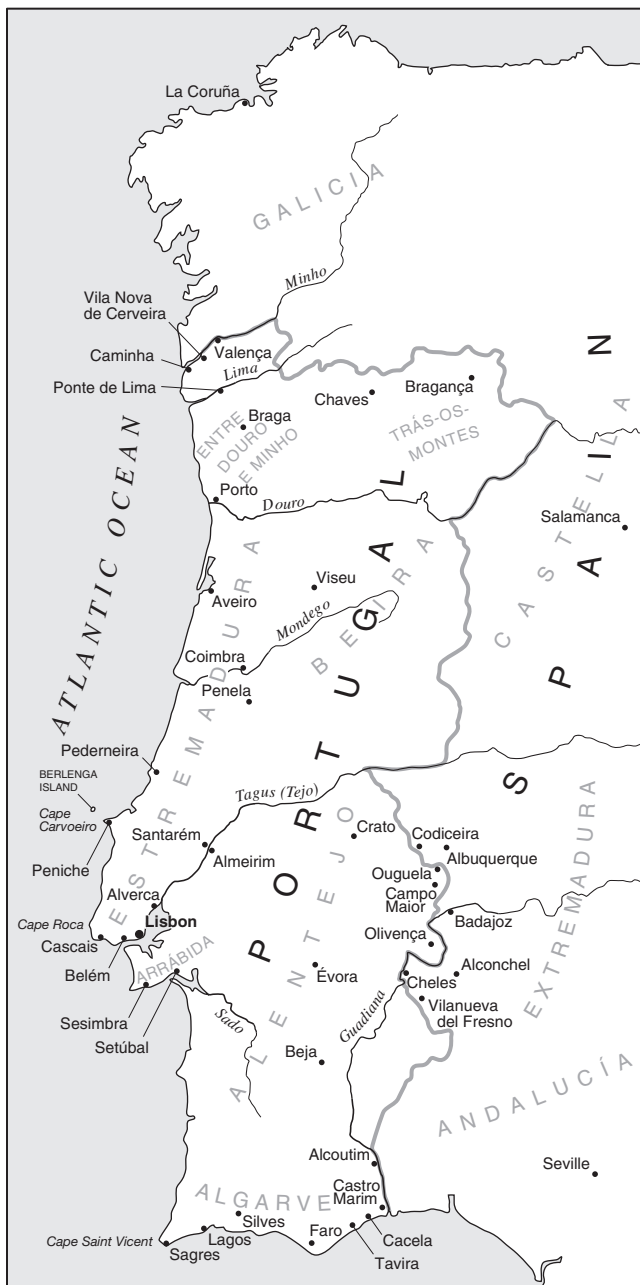


FIG. 38.1. REFERENCE MAP OF PORTUGAL.

by Teixeira da Mota and Cortesão, whose work has been continued by Albuquerque and Maria Emília Santos.

The history of Portuguese cartography between the fifteenth and the seventeenth centuries may be divided into three periods.¹² The first, covering the fourteenth century and the first half of the fifteenth, saw the origin of charts supposedly necessary during the early Portuguese exploration of the Atlantic. Only scarce references allow us to reconstruct this activity. The work is hampered by the nonexistence of Portuguese charts dated before the second quarter of the fifteenth century, although maps based on

Portuguese voyages do exist. In particular, the absence of charts from the time of Prince Henry does not allow us to draw conclusions far beyond mere speculation about Henry's role as a sponsor of activities in cartography and the nautical sciences.

The second period, from the last quarter of the fifteenth century to about 1640, is clearly the best known and most fully analyzed. In the first part of this period, Portuguese chartmakers, particularly the great families of Reinel, Homem, and Teixeira, made Lisbon a significant center of geographic and cartographic knowledge of the expanding world. From 1580 to 1640, Portugal was under Spanish dominion, facing competition in cartography and nautical science from northwest European powers, particularly England and the Low Countries. Despite some original cartography in Brazil and Africa, Portugal never regained its earlier importance.

In 1640, Portugal again became independent, and the third period of its cartographic history is characterized by military needs and the war with Spain that lasted until 1668. The focus moved to Portugal's own borders with Spain, and cartographic activity became primarily the domain of the military engineer. One of the ways that Portugal tried to regain independence and part of its lost overseas territories was to make diplomatic alliances with third parties, particularly France, England, and the German states, which supplied arms, mercenaries, engineers, architects, and cartographers in the service of Portugal.

This chapter is divided into three main thematic parts that crosscut this chronological arrangement. The first deals with the origin and development of nautical cartography in Portugal and the early discoveries. The second is a regional account of Portuguese cartographic activities overseas, in the Mediterranean, along the Atlantic coasts, and in the East. The final section covers the topographic and regional mapping of Portugal, including military cartography. (For a reference map, see fig. 38.1).

EARLY NAUTICAL CARTOGRAPHY

ORIGINS OF PORTUGUESE CARTOGRAPHY

The importance of Portuguese nautical cartography, especially in the sixteenth century, often causes us to forget

12. Cortesão, *History of Portuguese Cartography*, continues to be a valuable source for these two centuries. As a brief introduction to the themes and the period, see A. Teixeira da Mota, "Cartografia e cartógrafos portugueses," in *Dicionário de história de Portugal*, ed. Joel Serrão, 4 vols. (Lisbon: Iniciativas Editoriais, 1963–71), 1:500–506; Luís de Albuquerque, "A cartografia portuguesa dos séculos XV a XVII," in *História e desenvolvimento da ciência em Portugal*, 2 vols. (Lisbon: Academia das Ciências de Lisboa, 1986), 2:1061–84; and Alfredo Pinheiro Marques, *Origem e desenvolvimento da cartografia portuguesa na época dos descobrimentos* (Lisbon: Imprensa Nacional–Casa da Moeda, 1987).

that the monastic world in medieval Portugal also made its contributions to cartography. The oldest extant example of this contribution is the fragment of a Beatus map, oval in shape, included in a copy of the “Commentary on the Apocalypse of Saint John” from the monastery of Lorvão, near Coimbra. Its author was probably a Benedictine copyist named Egas, who signed and dated the manuscript in the year 1189. The historian Alexandre Herculano rescued this work in 1853.¹³ A further vestige of medieval cartography to survive to this day is the *mappamundi* included in a codex of the “Etymologies” of Isidore of Seville made by Frei Baltasar de Vila Franca early in the fourteenth century. This *mappamundi* is a modification of the Isidorian T-O type and features the Sea of Azov, where, curiously, the *oikoumene*, or inhabited world, is divided into four parts.¹⁴

Both these cartographic documents derived from a common Iberian culture fueled not only by the Christian monastic tradition but also by the considerable body of translations from works belonging to Arabic culture, which, as is well known, preserved much of the cultural legacy of the classical world. To these sources we must also add the Judaic cultural component, whose part in the Portuguese contributions to nautical science during the Renaissance is becoming still more evident. Problems of an eminently practical nature, however, were behind the appearance of Portuguese nautical cartography.

Cortesão, basing his conclusions on the intense maritime activity of the Portuguese in the late Middle Ages, which as early as the twelfth century extended as far as the North Sea, argued that such voyages must necessarily have been accompanied by parallel developments in the field of cartography. On this assumption, Cortesão dated the beginnings of Portuguese cartography to the fourteenth century, though at the same time he did not rule out the possibility that sea charts were already being produced in Portugal as early as the thirteenth century.¹⁵ Unfortunately, Cortesão was unable to produce firm documentary grounds for his theory, with the result that few of his arguments have been endorsed by later historians.

Without going as far as Cortesão, we can nevertheless concede that the presence of Nordic seagoing vessels in the Mediterranean in the twelfth and thirteenth centuries has generally been underestimated. There are many testimonies of expeditions during this period from Scandinavia, Friesland, Flanders, and England, which for different reasons (piracy, pilgrimage, or crusade) put into harbor in Portugal. Two examples will suffice to illustrate this: the “De expugnatione Lyxbonensi,” written by an Englishman who took part in the assault on Lisbon in 1147, and the “Narratio de itinere navali,” the work of an anonymous German who participated in the liberation of Silves in 1189.¹⁶ These two texts illustrate how, by the mid-twelfth century, the long experience of seagoing

peoples had crystallized into lists of sailing directions. This information and exchange of experiences were undoubtedly available in Portugal, but it would be imprudent to speculate further. We should note that one of the hypotheses advanced for the origin of nautical cartography is that the first portolan charts were based on texts similar to those just mentioned.¹⁷ Genoa and Mallorca (Majorca) are the two ports usually cited in relation to the appearance of this cartographic innovation, though some specialists argue for Portuguese origins.¹⁸ The problem, once again, is that there is no documentary evidence for the latter view. That thirteenth-century Portugal offered a favorable environment and had access to the information necessary for nautical cartography to emerge is one thing; that it actually produced the cartography is another.

Outside the Atlantic orbit, most historians have argued in favor of a Mediterranean influence in the emergence of Portuguese nautical cartography. One event frequently cited is the 1317 arrival in Lisbon of the Genoan Emanuele Pessagno. Pessagno came at the service of King Dinis (1279–1325), accompanied by twenty of his fellow Ligurians. The official reason for his visit was to reform and modernize the Portuguese navy.¹⁹ It is possible, however, as some authors contend, that to assist him in his task the Genoan brought to Portugal some copies of portolan charts.²⁰ Basing their speculations on just such a conjecture, some authors have even argued that contact with the charts led to the formation of a nucleus of Portuguese draftsmen capable of constructing, or at least copying, nautical charts similar to those produced at the same time

13. He deposited it in the IAN/TT (Casa Forte, 160), where it remains.

14. Biblioteca Nacional, Lisbon (Cod. Al. 446, fol. 139).

15. Armando Cortesão, *Cartografia portuguesa antiga* (Lisbon: Comissão Executiva das Comemorações do Quinto Centenário da Morte do Infante D. Henrique, 1960), 52–54.

16. Both texts have been edited and studied by David; see Charles Wendell David, *De expugnatione Lyxbonensi: The Conquest of Lisbon* (New York: Columbia University Press, 1936), and idem, ed., *Narratio de itinere navali peregrinorum Hierosolymam tendentium et Silviam capientium, A.D. 1189* (Philadelphia: American Philosophical Society, 1939).

17. See Bacchisio R. Motzo, “Il Compasso da navigare, opera italiana della metà del secolo XIII,” *Annali della Facoltà di Lettere e Filosofia della Università di Cagliari* 8 (1947): 1–137, and Jonathan T. Lanman, *On the Origin of Portolan Charts* (Chicago: Newberry Library, 1987). Compare Patrick Gautier Dalché, *Carte marine et portulan au XII^e siècle: Le Liber de existencia riveriarum et forma maris nostri mediterranei (Pise, circa 1200)* (Rome: École Française de Rome, 1995).

18. Yūsuf Kamāl (Youssef Kamal), *Quelques éclaircissements épars sur mes Monumenta cartographica Africae et Aegypti* (Leiden: E. J. Brill, 1935), 188.

19. See João Martins da Silva Marques, *Descobrimientos portugueses: Documentos para a sua história*, 3 vols. (Lisbon: Instituto para a Alta Cultura, 1944–71), 1:27–30 (doc. 37).

20. See, e.g., Jaime Cortesão, *Os descobrimientos portugueses*, 6 vols. (Lisbon: Livros Horizonte, 1975–81), 1:167.

in Liguria.²¹ Two points are against this speculative claim: first, there is no proof that Pessagno or his contemporary Ligurians produced portolan charts, and there are no grounds for thinking them capable of teaching this art; second, to know and use nautical charts is one thing, but to make them is quite another. In fact, that Italian nautical charts arrived in Portugal in the fourteenth century is itself no more than conjecture, plausible enough but lacking documentary support.

By the time of Prince Henry, early Portuguese cartography was linked to the mapmaking tradition of the Aragonese-Catalan court. The principal argument in favor of this hypothetical linkage is the presumed arrival in Portugal of Mestre Jácome de Mallorca in the first third of the fifteenth century. The two chroniclers who record this event, Duarte Pacheco Pereira and João de Barros, coincide in noting that Henry enlisted the services of Mestre Jácome, a reputed maker of nautical charts, to teach his skill to the Portuguese.²² From here it is a small step, for certain authors, to date to the arrival of Mestre Jácome the emergence of Portuguese nautical cartography—a cartography presumably characterized by its extension of coverage beyond the Mediterranean area.²³

Cortesão and Leite both argued against this interpretation of events. The former did so because, as we have seen, he believed in the existence of a genuinely Portuguese cartography that predated the arrival of Mestre Jácome; furthermore, for Cortesão, the presence of the Mallorcan in Portugal can be explained more by his presumed knowledge of the African interior and his expertise in the manufacture of nautical instruments than by his skills as a cartographer.²⁴ Leite argued from a completely different perspective, discrediting the influence of Mestre Jácome on Portuguese cartography and even calling into question the Mallorcan's enlistment to the service of Prince Henry. He based his arguments on the absence of contemporary documents attesting to the presence of the Mallorcan cartographer in Portugal, on the fact that his name received no mention in the records of the official chronicler of the time, Gomes Eanes de Zurara, and on Prince Henry's presumed ignorance of Catalan-Mallorcan cartography.²⁵

Later historians modified Leite's skepticism. A document of 1427, of which Leite was unaware, attests to the existence of a "Mestre Jácome" living in Alverca, near Lisbon.²⁶ Unfortunately, this document gives no details of the professional activities of the Jácome in question, disqualifying the document as conclusive evidence. There is also some discussion as to the real identity of Mestre Jácome. Reparaz Ruiz, basing his arguments on the research of Llabrés,²⁷ concluded that the Mallorcan cited by Pacheco and Barros could have been none other than the famous cartographer Jaume Ribes (the Christianized name of Jafuda Cresques), who is thought to have arrived

in Portugal sometime between 1420 and 1427.²⁸ This argument was widely accepted until the Mallorcan historian Riera i Sans brought to light a series of documents that appear to indicate that Ribes died before 1410.²⁹

The conclusions of Riera i Sans at first seem to lend support to the skepticism of Leite and his refusal to acknowledge any Catalan-Mallorcan influence on the emergence of Portuguese cartography. However, while it is true that the identification of Mestre Jácome with Ribes seems problematic, there is still no sufficient reason to question the accuracy of the testimonies of Pacheco Pereira and Barros. It is quite possible that a Mallorcan cartographer, whatever he was called, came to Portugal in the first third of the fifteenth century. One final indirect indication that supports this hypothesis is the stylistic affinity between the earliest surviving Portuguese nautical charts and those of the Catalan-Mallorcan tradition, a fact that is visible, for example, in the 1492 chart by Jorge de Aguiar (fig. 38.2).

There are no firm conclusions, then, on the origins of Portuguese cartography, except that it drew on a varied and heterogeneous cultural stock. Nor does the absence

21. See Max Justo Guedes, "A cartografia do Brasil" (photocopied text, n.d.), 3–4.

22. Duarte Pacheco Pereira, *Esmeraldo*, bk. 1, chap. 33; see the critical edition by Joaquim Barradas de Carvalho, ed., *Esmeraldo de situ orbis* (Lisbon: Fundação Calouste Gulbenkian, Serviço de Educação, 1991), and João de Barros, *Ásia de João de Barros: Dos feitos que os portugueses fizeram no descobrimento e conquista dos mares e terras do Oriente*, 6th ed., 4 vols., ed. Hernâni Cidade (Lisbon: Divisão de Publicações e Biblioteca, Agência Geral das Colónias, 1945–46), 1:65–67 (*década* 1, bk. 1, chap. 16).

23. See, e.g., A. Fontoura da Costa, "Descobrimientos portugueses no Atlântico e na costa ocidental Africana do Bojador ao Cabo de Catarina," in *Publicações*, 3:243–86, esp. 254. From more recently, see Marques, *Origem e desenvolvimento*, 74.

24. Cortesão, *Cartografia portuguesa antiga*, 105–6.

25. Duarte Leite, *História dos descobrimentos: Colectânea de esparsos*, 2 vols. (Lisbon: Edições Cosmos, 1958–60), 1:175–80, and 390–93.

26. See Armando Sousa Gomes, "O mestre Jácome de Maiorca," in *Publicações*, 3:645–51.

27. Gabriel Llabrés, "Los cartógrafos mallorquines," *Boletín de la Sociedad Arqueológica Luliana* 2 (1888): 323–28; and 3 (1890): 310–11 and 313–18.

28. Gonzalo de Reparaz Ruiz, "*Maestre Jacome de Malhorca*," *cartógrafo do Infante* ([Coimbra]: Coimbra Editora, 1930).

29. Jaume Riera i Sans, "Cresques Abraham, jueu de Mallorca, mestre de mapamundis i de brúixoles," in *L'atlas català de Cresques Abraham* (Barcelona: Diàfora, 1975), 14–22, and idem, "Jafudà Cresques, jueu de Mallorca," *Randa* 5 (1977): 51–66. See also Alfredo Pinheiro Marques, "Realidades e mitos da ciência dos descobrimentos quatrocentistas (A propósito da 'Escola de Sagres' e do célebre 'Mestre Jaime de Maiorca')," in *Bartolomeu Dias*, 2:347–61. Despite these works, some recent studies within and outside Portugal persist in identifying Mestre Jácome with Jafuda Cresques. See, e.g., Joaquim Ferreira do Amaral, *Pedro Reimel me fez: À volta de um mapa dos descobrimentos* (Lisbon: Quetzal Editores, 1995), 38.

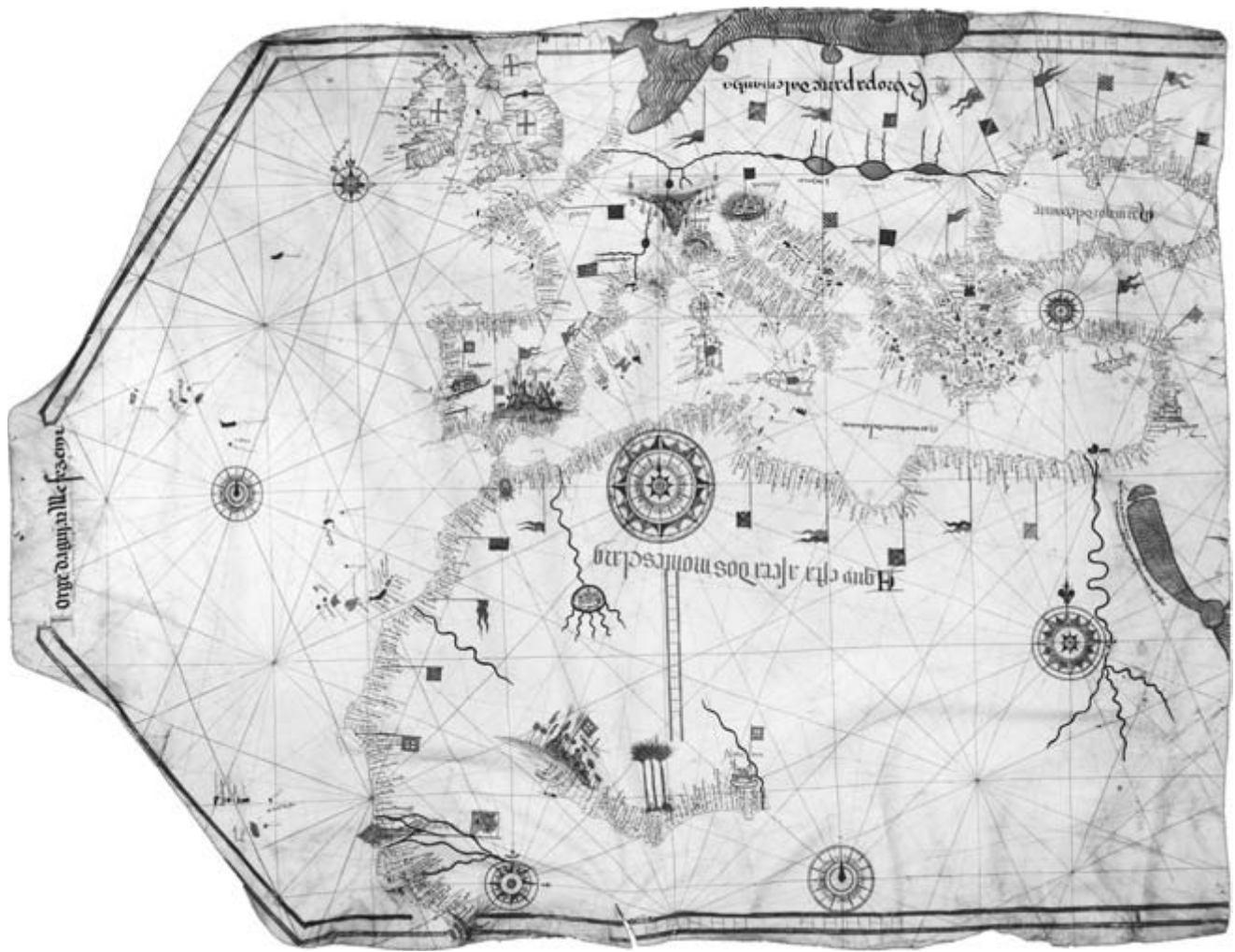


FIG. 38.2. SIGNED AND DATED CHART OF THE AFRICAN COAST BY JORGE DE AGUIAR, 1492.

Photograph courtesy of the Beinecke Rare Book and Manuscript Library, Yale University, New Haven.

of Portuguese maps until the final quarter of the fifteenth century allow us to date the beginnings of cartography in Portugal with much precision. However, it is from the first half of the fifteenth century, during the lifetime of Prince Henry, that we find the earliest documentary mentions of maps made in Portugal.

DOCUMENTARY EVIDENCE

The earliest explicit references to genuinely Portuguese maps are to be found in the context of the expedition to Cape Bojador, which was rounded by Gil Eanes in 1434. A charter issued in Penela by Prince Pedro in October 1443, when the latter was still acting as regent to the young King Afonso V, offers testimony to the lack of knowledge of the region and to the often misleading form in which those southern lands were depicted in contemporary cartography. It was for this reason, according to the same document, that Prince Henry dispatched many

ships southward with the mission of drawing up a *carta de marear* of the coastline they discovered.³⁰

Identical circumstances are revealed by passages in the “Crónica dos feitos da Guiné” by Gomes Eanes de Zurara, a work completed around 1453 but with amendments added after 1460.³¹ In one of these passages, Zurara broadly repeats the ideas expressed in the royal charter of Penela.³² In another, we read that Prince Henry

30. José Ramos Coelho, comp., *Alguns documentos do Arquivo Nacional da Torre do Tombo acerca das navegações e conquistas portuguesas publicados por ordem do governo de sua majestade fidelissima ao celebrar-se a comemoração quadricentenaria do descobrimento da America* (Lisbon: Imprensa Nacional, 1892), 8–9; Marques, *Descobrimentos portugueses*, 1:435–36 (doc. 339); and *Monumenta Henricina* (Coimbra, 1960–), 8:107–8 (doc. 62).

31. See Duarte Leite, *Ácera da “Crónica dos feitos de Guinee”* (Lisbon: Livraria Bertrand, 1941), 173.

32. Gomes Eanes de Zurara, *Crónica dos feitos da Guiné* (Lisbon: Publicações Alfa, 1989), 149 (chap. 78).

commissioned new nautical charts and, curiously, stipulated that such charts should contain indications of the depth of the waters and sandbanks, a detail that seems unlikely at such an early time.³³ In any event, the important point is that we have various mentions of Portuguese nautical charts from before the middle of the fifteenth century.

Verlinden attempted to pin the beginnings of this cartographic activity with some precision. To do so, he examined in detail the context in which the previously mentioned documents came into being, concluding that Portuguese cartography began in 1443. Verlinden's insistence on a precise date also led him to affirm that there was no reason to believe that Portuguese charts should have existed at an earlier date.³⁴ Although there is documentary evidence that the Portuguese produced charts in 1443, this does not necessarily imply that these were the first.³⁵ In fact, in the allegations made against the Portuguese at the Council of Basel in 1435, Alfonso de Cartagena, bishop of Burgos, referred to a *carta maris* displayed by the Portuguese delegation as proof that the Canaries were closer to Portugal than to Castile.³⁶ Verlinden, who knew of this document, believed that the map in question was not Portuguese but a portolan chart of Italian or Mallorcan origin.³⁷ He lacked firm ground for this affirmation, however. From the cursory description given by Alfonso de Cartagena, it appears more probable that the map in question was Ptolemaic.³⁸ Then again, we cannot exclude the hypothesis that the chart *was* a genuine Portuguese one, as Cortesão maintained.³⁹ We should not be too demanding in our attempts to establish a precise date for the beginnings of Portuguese nautical cartography. It would be more prudent to limit ourselves to a qualified approval of Verlinden's assertions, to the effect that the available documentary sources suggest that the earliest Portuguese nautical charts were produced in the second quarter of the fifteenth century.

This was the period during which the Azores were discovered, confirming the vague reports, in circulation since the Middle Ages, of the archipelago's existence. Some authors believe that this event, like the forays down the African coast, must necessarily have been recorded by the Portuguese authorities in regularly revised *cartas padrões*.⁴⁰ This may have been the case, but we lack documentary evidence from this early period to confirm it. In fact, all the surviving cartography from the first half of the fifteenth century in which the Atlantic islands and the African coast appear is of Italian or Mallorcan origin. Nevertheless, some authors have analyzed these charts in attempts to demonstrate that the Mediterranean cartographers based their works on Portuguese cartographic prototypes.⁴¹ Their analyses have yielded an extensive toponymical stock of Portuguese origin, but this does not demonstrate that the information in question was necessarily taken from cartographic material. For an experi-

enced cartographer, lists of detailed nautical instructions, which undoubtedly existed and were easier to obtain than maps, were sufficient to enable him to record in chart form the progress of the discoveries. The only cartographic document that makes explicit mention of the use of Portuguese nautical charts is the *mappamundi* of Fra Mauro from about 1459 (fig. 38.3).⁴² Yet, curiously, the conventional manner in which the African coastline is rendered in this *mappamundi* (from the Red Cape southward) suggests that, if Fra Mauro really had contemporary Portuguese maps in his hands, he did not use them as models for his own depiction.

Documentary allusions to Portuguese maps proliferated in the second half of the fifteenth century. In addi-

33. Zurara, *Crónica*, 145–47 (chap. 76).

34. Charles Verlinden, *Quand commença la cartographie portugaise?* (Lisbon: Junta de Investigações Científicas do Ultramar, 1979), 135–39.

35. Maria Fernanda Alegria and João Carlos Garcia, “Etapas de evolução da cartografia portuguesa (séculos XV a XIX),” in *La cartografía de la Península Ibérica i la seva extensió al continent Americà* (Barcelona: El Departament, 1991), 225–79, esp. 233.

36. See Marques, *Descobrimientos portugueses*, 1:297–98 (doc. 281).

37. Verlinden, *Quand commença*, 138.

38. Of this map, the bishop of Burgos comments: “[He/she/it] was misled by the chart of the sea according to which it is clear that the corner of Portugal which is called the end or the cape of Saint Vincent makes a great ingress in the ocean”; see Marques, *Descobrimientos portugueses*, 1:297–98 (doc. 281). This geographical feature is not shown on any portolan chart, but it does appear regularly on the traditional maps of the Iberian Peninsula in Ptolemy's *Geography*. We also know that the work in question had been in circulation in the councils at least since Constance. See, e.g., the classic study by Raymond Thomassy, “De Guillaume Fillastre considéré comme géographe: A propos d'un manuscrit de la Géographie de Ptolémée,” *Bulletin de la Société de Géographie* 17 (1842): 144–55.

39. Cortesão, *Cartografia portuguesa antiga*, 63. An anonymous Portuguese work from the early fifteenth century mentions the characteristic prominence of Cape St. Vincent (Cabo de São Vicente) described by Alfonso de Cartagena. See Aires Augusto Nascimento, *Livro de arautos* (Lisbon: A. A. Nascimento, 1977), 258.

40. See, e.g., A. Fontoura da Costa, “Ciência náutica portuguesa: Cartografia e cartógrafos,” in *Publicações*, 3:537–77, esp. 566.

41. One of the authors who most vehemently defended this theory throughout his career was Cortesão. The hypothesis in question, he argued, is already present in the nautical chart of Zuane Pizigano (1424). See Armando Cortesão, *The Nautical Chart of 1424 and the Early Discovery and Cartographical Representation of America: A Study on the History of Early Navigation and Cartography* (Coimbra: University of Coimbra, 1954). Compare Marques, *Origem e desenvolvimento*, 87–111, and Alegria and Garcia, “Etapas de evolução,” 235–38.

42. Reproduced in forty-eight plates in Tullia Gasparini Leporace, ed., *Il mappamondo di Fra Mauro* (Rome: Istituto Poligrafico dello Stato, 1956). The legend that mentions Portuguese maps, written over the African southwest between “Ethyopia Occidentale” and “Ethyopia Avstral,” reads: “Many opinions and readings exist that in the southern part the water does not encircle our inhabited zone, but rather many testimonies on the contrary and mostly those which his majesty the King of Portugal has ordered with his caravels to search and see with the eyes . . . and these navigators have made new maps from these navigations and have placed new names on the rivers, bays, inlets, ports, from which I have had copies made.”



FIG. 38.3. DETAIL OF THE AFRICAN COAST ON THE MAPPAMUNDI OF FRA MAURO, CA. 1459. Photograph courtesy of the Biblioteca Nazionale Marciana, Venice.

tion to the testimony of Fra Mauro, we know through Bartolomé de Las Casas that Isabel Perestrello, mother-in-law of Christopher Columbus, gave her son-in-law some “writings and paintings to aid navigation” that had formerly belonged to her husband, Bartolomeu Perestrello.⁴³ According to Cortesão, these “paintings” were, in all probability, nautical charts of Portuguese origin.⁴⁴ Another episode in which Columbus was involved took place in the court of João II on the return of Bartolomeu Dias from his voyage to the extreme southern tip of Africa in 1487–88. According to an annotation by the Genoese navigator in his copy of Pierre d’Ailly’s *Imago mundi*, Columbus was present when Dias showed the king a *carta navigacionis* that he himself had drawn in which figured all the newly discovered lands.⁴⁵ This testimony offers confirmation that at some point the Portuguese navigators began to draw cartographic sketches of their voyages.

Almost at the same time, Pero da Covilhã and Afonso de Paiva were setting off, by land, for the Orient. From a later account by Francisco Álvares, who met Covilhã in Ethiopia in 1520, we know that a “chart extracted from a mappa mundi” had been prepared in Portugal to help the two men on such a difficult voyage. According to Álvares, this chart was produced in the house of Pero de Alcaçova, in the presence of the *licenciado* Calçadilha, bishop of Viseu; the *maestro* Rodrigo of Pedras Negras; and a *maestro* of Judaic origin named Moyses.⁴⁶ However, there is no indication of the author of the original *mappamundi* or of its appearance. Scholars have advanced various hypotheses to fill this gap in our knowledge. Some believe that the original cartographic model must have been a copy of Fra Mauro’s *mappamundi*, commissioned by King Afonso V and presumably brought to Portugal at an indeterminate date in the second half of the fifteenth century.⁴⁷ Others maintain that

the original *mappamundi* was a Ptolemaic map with the outline of Africa retouched to illustrate the idea of circumnavigability.⁴⁸ However, Álvares’s account offers no clues to its identification.

Whatever the original *mappamundi* might have been, of particular importance is the new testimony Álvares offers of a map produced in Portugal around 1487. It is impossible to ascertain how useful it proved to the voyagers, but, from what we read in book 1 of the first edition of the *História do descobrimento & conquista da Índia*, written by Fernão Lopes de Castanheda in 1551, it appears that Covilhã not only used the map but also added new place-names to it before sending the king all the material he had gathered via a Jew from Lamego named Josef.⁴⁹

Two other possible mentions of fifteenth-century Portuguese maps exist, although there are serious doubts about their authorship and authenticity. The first is in the cosmography contained in a *tabula deaurata* (gilded picture) measuring fourteen palms in diameter that was seen by Hieronymus Münzer (Monetarius) in the Castle of São Jorge, Lisbon, in 1494.⁵⁰ It was long thought that the document in question was a Portuguese *mappamundi*, but more recently Marques has been inclined to believe that it is one more testimony to the existence of Fra Mauro’s *mappamundi* in Portugal.⁵¹ What is certain is that Münzer’s description offers no firm grounds for either hypothesis. Similar doubts plague the “mappa mundi antiguo” (old world map) mentioned by João Faras in a letter he wrote from Vera Cruz (Brazil) to King Manuel I in

43. Bartolomé de Las Casas, *Historia de las Indias*, 3 vols., ed. Agustín Millares Carló (Mexico City: Fondo de Cultura Económica, 1951), 1:36.

44. Cortesão, *History of Portuguese Cartography*, 2:119; compare Charles de La Roncière, *La découverte de l’Afrique au Moyen Âge, cartographes et explorateurs*, 3 vols. (Cairo: Société Royale de Géographie d’Égypte, 1924–27), 3:41.

45. Pierre d’Ailly, Jean Gerson, and Christopher Columbus, *Imago Mundi*, trans. Antonio Ramírez de Verger (Madrid: Testimonio Compañía Editorial, 1990), sch. 23b, 43.

46. Francisco Álvares, *Ho Preste Joam das Indias* (Lisbon, 1540), chap. CIV.

47. See, e.g., Alfredo Pinheiro Marques, *A maldição da memória do Infante Dom Pedro: E as origens dos descobrimentos portugueses* (Figueira da Foz: Centro de Estudos do Mar, 1994), 185.

48. Armando Cortesão, “A ‘Carta de Marear’ em 1487 entregue por D. João II a Pêro da Covilhã,” *Memórias da Academia das Ciências de Lisboa, Classe de Ciências* 17 (1974): 165–75.

49. Fernão Lopes de Castanheda, *História do descobrimento & conquista da Índia pelos portugueses* (Coimbra, 1551), bk. I, 3–4. These details on the maps were removed in later editions. On this problem, see Armando Cortesão, *The Mystery of Vasco da Gama* (Lisbon: Junta de Investigações do Ultramar, 1973), 90–98.

50. Hieronymus Münzer, “Itinerário” do dr. Jerónimo Münzer (*ex-certos*), ed. and trans. Basílio de Vasconcelos (Coimbra: Imprensa da Universidade, 1931), 22.

51. Marques, *A maldição*, 186.

May 1500,⁵² for we have no indication of how old the map in question was or of its author. We are told only that it had belonged to Pedro Vaz Bisagudo and that it featured the Castle of São Jorge da Mina in addition to the island of Vera Cruz. These details invite us to surmise that the map in question was Portuguese, presumably the first to represent Brazil, but the data are insufficient for us to arrive at so firm a conclusion.

Leaving aside later or extremely imprecise documentary mentions, such as the mysterious maps alluded to by António Galvão—which, even by the most generous reading, make no reference to Portuguese cartographic production⁵³—we can draw some conclusions from our observations thus far. The first is that the surviving documentary sources suggest that the earliest Portuguese nautical charts must have been produced in the second quarter of the fifteenth century. The second is that, curiously enough, the clearest and most unequivocal documentary statements (those in the charts commissioned by Prince Henry, the maps used by Fra Mauro, and Dias's sketch) all refer to cartography of a utilitarian nature. Then again, other more doubtful testimonies of Portuguese maps (those of Münzer and Galvão) generally refer to cartography of a more decorative character. This appears to confirm that the earliest Portuguese maps were designed for nautical use.

The utilitarian character of the earliest Portuguese nautical charts explains the absence of information on their authors. More important still, their practical use as nautical aids in the service of those making the discoveries helps us to understand why most of these early cartographic specimens have not survived to our day. As we have already seen in the case of the latter half of the fifteenth century, it is highly probable that early cartographic sketches were constantly revised as new navigation opened up new horizons. Deterioration through use and the constant process of revision must, therefore, have been the main reasons for the disappearance of the earliest Portuguese cartographic specimens.⁵⁴

THE FIRST PORTUGUESE CHARTS

Despite the numerous documentary references to Portuguese maps of the fifteenth century, their actual existence was only recently confirmed with the presentation of various specimens at successive international conferences. Today, three complete nautical charts and various fragments are extant and datable to the last quarter of the fifteenth century. These charts attest to an already mature cartographic tradition with its own stylistic traits, which confirms the existence of earlier Portuguese cartography now lost.

The earliest specimen is an anonymous and undated nautical chart now preserved in Modena (fig. 38.4). This

chart depicts the Atlantic coast from Normandy to the Gulf of Guinea and includes the archipelagos of the Azores, Madeira, the Canaries, and Cape Verde. The earliest studies on this chart were by Almagià, who noted the Portuguese origin of the toponymy but refrained from pronouncing the nationality of the chart's maker.⁵⁵ In 1938, at the International Geographical Congress in Amsterdam, the chart gained international renown and was subsequently the subject of a monograph by Costa, who published an excellent reproduction of the map two years later. His conclusions were that the chart was in fact of Portuguese origin and was produced about 1471.⁵⁶ This dating involved implicit acceptance of the theory that the chart was produced concomitant to the Portuguese navigations along the coast of Guinea: because the "rio do lago" (the Lagos River, 6°23'N, 3°24'E) is the last recorded toponym, Costa thought that the map must necessarily be related to the expedition of João de Santarém and Pêro Escobar to exactly those latitudes early in 1471. In support of this hypothesis, Peres drew attention to the fact that the chart recorded, for the first and only time, the toponym "Rio de Santarém" (5°09'N), evidently a reference to the Portuguese navigator of the same name.⁵⁷

52. This document has been reproduced on numerous occasions. See, e.g., Duarte Leite, "O mais antigo mapa do Brasil," in *História da colonização portuguesa do Brasil*, 3 vols., ed. Carlos Malheiro Dias (Porto: Litografia Nacional, 1921–24), 2:225–81.

53. António Galvão, *Tratado dos descobrimentos*, ed. Viconde de Lagoa and Elaine Sanceau, 3d ed. ([Porto]: Livraria Civilização, [1944]), 122 n. 3, 320, and 323. According to Galvão, these maps predated the beginning of the Portuguese expansion and already depicted the Cape of Good Hope and the route to the Indies (one even shows the Magellan Straits). Although the information has sometimes been taken literally (Antonio Ribeiro dos Santos, "Sobre dois antigos mappas geograficos do Infante D. Pedro, e do cartorio de Alcobaca," in *Memorias de Litteratura Portugueza*, 8 vols. [Lisbon: Academia, 1792–1814], 8: 275–304), many authors have called into question the existence of these maps. See, e.g., Francisco de Borja Garção Stockler, "Memoria sobre a originalidade dos descobrimentos maritimos dos portuguezes no seculo decimoquinto," in *Obras de Francisco de Borja Garção Stockler*, 2 vols. (Lisbon: Academia Real das Sciencias, 1805–26), 1:343–88; Gabriel Pereira, "Importancia da cartographia portugueza," *Boletim da Sociedade de Geographia de Lisboa* 21 (1903): 443–50; and Ernest George Ravenstein, *Martin Behaim: His Life and His Globe* (London: George Philip and Son, 1908), 38. Even among those who, more recently, have seen some truth in the story and have sought to identify the maps, the conclusion has always been the same: the charts are Italian. See Armando Cortesão, *Cartografia e cartógrafos portugueses dos séculos XV e XVI (Contribuição para um estudo completo)*, 2 vols. (Lisbon: Edição da "Seara Nova," 1935), 1:123–25, and Marques, *A maldição*, 158–61.

54. See Marques, *Origem e desenvolvimento*, 83–87.

55. Roberto Almagià, "Notizia di quattro carte nautiche della R. Biblioteca Estense," *Bibliofilia* 27 (1926): 337–47.

56. A. Fontoura da Costa, *Uma carta náutica portuguesa, anónima, de "circa" 1471* (Lisbon: República Portuguesa, Ministério das Colónias, Divisão de Publicações e Propaganda, Agência Geral das Colónias, 1940), 55–56.

57. Damião Peres, *História dos descobrimentos portugueses*, 2d ed. (Coimbra: Edição do Autor, 1960), 209.

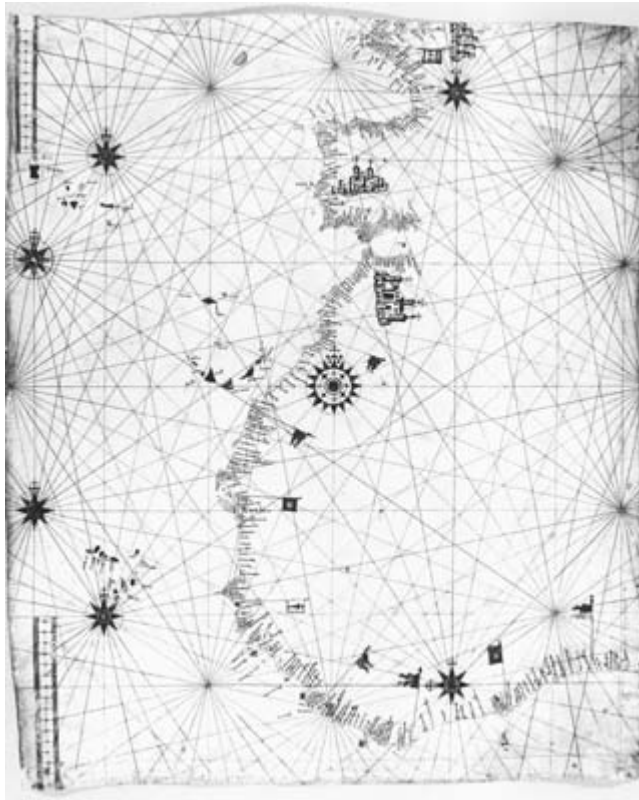


FIG. 38.4. ANONYMOUS UNDATED NAUTICAL CHART OF THE ATLANTIC COAST, CA. 1471.

Size of the original: 95 × 75 cm. Photograph courtesy of the Biblioteca Estense e Universitaria, Modena (C.G.A.5c).

Cortesão argued against the theory that the Modena chart took form as the Portuguese voyages edged farther south. There is no indication, he argued, that the Modena chart was produced immediately subsequent to the voyages of Santarém and Escobar, and it would therefore be more prudent to conclude merely that the chart was made during the last three decades of the fifteenth century.⁵⁸ But certain factors do allow us to establish a slightly more precise date. The first is that the chart has no latitude markings. This is apparent, for example, in the east-west alignment of Rio do Lago with Cabo da Verga (Cape Verga, 10°12'N, 14°30'W), though the two are in fact separated by four degrees of latitude.⁵⁹ It seems reasonable, therefore, to infer that the Modena chart was produced before hydrographic surveys of the Guinea coast were carried out by José Vizinho and Pacheco Pereira around 1485. Second, it is significant that the Modena chart neither mentions nor depicts the Castle of São Jorge da Mina, built on the orders of João II from 1482 onward and ostentatiously displayed on all later Portuguese maps. In its place, the Modena chart merely indicates “amina do ouro,” a clear reference to the trading posts that the Portuguese had established from their earliest voyages.

We can conclude, then, that although the Modena chart was not made immediately after the expedition of Santarém and Escobar, it was in all probability produced in the decade following that voyage.⁶⁰

The second fifteenth-century Portuguese cartographic specimen surviving to the present day is the nautical chart of Pedro Reinel, now in Bordeaux (fig. 38.5). Unknown until 1960, it gained renown at the V Colóquio Internacional de História Marítima held in Portugal that year. It is a signed but undated map depicting the western Mediterranean and the African coasts, complete with the Atlantic archipelagos and extending as far as the Congo River. The African coast is rendered in two distinct sections: the first is a conventional line drawing of the Atlantic coast as far as Cabo Corço, near the Castle of São Jorge da Mina; the second follows the rest of the African coast as far as Rio Poderoso or Rio do Padrom (the Congo), but it is drawn separate from the first in the inner landmass.

The main problem presented by Reinel's chart is its date. Cortesão, the first scholar to study the chart, initially dated it about 1485.⁶¹ Basing his arguments on the traditional chronology of the voyages of Diogo Cão, Cortesão noted that Reinel's chart includes the Congo River, which Cão sighted during his first expedition (1482–84).⁶² But the question arises, Why did Reinel not also include on his map the stretch of coast south of the Congo River that Cão discovered during the same voyage? To resolve the difficulty, Cortesão later advanced the hypothesis that as soon as he discovered the Congo River, in April 1483, Cão sent a ship back to Portugal with the news. Reinel might therefore have known only of the advances as far as the Congo River, which he hurriedly con-

58. PMC, 1:3–4, and Cortesão, *History of Portuguese Cartography*, 2:211–12. See also Marcel Destombes, “Une carte intéressante les études colombiennes conservée à Modène,” in *Studi colombiani*, 3 vols. (Genoa: S.A.G.A., 1952), 2:479–87.

59. A. Teixeira da Mota, *A evolução da ciência náutica durante os séculos XV–XVI na cartografia portuguesa da época* (Lisbon: Junta de Investigações do Ultramar, 1961), 13, and Guedes, “A cartografia do Brasil,” 12.

60. Alfredo Pinheiro Marques, “The Dating of the Oldest Portuguese Charts,” *Imago Mundi* 41 (1989): 87–97, esp. 87–90, and idem, *Origem e desenvolvimento*, 116–23.

61. Cortesão, *Cartografia portuguesa antiga*, 99–101. See also PMC, 5:3–4.

62. On the reconstruction of the voyages of Diogo Cão (1482–84 and 1485–86), see the account by Peres in *História dos descobrimentos*, 253–86. This long-standing hypothesis has recently been challenged by Radulet, who contends that there were three, not two, voyages (1481–82, 1483–84, and 1485–86). See Carmen M. Radulet, “As viagens de descobrimento de Diogo Cão: Nova proposta de interpretação,” *Mare Liberum* 1 (1990): 175–204. Though thought-provoking, this new proposal fails to dispel all uncertainties, and the traditional theory continues to enjoy more acceptance among historians.



FIG. 38.5. FIFTEENTH-CENTURY NAUTICAL CHART OF THE WESTERN MEDITERRANEAN AND THE AFRICAN COAST BY PEDRO REINEL.

Size of the original: 95 × 75 cm. Photograph courtesy of the Archives Départementales de la Gironde, Bordeaux (2 Fi 1582 bis).

signed to his chart; if that was the case, Cortesão argued, the chart should be dated to 1483.⁶³

This explanation, though plausible, is based on a hypothesis for which there is no documentary evidence. Furthermore, it does not account for the way the coastline in Reinel's chart breaks off at the Castle of São Jorge da Mina, with the rest of the depiction continuing inland. These problems notwithstanding, Cortesão's line of reasoning has recently been advanced by Guedes, who also dates the map to about 1483, basing his date on a putative voyage of about 1481—earlier than Cão's first expedition—which reached the Congo River. On the basis of the proper names in the toponymy of Reinel's chart, Guedes even advances a name for the captain of the presumed expedition: Álvaro Martins.⁶⁴ But this conclusion is merely one step further into the realm of conjecture.

Other authors who have studied the Reinel chart argue against Cortesão and Guedes and contend that there is no real justification for the hypothesis that the chart took form as the discoveries progressed. Marques, for ex-

ample, maintains that the chart was made after Cão's first voyage and that it may in fact have been produced at any time in the following years. The upper limit would have been 1492, because Reinel's chart sports a red banner over Granada, an indication of the Muslim domination of the city that lasted until that year. Marques therefore dates Reinel's chart to about 1484–92.⁶⁵ In order to explain why Reinel did not depict the full extent of Cão's voyages on his chart, Marques finds himself obliged to postulate an element of secrecy imposed by the Portuguese crown to withhold the most recent discoveries from foreign eyes. To account for the break in the African coastline, Marques resorts to the rather obscure hypothesis that Reinel used preexisting maps to which he merely added new stretches of coastline.

In line with the sentiments of those who lean toward a later date, Amaral contends that the Reinel chart was made in two stages between 1492 and 1504.⁶⁶ His principal arguments are that the red banner over Granada has no Islamic connotation, which invalidates the argument that the chart was produced before the liberation of the city in January 1492; Reinel's map records the island of Ano Bom, the name by which it was known only from 1501 onward; the latitudes are broadly accurate for the stretch of coastline between Cabo Corço and the Congo River; and the Aragonese-Catalan flag over Naples indicates that the map was completed after 1504. Amaral pulls these observations together to conclude that Reinel drew the coastline as far as the Castle of São Jorge da Mina in 1492, and later, sometime after 1504, added the continental interior and the remaining coastline as far as the Congo River, employing accurate latitudes in this second stage.

Amaral's theory offers new elements for reflection in our attempts to date the map and provides a reasonable explanation as to why Reinel drew the African coast in two separate parts. However, not all of his arguments are sound enough to be conclusive. It is unlikely, for example, that a red banner over Granada, with or without the crescent emblem, could indicate anything other than Islamic sovereignty over the city. This removes the obstacle to a date earlier than 1492 for Reinel's chart. At the other end of the chronological spread, the Aragonese-Catalan flag over Naples is less significant than it might seem, for dynastic links had existed between the two kingdoms since the mid-fifteenth century. The relative accuracy of the latitudes along one stretch of coastline is problematic, too:

63. Cortesão, *History of Portuguese Cartography*, 2:210–11.

64. According to Guedes, the toponym "angra de a° miz" stands for Angra de Alvaro Martins (Guedes, "A cartografia do Brasil," 12–13).

65. Marques, *Origem e desenvolvimento*, 123–33, and idem, "Dating," 90–93.

66. Amaral, *Pedro Reinél*.

the improvements are significant, but not conclusive. Finally, although it is interesting that Reinel gave one of the islands in the Gulf of Guinea the name *Ano Bom*, the doubts about when this island was really discovered, and its possible identification with the *Ilha de Diogo Cão* in contemporary thought, remove much of the force of the use of this name as a chronological factor.

The difficulty of dating Reinel's chart should come as no surprise. The only certainty we have about it, in fact, is that it was produced after 1483. This date belongs to the period in which Diogo Cão made his expeditions and in which navigation by the stars was just beginning—both events that are still fraught with uncertainties. Thus, further research needs to be done in order to date the chart more precisely.

The third and final complete cartographic specimen of the fifteenth century to have survived to the present day is the chart by Jorge de Aguiar of 1492 (see fig. 38.2). Revealed to the scientific community by Viator at the inaugural *Reunião Internacional da História da Náutica* held in Coimbra in 1968, Aguiar's chart was later reproduced and studied in detail by Guerreiro.⁶⁷ Because it is signed and dated, neither its maker nor its year of creation are problematic. From a geographical point of view, it is of little interest, for it depicts only the coast of Africa as far as the Castle of São Jorge da Mina, which is well north of the known latitudes of the time. As in Reinel's chart, the African coastline is depicted in two distinct sections. From a stylistic point of view, Aguiar's chart is far more decorative than earlier charts. Some elements reveal the influence of the Catalan-Mallorcan cartographic tradition, such as the undulating waves of the Baltic Sea, the color and design of the Red Sea, and the course of the Danube. However, the southern Atlantic zone has typically Portuguese characteristics: abundant toponymy, precision of latitudes (though there is no clear gradation), and the general absence of mythical elements, although the *Ilha Brasil* is depicted. Therefore, we can safely state that Portuguese cartography of the fifteenth century did not always represent the full extent of the discoveries to date, but if we compare them with contemporaneous European maps, those produced by the Portuguese are remarkable for their precision and detail.

In addition to complete nautical charts, many anonymous cartographic fragments of Portuguese origin and dating from the late fifteenth century or the early sixteenth have been preserved.⁶⁸ All are limited to the Mediterranean, and though they document no new geographical discoveries, they do confirm something that has become increasingly clear over the course of the preceding pages: that by the latter half of the fifteenth century, Portuguese cartography had reached maturity. The fact that the fragments recently discovered were used as bindings for other documents indicates that nautical charts,

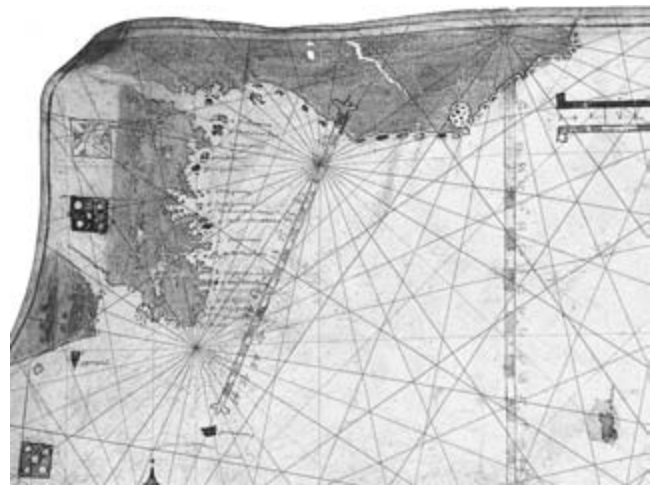


FIG. 38.6. DETAIL FROM A CHART OF THE NORTH ATLANTIC BY PEDRO REINEL, CA. 1504.

Photograph courtesy of the Bayerische Staatsbibliothek, Munich (Cod. Icon 132).

once obsolete, may have been valued only for their parchment. We can easily imagine, then, that other maps must have existed, but have long since perished.

The culmination of this early period in Portuguese cartography came in the opening years of the sixteenth century with the introduction of a clear system of latitudes in the nautical charts produced. Although the improvement in the latitudes given for the African coast was already remarkable in Reinel's chart, the first nautical chart to graphically depict a scale of latitudes was an anonymous map of Portuguese origin dating from about 1500.⁶⁹ The so-called Cantino map, which appeared a little later (1502), does not explicitly indicate a graduated meridian but does locate the equator and the tropics accurately and provides graphic scales.⁷⁰ A nautical chart signed by

67. Inácio Guerreiro, *A carta náutica de Jorge de Aguiar de 1492* (Lisbon: Academia de Marinha, Edições Inapa, 1992), and Alexander O. Viator, *A Portuguese Chart of 1492 by Jorge Aguiar* (Coimbra: Junta de Investigações do Ultramar-Lisboa, 1970). See also Armando Cortesão, "Uma carta portuguesa recém-descoberta, assinada e datada do século XV," *Memórias da Academia das Ciências de Lisboa, Classe de Ciências* 12 (1968): 201–11. The map is in the Beinecke Rare Book and Manuscript Library, Yale University.

68. PMC, 1:5; Alfredo Pinheiro Marques, "Alguns fragmentos de mapas encontrados em Viana do Castelo e outras novidades do ano de 1988 para a história da cartografia," *Revista da Universidade de Coimbra* 35 (1989): 309–22; and idem, "Portolan Fragments Found in Portugal," *Map Collector* 65 (1993): 42–44.

69. Munich, Bayerische Staatsbibliothek, Cod. Icon 138/40, fol. 82. See Heinrich Winter, "Die portugiesischen Karten der Entdeckungszeit, insbesondere die deutschen Stücke," in *Publicações*, 3:505–27, and PMC, 1:23–24 and 5:3–4.

70. Modena, Biblioteca Estense e Universitaria (C.G.A. 2). For more on this map, see p. 993, note 99, in this chapter and figure 30.10.

Pedro Reinel around 1504 shows not only the graduated meridian but also an additional scale of latitudes positioned obliquely off the coast of Newfoundland (fig. 38.6).⁷¹ These maps show Portuguese cartography fully mature in its technical accomplishment, and they mark a new stage in Portuguese cartography characterized by an increase and diversification of production.

CHARTMAKERS AND CHARTS: THE PRACTITIONERS

This section summarizes the work of some professional Portuguese cartographers and charts identified or reproduced in *Portugaliae monumenta cartographica* (PMC), which discusses fifty-five chartmakers with known works or works that have been attributed to them with relative assurance. Appendix 38.1 lists twenty-seven chartmakers with more than four known charts.

We have selected three families of professional Portuguese cartographers—the Reinel, Homem, and Teixeira families—to discuss separately. Although not much is known about mapmaking organization in Portugal, these three families figured prominently in the production of many known maps. Later, brief biographies are given on other individual mapmakers: Francisco Rodrigues, João de Castro, Gaspar Correia, and Manuel Godinho de Erédia. The compilers of graphic representations of coastal fortresses in Portuguese Asia, such as Pedro Barreto de Resende and António Bocarro, are also discussed later, and shorter references are made to Diogo Ribeiro, Fernão Vaz Dourado, Bartolomeu Velho, Duarte Pacheco Pereira, Duarte de Armas, and Fernando Álvaro Seco, all of whom made contributions to Portuguese mapmaking during this period.

Figure 38.7 presents the chronology of the main families of cartographers and other important individual Portuguese mapmakers. The figure shows that Portuguese cartographers concentrated their production in the sixteenth century. Only four continued high-quality cartographic work into seventeenth century: Pedro Teixeira Albernaz, João Teixeira Albernaz I, João Baptista Lavanha, and Manuel Godinho de Erédia.

THE REINEL FAMILY

The cartographic work of the Reinel family began with Pedro Reinel, the first Portuguese cartographer with signed maps, and his son Jorge Reinel. Their known charts extend from about 1485 until about 1540.⁷² According to Cortesão, Pedro Reinel and his son created the “School of Reinel.”⁷³ They worked almost exclusively in Lisbon, but in 1519 they were in Seville. Jorge Reinel collaborated in the preparation for the circumnavigation of Ferdinand Magellan in the service of Castile. Sebastião Álvares, *feitor*

(consul) of Portugal, informed King Manuel that he had “seen the land of the Moluccas put on the globe and chart that the son of Reinel has made here, which was not finished when his father came here to fetch him, and his father finished it all and put these lands of the Moluccas [on it], and this is the standard for all the other charts which are made by Diogo Ribeiro.”⁷⁴

Jorge Reinel’s departure from Portugal seems to have been motivated by the insolence of youth. Pedro Reinel went to Seville to get his son and succeeded in taking him back to Lisbon without punishment. In 1524, they were present at the negotiations on the Badajoz-Elvas Junta, where the geographical position of the Molucca Islands in relation to the line of demarcation established by the Treaty of Tordesillas was discussed.

The problem of the Moluccas (the Spice Islands) became even more delicate after the return of Juan Sebastian del Cano, who commanded the surviving ship of Magellan’s fleet. This and other problems led Castile to seek out Portuguese cartographers, cosmographers, and pilots. Mentioned among them, in addition to Magellan, are Juan Díaz de Solís, Estevão Gomes, João Rodrigues, and Francisco and Rui Faleiro.

In 1528, King João III conceded an annual pension of 15,000 *reis* to Pedro Reinel⁷⁵ and one of 10,000 *reis* to his son. In 1542, Pedro is mentioned again in a document saying that he was making navigation charts. Jorge Reinel is mentioned in several documents of the 1560s, and it seems that he was still living in 1572.⁷⁶

71. Heinrich Winter, “The Pseudo-Labrador and the Oblique Meridian,” *Imago Mundi* 2 (1937): 61–73, esp. 65–66; E. G. R. Taylor, “Hudson’s Strait and the Oblique Meridian,” *Imago Mundi* 3 (1939): 48–52; *PMC*, 1:25–27; and figure 30.13.

72. The known charts are Pedro Reinel’s chart of the Atlantic and the Mediterranean, ca. 1485; Pedro Reinel’s chart of the Mediterranean, ca. 1500; Pedro Reinel’s chart of the North Atlantic, ca. 1504; Jorge(?) Reinel’s chart of the Indian Ocean, ca. 1510; two charts of the Indian Ocean by Pedro Reinel, ca. 1517 and 1518; a chart of the southern hemisphere by Pedro(?) Reinel, ca. 1522; an Atlantic chart by Pedro(?) Reinel, ca. 1535; and an Atlantic chart by Jorge Reinel, ca. 1540.

73. Cortesão, *Cartografia e cartógrafos portugueses*, 1:249–305, esp. 302. Giving special attention to the Reinels has been motivated by the supposition that the so-called Miller Atlas of 1519 was co-authored by them with Lopo Homem. This was later doubted, but even today cannot be completely refuted.

74. IAN/TT, Corpo Cronológico, P. 1.ª, maço 13, doc. 20 (cited in *PMC*, 1:20).

75. The accompanying notation is: “. . . considering the services that Pero [i.e. Pedro] Reinel, my servant, master of charts and navigation compasses in my kingdoms and lands has rendered to King John [João II] my uncle, and the King my lord and father”; see IAN/TT, Chancelaria de D. João III, Doações, liv. 14, fl. 67 (cited in *PMC*, 1:19).

76. In a text dated 1572, his wife, Beatriz Lopes, is forgiven for stealing porcelain because “she and her husband are sick, old and poor.”

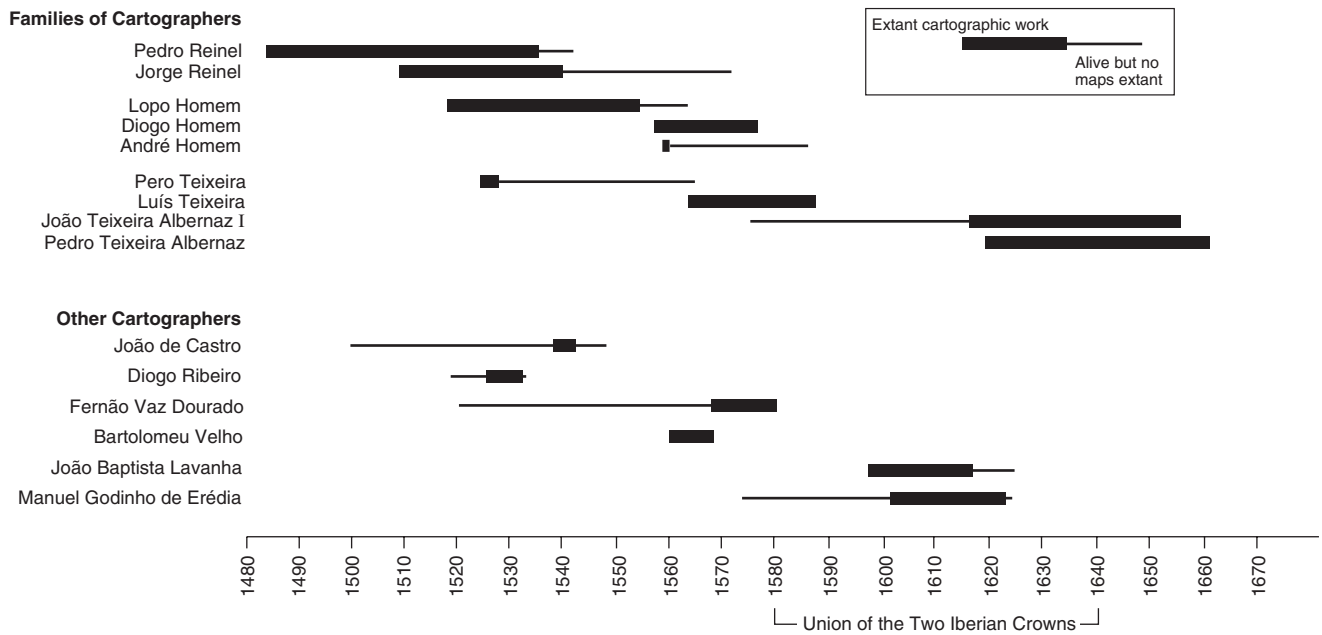


FIG. 38.7. CHRONOLOGY OF THE MAIN PORTUGUESE CARTOGRAPHERS AND CARTOGRAPHIC FAMILIES OF THE RENAISSANCE.

THE HOMEM FAMILY

We know three Portuguese cartographers with the surname Homem: Lopo Homem and two of his sons, Diogo Homem and André Homem. There is information about two more sons, Thomas and António, from whom no charts are known.⁷⁷

Lopo Homem's birth date is unknown, but he seems to have died shortly after 1563. There is information that the cartographer may have belonged to a noble family, of which the most important member was Pedro Homem, chief equerry of the royal family.⁷⁸ This might explain why Lopo was considered official cartographer while still very young.⁷⁹

Through documents that refer to the cartographer and cosmographer Lopo Homem, we know relevant facts of his activity, which was almost always exercised in Portugal (though this was not the case for his sons Diogo and André) or in North Africa (in Azamor, where he seems to have been between 1520 and 1522).⁸⁰ He was compensated with a royal pension of 1200 *reais* and performed important functions as representative of the crown in complex disputes with Castile relative to the possession of the Molucca Islands.

The charts by Diogo Homem concentrate almost exclusively on coastlines.⁸¹ There seems to have been considerable evolution in his production, from an initial

which would be explained if the annual pension had not been paid; see IAN/TT, Chancelaria de D. Sebastião e D. Henrique, *Legitimações*, liv. 44, fl. 196v (cited in *PMC*, 1:21).

77. One of the main references for this synthesis on the Homem family is the work of Léon Bourdon, "André Homem, cartographe Portugais en France (1560–1586)," *Revista da Universidade de Coimbra* 23 (1973): 252–91.

78. "Pedro Homem held a very high office, second only to that of Lord High Constable [Condestável]"; see *PMC*, 2:52.

79. Lopo Homem's known charts are the Lopo Homem and Reinel family atlas, 1519; a chart of the Mediterranean, ca. 1550; an anonymous chart of the North Atlantic (attributed to Lopo Homem), ca. 1550; a world map, 1550; and another world map, 1554.

80. The royal charter of João III dated 1524 confirms the permission of Manuel I from 1517, referring to "Lopo Homem, master of our navigation charts," to whom was conceded exclusivity so that he might "make and correct all navigation compasses which may belong to our fleets"; see IAN/TT, Chancelaria de D. João III, *Doações*, liv. 37, fl. 170v (cited in *PMC*, 1:49). Other known dates, documents, and what we learn from them include: 1519, map signed and dated; 1523, document in which the Spanish ambassador Zuñiga, in a missive to Emperor Charles V, refers to the cartographer and cosmographer Lopo Homem; 1524, through Alonso de Santa Cruz it is known that "a Lopo Homem, master of making nautical charts," was one of the representatives of Portugal in the Elvas-Badajoz Junta, on the localization of the Moluccas (see Alonso de Santa Cruz, *Crónica del emperador Carlos V*, 5 vols., ed. F. de Laiglesia [Madrid, 1920–25], 2:88–89); 1529, document confers to "Lopo Homem cosmografo," from 1526, 1200 *reais* from the budget of the royal family; 1541, document refers to Lopo Homem, who "makes nautical charts"; 1547, royal charter and correspondence of José Pereira Dantas, ambassador of Portugal in Paris, confirms that Lopo Homem is the father of the cartographer Diogo Homem; ca. 1550, chart of the Mediterranean signed; and 1554, world map signed and dated (see *PMC*, 1:49–53).

81. Diogo Homem was one of the most prolific Portuguese cartographers. Extant are 11 separate charts made by him between 1557 and 1576; 7 atlases of Europe and the Mediterranean, with a total of 52 sheets, drawn between 1559 and 1574; and 5 universal atlases from 1558 to 1568, with 81 sheets, amounting to a total of 144 charts (these occupy most of vol. 2 of *PMC*).

period (1557/58) during which he limited himself to copying others until his final years (1569–76), during which he improved his own charts, especially in the eastern Mediterranean.⁸²

The documents discovered shed some light on the places where Diogo Homem worked, but little is known about the period between the beginning of his known activity as a cartographer, in 1547, and 1568, the date of the first work he did in Venice, a city where he must have lived between 1568 and 1576, and possibly earlier.

In 1544, Diogo Homem was condemned to exile by King João III for the murder of a man. His father intervened to commute his punishment on the condition that Diogo remain in Portugal. It is known, however, that soon after that he went to England, where he lived in 1557 and 1558. There is no information on his presence in Portugal after 1547, the year of his pardon.⁸³

The signature on Diogo Homem's works before 1568 was always in Latin. After that year, he signed "Diegus homê Cosmographus Lusitanus," which expressed his desire to make his Portuguese nationality clear far from his homeland. On one hand, the fact that he remained without immediate access to the new areas discovered and to the maps made in the meantime could explain the dominance of the Mediterranean basin in his work; on the other hand, his audience was not Portuguese, but English, Italian, or French.

We know that André Homem drew a world map in Antwerp, dated 1559. There is also information that he made a map of France with rhumb lines. Like many other Portuguese cartographers, such as João Afonso, Bartolomeu Velho, and Diogo Homem, André Homem lived a large part of his life outside Portugal. The motive that led André to leave the country is unknown, but there are conjectures of an attempted homicide.⁸⁴

The date of André Homem's departure from Portugal is not known, but it was before 1554, for his obsolete representation of Japan indicates that he was not familiar with the representation of the archipelago made by his father in 1554. After having lived in Antwerp, he went to Paris with the intention of being admitted as cosmographer of Admiral Coligny, who was trying to found a "New France" in Florida.

The story of André Homem's stay in Paris from 1560 at the residence of João Pereira Dantas, ambassador of Portugal at the French court since 1555, was reconstructed by Bourdon, from whom we will bring together the most important facts.⁸⁵ The ambassador was convinced of the professional merit of André Homem and his brothers, which led him to take several initiatives to make them return to Portugal and avoid their placement in the service of other countries. Several times he solicited financial help for their return trip to Lisbon and a survival pension that was never forthcoming. In 1564, Dantas de-

cidated to send them to India, but André Homem refused to go, because that would not allow him to defend himself against accusations. So André Homem went to England, where he seemed to be in 1567. Shortly afterward, he returned to Paris. Of his brothers it is known that António served Portugal in India and that Thomas died in war.

THE TEIXEIRA FAMILY

The complex genealogy of this family of cartographers, who worked for five or six generations over two centuries, was reconstructed by Cortesão and Teixeira da Mota.⁸⁶ The family was headed by Pero Fernandes (from whom two charts are known, one from ca. 1525, another from 1528), the father of Luís Teixeira and Marcos Fernandes Teixeira and also, probably, of Domingos Teixeira.

Pero Fernandes was the grandfather of Pedro de Lemos and of João Teixeira Albernaz I (who sometimes signed maps only "João Teixeira") and also of Pedro Teixeira Albernaz. He was the great-grandfather of Estêvão Teixeira and the great-great-grandfather of João Teixeira Albernaz II.⁸⁷ Considering the number of family members and the dates of their work, we will refer mainly to Luís Teixeira and to his son João Teixeira Albernaz I.

Luís Teixeira worked mainly in Lisbon, where he compiled the elements that he brought from his travels, specifically from the Azores and Brazil, areas where he executed original surveys. The merit of his charts was recognized outside Portugal, particularly in the Low Countries, where some were engraved. Thirty-five charts are attributed to him, not counting the anonymous atlas from 1597–1612, which was drawn in part by João Baptista Lavanha.

The place and date of Luís Teixeira's birth are not known. The first document mentioning his name con-

82. Marcel Destombes distinguishes four periods in the work of Diogo Homem: in the first (1557–58), he limited himself to copying old models of Lopo Homem; in the second (1559–63), he made regular corrections to the charts; in the third (1564–68), the corrections were more numerous, although not always significant, as in the previous period; and finally, in the fourth (from 1569, during which he was settled in Venice), he made several improvements and a refinement of his style, tending toward moderation (*PMC*, 6:91–92).

83. *PMC*, 2:5–8.

84. Sousa Viterbo, *Trabalhos náuticos dos portugueses nos séculos XVI e XVII*, 2 vols. (Lisbon: Typographia da Academia Real das Ciências, 1898–1900), 1:159.

85. Bourdon, "André Homem."

86. *PMC*, 1:113 and 4:79–86.

87. Pero Fernandes was also the great-great-great-grandfather of Francisco da Silva Albernaz, the nephew of João Teixeira Albernaz II. The last cartographer of the family, Francisco Albernaz, would have been working in the eighteenth century, but none of his maps survive.

cerns an exam he took on 18 April 1564 to obtain a license to make navigational charts, for which the examiner was the chief cosmographer, Pedro Nunes, and Jorge Reinel was present.⁸⁸ Luís Teixeira was considered capable of making navigational charts, astrolabes, and compasses. A permit of 15 January 1569 states that he was officially responsible for the nautical charts and instruments necessary to the royal fleets.

Luís's surveys in Brazil, of which special mention will be made later, must have been done between 1573 and 1578, giving rise to the first rutter of the coast, which probably was finished around 1585. The surveys of the Azores were performed before 1582, for they resulted in a chart of Terceira Island published by Abraham Ortelius that year, and in a general chart of the archipelago published by Ortelius in 1584. There is another group of manuscript charts of the Azores by the same author with the date 1587.

Brazil and the Azores were laboratories for Luís Teixeira, whose work Ortelius and Jodocus Hondius admired. What remains obscure are the sources used to make the chart of Japan (also published by Ortelius, in 1595), which broke with all previous traditions. There is no indication that Teixeira had ever been there.

Luís Teixeira worked as a cartographer for at least fifty years. The last important reference concerning him involves an expedition to India commanded by Belchior Ruiz in 1613. Teixeira was to survey the African coast between Cabo Negro and the Cape of Good Hope on the return voyage. But it seems that the cartographer did not leave Portugal, probably due to his advanced age.

João Teixeira Albernaz I was the most notable Portuguese cartographer of the first half of the seventeenth century. A good part of his work, especially the first maps, is stylistically similar to that of his father.⁸⁹ Among the 340 maps that he produced (not counting 323 copies), a total of 146 specifically concerned Brazil; that number does not include the copies and charts in universal atlases where Brazil appeared. Until about 1645, the work of João Teixeira Albernaz I was limited almost exclusively to Brazil (including maps attributed to him that accompanied Diogo de Campos Moreno's *Livro que dá razão do estado do Brasil* of 1612); after 1648, he worked in the dominions of Portugal and the Far East.

João Teixeira Albernaz I was born in Lisbon about 1575. In October 1603, he received a certificate as master of navigational charts and of nautical instruments, having been examined by João Baptista Lavanha, with whom he would later collaborate. In January 1605, he was named cartographer of the Armazéns da Casa da Guiné e da Índia to make charts for the royal fleets.

In August 1619, together with his brother Pedro Teixeira Albernaz, João Teixeira Albernaz I made a new chart of the Strait of Magellan. Pedro remained in Madrid

and made a chart of the strait there, signed only by him, in addition to an engraved map of Madrid in 1656 and an engraved chart of Portugal in 1662. João returned to Lisbon, stating the necessity of working for Portugal.

João Teixeira Albernaz I was a candidate for the position of chief cosmographer of Portugal in 1622, after the death of Manuel de Figueiredo and during the absence from Spain of João Baptista Lavanha, the holder of that position. The chosen candidate was Valentim de Sá, but in a 1648 atlas of the coast of Portugal, João Teixeira Albernaz I is called "chief cosmographer." The explanation could be related to the deportation to Brazil of the chief cosmographer, António de Mariz Carneiro, for unknown reasons around 1646. In July of 1647, King João IV selected Luís Serrão Pimentel for the position, but there could have been a short period in which João Teixeira Albernaz I held it. The last known work of João Teixeira Albernaz I was a chart of the Atlantic and of the Indian Ocean dated 1655, although it could also have been made by João Teixeira Albernaz II. Neither the date nor the place of João Teixeira Albernaz I's death is known.

THE CHARTS

THE CORPUS OF OVERSEAS CARTOGRAPHY

This section summarizes the charts identified and reproduced in *PMC* that are of primarily nautical and overseas interest.⁹⁰ After the publication of *PMC* (1960–62) and the 1987 edition and update,⁹¹ only a few nautical maps

88. Viterbo, *Trabalhos náuticos dos Portuguezes*, 1:295–96, and *PMC*, 3:41–49.

89. Much confusion has been recorded about the authorship of some charts because one of his grandsons had the same name. The authors of *PMC* succeeded, however, in undoing previous mistakes.

90. "Overseas" refers to all the regions geographically distant from continental Portugal and from the archipelagos of the Azores and Madeira that were considered Portuguese colonies (in Africa, America, and Asia). Excluded from this section of study were 207 maps of Portugal: 114 views and plans of the "Livro das fortalezas" by Duarte de Armas, a chart of Portugal by Fernando Álvaro Seco, 6 charts relative to the Portuguese territory of the Escorial Atlas (1 general), 43 charts of the "Códice da Casa de Cadaval" by Luís de Figueiredo Falcão, 23 charts of the "Atlas do Priorado do Crato" by Pedro Nunes Tinoco, 3 anonymous charts of "Correições de Portugal" attributed to João Teixeira Albernaz I, 16 charts of the atlas of the coast of Portugal by João Teixeira Albernaz I (1648), and a plan of Lisbon by João Nunes Tinoco (1650). Also, 10 terrestrial maps were excluded: 3 anonymous plans of the city of Angra do Heroísmo, Terceira Island, and the Azores; 2 engraved charts of the Congo and of Africa published by Antonio Pigafetta; a chart of Aragon by João Baptista Lavanha; a plan and profile of the royal fort of Pernambuco by Cristóvão Álvares; a plan of Madrid by Pedro Teixeira Albernaz (1656); an anonymous chart of Angola; and a chart of Abyssinia published by Balthazar Telles.

91. The second edition of *PMC*, coordinated by Alfredo Pinheiro Marques, included an introduction by him (1:13–22), a supplement of "New materials relating to Portuguese cartography twenty-seven years

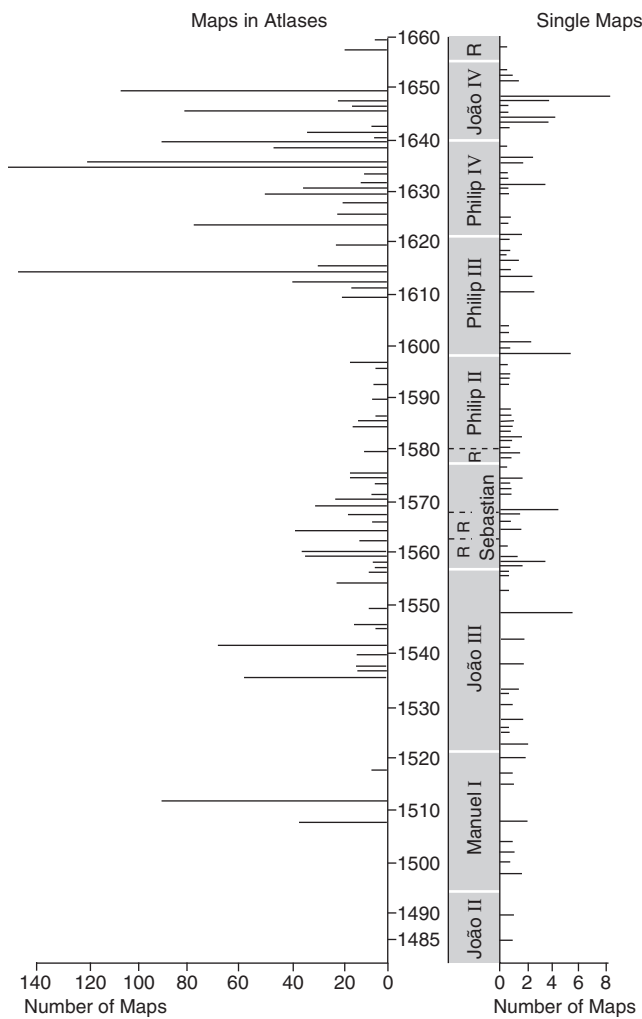


FIG. 38.8. NUMBERS OF EXTANT PORTUGUESE NAUTICAL CHARTS AND OVERSEAS MAPS OF THE RENAISSANCE, BY DATE. The graph includes charts listed, but not necessarily reproduced, in *PMC*. Uncertainty of dating must be taken into account. For undated maps of given periods, the following dates were assigned: mid-sixteenth century and mid-seventeenth century—1550 and 1650; end of the sixteenth century and end of the seventeenth century—1600 and 1700; second half of the seventeenth century—1675; date within a known range: the middle of the period; end of the sixteenth century or beginning of the seventeenth century—1605; beginning of the seventeenth century—1610; post-1635—1650; post-1650—1675; post-1625—1640. These imprecisions in dates are not numerous, nor are the differences in years substantial. R = regent; Philip II, III, and IV of Spain were, respectively, Philip I, II, and III of Portugal.

made by Portuguese cartographers about 1450–1660 were discovered. As can be seen in figure 38.8, a general overview of the quantity of charts in chronological sequence, most of the cartographic production was associated with collections of maps (almost always by a single author, very rarely by two), implying an intention to systematically map certain areas.⁹²

Despite the approximate nature of many of the assigned dates, figure 38.8 reveals periods of generally greater production interrupted by others of less activity. Until about 1535, production was quite modest, with separate maps dominating.⁹³ Following that was a period of steady output of separate maps and collections until the end of the century. However, the greatest production occurred from 1610 to 1650, consisting largely of detailed maps of Brazil and the Indian Ocean.

This pattern contradicts Cortesão’s view that the quantity of Portuguese cartography was much diminished during the union of the two Iberian crowns (1580–1640).⁹⁴ Regarding quality, it must be borne in mind that the years of greatest production of two of the cartographers of the Teixeira family, Luís Teixeira and João Teixeira Albernaz I, and also of João Baptista Lavanha and Manuel Godinho de Erédia, coincided with the Iberian union, leading to a greater exchange of cartographic information.

Locations of Preserved Charts

As table 38.1 broadly illustrates, and as might be expected, Portugal preserves the greatest portion of the maps we are considering. But that portion represents less than half of the extant Renaissance Portuguese cartographic production. Brazil is where the next-greatest number of maps is preserved. The Napoleonic invasion of 1807 forced the exile of the Portuguese royal family to Brazil,

after the first publication of *Portugaliae monumenta cartographica* (6:7–72), and “New Portuguese charts not included in the first edition of *Portugaliae monumenta cartographica*” (6:75–112), that is, six charts: one by Jorge de Aguiar, 1492; an anonymous chart, ca. 1510; an anonymous chart (attributed to Diogo Homem), ca. 1566; an anonymous chart (attributed to António Sanches), ca. 1633; a world map engraved on four sheets by Luís Teixeira, 1604 (?) [ca. 1645]; and a chart by João Teixeira Albernaz I, 1640.

92. The authors of *PMC* adopted the word “atlas” to refer to a variety of collections of maps, such as maps of the whole coast of a country, nautical charts of small parts of a specific coast, plans of fortresses and city views, sketches, and nautical charts. For the purpose of this section, we kept the classification of *PMC*, but the expression “collection of maps” is sometimes used.

93. The two usual explanations for the existence of so few pre-1535 maps—the earthquake of 1755 and the subsequent fires that destroyed the Palácio Real da Ribeira and the Casa da Índia as well as the Armazém da Guiné e da Índia in Lisbon and the policy of silence—have both been refuted (later in this chapter). The most plausible explanation for the small number of charts by Portuguese authors preserved is their natural destruction by use. Most of the charts preserved are those offered to great civil or religious dignitaries.

94. Cortesão, *Cartografia e cartógrafos portugueses*, 1:26–32, concerns four periods in the history of Portuguese cartography, the last being “decadência”: “After Portuguese cartography reached its maximum height in the third quarter of the [sixteenth] century, it begins frankly to decline, the beginning of this decline coinciding with the absolute domination of Portugal by the Inquisition, by the Company of Jesus, and by the Filipes” (1:32).

TABLE 38.1 Countries Where Portuguese Manuscript Maps Mentioned in *PMC* (ca. 1485–1660) Are Preserved

Country	Total Maps
Portugal	1247
Brazil	277
United States of America	269
United Kingdom	248
Spain	238
France	181
Austria	156
Italy	142
Germany	110
Netherlands	85
Sri Lanka (formerly Ceylon)	52
Belgium	40
Russia	15
Vatican City	9
The former Yugoslavia	7
Australia	1
Turkey	1
Total	3078

and with them went a great part of the national cartographic heritage.⁹⁵ Spain, France, Italy, and England, in addition to being situated geographically close to Portugal, maintained traditional and strong political, cultural, and commercial relationships with it. Thus, the preservation of maps in these countries is due to historical reasons, as well as to the appreciation in these countries of Portugal's technological and cultural heritage, regardless of historical period. In the case of the United States and possibly Austria and Germany, the motivation was more antiquarian and cartobibliographical. The great buying power of these nations permitted the acquisition of maps by persons or institutions at auctions, through information from catalogs, and from private collections.

In areas colonized by Portugal other than Brazil, such as Angola, Mozambique, other African regions, areas of the Indian Ocean, and areas of the Asian coast, only a few early Portuguese maps are known to exist. One explanation might be that the effective appropriation of Africa by Portugal occurred only at the end of the nineteenth century. On the other hand, it is possible that these collections are not completely inventoried and that examples of Renaissance Portuguese cartography may still be found there.

Many manuscripts maps exist only as single examples or in small numbers, often due to loss or damage by use at sea. Those that are preserved are mostly prestigious copies that were offered to persons of the church or the nobility or to scholars curious about the unexpected rev-

TABLE 38.2 Portuguese Maps, Manuscript and Printed, Identified in *PMC* (ca. 1485–1660)

Types of Maps	Number
Manuscript maps and atlases	3078
Separate engraved maps with only one known copy	30
Separate engraved maps with several known copies (1st ed.)	10
Engraved maps included in printed books and atlases (1st ed.)	57
Total	3175

olution of geographical knowledge. Because map engraving came late to Portugal, the proportion of printed maps is very small (table 38.2).⁹⁶ During the sixteenth century, none of the engraved examples were printed in Portugal; they were printed primarily in Italy and the Netherlands, then in France and England.

Inventory and Classification

Based on the voluminous and varied cartographic corpus published in *PMC*, appendix 38.2 illustrates the relative quantity of Portuguese maps of various world regions and reveals the prominence of maps of the Mediterranean and the Atlantic, the Indian Ocean, the Far East, and Brazil. Note that Portuguese cartography of the Indian Ocean and the Far East began the same year, which has to do with the spatial continuity of these areas. The reasons for the individualization of these two areas, as well as the treatment of the cartography of Brazil separately from that of the rest of the American continent, will be explained later. Starting from this brief inventory and classification, we will now analyze the maps of each of the areas identified in appendix 38.2, beginning with the world maps and later referring to maps of five of the large regions identified therein.

World Maps

Twenty-five world maps by Portuguese cartographers produced during the period of our study are now extant

95. José Silvestre Ribeiro, *Historia dos estabelecimentos scientificos, litterarios e artisticos de Portugal . . .*, 19 vols. (Lisbon: Typographia da Academia Real das Sciencias, 1871–1914), and António Pedro Vicente, "Memórias políticas, geográficas e militares de Portugal (1762–1796)," *Boletim do Arquivo Histórico Militar* 41 (1971): 11–298.

96. Printed cartography in Portugal was sporadic in the seventeenth and eighteenth centuries. It became systematic only in the middle of the nineteenth century, with the arrival in Portugal of the Polish engraver J. Lewicki, who was invited to work at the institution that preceded the current Instituto Geográfico de Portugal (IPG).

(appendix 38.3). Three of the most significant are the so-called Cantino world map of 1502,⁹⁷ the world map of Diogo Ribeiro of 1529, and that of André Homem of 1559.

Made up of three sheets of parchment, the Cantino map distinguished for the first time, unmistakably, the New World and Asia. Although Juan de la Cosa's chart of 1500 was the first to portray the East Coast of the new continent, the separation between Asia and America on this map is rather controversial. The Cantino chart is also the first known to have recorded the word "Antilia," using the Portuguese form.⁹⁸

Leite studied the representation of South America on this chart (fig. 38.9). A piece of parchment was glued over the northeast coast to cover an earlier representation. This correction, moving the coast farther west as well as adding some names (Abaia de todos Sanctos, San Miguel,

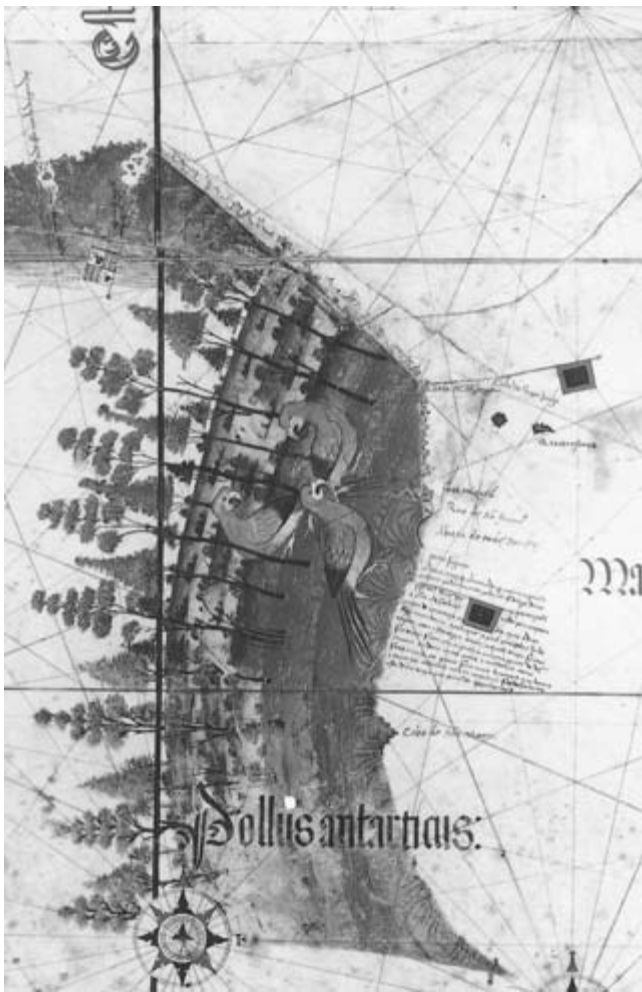


FIG. 38.9. DETAIL OF SOUTH AMERICA FROM THE CANTINO MAP, 1502.

Photograph courtesy of the Biblioteca Estense e Universitaria, Modena (C.G.A.2).

Rio de Sã franc., and Rio de Brasil), resulted from knowledge brought back by the expedition of João da Nova of 1501–2.⁹⁹ Also, the strong presence of the line of demarcation resulting from the Treaty of Tordesillas, drawn for the first time, reveals the importance of this accord between Portugal and Spain.

The portrayal of Asia in the Cantino map presents deficiencies, as in the case of the peninsula of Indochina, which is excessively elongated toward the south, almost touching the Tropic of Capricorn. East Asia was imaginary, because there was still no direct Portuguese knowledge of it. Sources of information could have been Asian maps and old written sources such as the account of the voyage of Marco Polo.

For Africa, the Cantino map contains many place-names, particularly on the West African coast. From the mouth of the Zaire River to the Cape of Good Hope, sixty-eight place-names are recorded (about twenty more than on the map by Juan de la Cosa). The *padrões* mark the main places reached by the navigations of Diogo Cão, Bartolomeu Dias, Vasco da Gama, and Pedro Álvares Cabral. Numerous legends pay homage to King Manuel and tell of the evangelization of the Portuguese, the commerce, and the qualities of the people in several places. To the east, although the drawing shows the abandonment

97. The name Cantino designates the buyer, Alberto Cantino, sent by the duke of Ferrara in Lisbon to gather information on the Portuguese discoveries. In a letter of November 1502, Cantino says that his mission had gone well, referring, specifically, to obtaining information on the voyages of Vasco da Gama to India; of Pedro Álvares Cabral to the Orient, passing via Brazil; and of Gaspar Corte-Real and others to the North Atlantic, calling at Newfoundland, Greenland, and Labrador. The author of the world map also took into account the voyage to India of João da Nova in 1501–2, for it was on his return, in September of 1502, that he discovered Ascension Island, which is portrayed on the Cantino world map. Several of the manuscript world maps discussed in this section are illustrated in appendix 30.1.

98. The "Antilia" that appears on the chart of Zuane Pizigano (1424) and on other later charts has no relation to the Antilles of the Cantino world map, either in shape or in location.

99. Of the numerous works that study the Cantino map, in addition to Cortesão, *Cartografia e cartógrafos portugueses*, 1:142–51, and PMC, 1:7–13, the following are important: Leite, *História dos descobrimentos*; idem, "O mais antigo mapa," 225–81; Luís de Albuquerque and J. Lopes Tavares, *Algumas observações sobre o planisfério "Cantino" (1502)* (Coimbra: Junta de Investigações do Ultramar, 1967); A. Teixeira da Mota, "A África no planisfério português anónimo 'Cantino' (1502)," *Revista da Universidade de Coimbra* 26 (1978): 1–13; idem, "Cartografia e cartógrafos portugueses"; Ernesto Milano, *La carta del Cantino e la rappresentazione della terra nei codici e nei libri a stampa della Biblioteca estense e universitaria* (Modena: Il Bulino, 1991); Luís de Albuquerque, *Os descobrimentos portugueses* (Lisbon: Publicações Alfa, 1985); Francesc Relaño, "Uma linha no mapa e dois mundos: A visão ibérica do Orbe na época de Tordesilhas," *Vértice*, 2d ser., 63 (1994), 36–44; Maria Fernanda Alegria, João Carlos Garcia, and Francesc Relaño, "Cartografia e Viagens," in *História da expansão portuguesa*, 5 vols., ed. Francisco Bethencourt and K. N. Chaudhuri (Lisbon: Círculo de Leitores, 1998–2000), 1:26–61.

of Ptolemaic ideas and significantly improves the outline of Juan de la Cosa, there are few place-names, less than one-third the number of those on the Juan de la Cosa map.

The Cantino map was clearly separated from classical heritage and established the new African profile that other cartographers hastily copied in their work, such as the map known as Kunstmann II (ca. 1503–6), the one known as King-Hamy (ca. 1504), the one by Nicolò de Caverio (ca. 1505), and the chart of Pesaro (ca. 1505). For about half a century, only small details were introduced to improve the outline of Africa shown in the Cantino map. Among these were the correct orientation of the Mediterranean by Diogo Ribeiro (1529), the correct placement of Madagascar attributed to Jorge Reinel (1510), and, finally, the correct drawing of the Red Sea by João de Castro (1541).

The Cantino map does not have a latitude scale, but the equator, the Tropic of Cancer, and the Tropic of Capricorn are correctly placed. On Ptolemy's world map, the equator had been placed at the latitude of Cape Verde, fifteen degrees farther north than its correct location.

The work of Diogo Ribeiro comprises four world maps, dated 1525, 1527, 1529 (two maps, one in the Vatican, another in Weimar), and a chart of the western hemisphere from about 1532. There are similarities between the 1525 world map, known as Castiglione,¹⁰⁰ and the later ones, although differences are noted, especially in the world map of 1529, relative to the coasts of Florida and Nova Scotia, which had just been discovered by the experienced Portuguese pilot Estevão Gomes, who had participated in the first voyage of circumnavigation.¹⁰¹ The chart most reproduced is perhaps that of about 1532, for its attractiveness, but the 1529 world map is considered one of the best maps of the period for the quantity and quality of its information.

All the known charts of Diogo Ribeiro were elaborated while he was in the service of Emperor Charles V, first in Seville, then in La Coruña, and again in Seville, where he died in August 1533. It is not known what led Diogo Ribeiro to leave Portugal, nor are maps known to have been drawn by this cartographer in Portugal.

Diogo Ribeiro was the first to diffuse information on Magellan's voyage in 1519–22, an expedition for which he collaborated on the construction of instruments and the drawing of charts. Among his sources for the northern coast of North America were the already mentioned explorations of Estevão Gomes, who from 1524 continued previous attempts to find a passage between the Atlantic and the Pacific coasts of the New World somewhere between Florida and Cape Breton. Diogo Ribeiro also recorded data from the attempts of Lucas Vázquez de Ayllón to colonize the Carolina coast in 1526. The curved outline of the coast of North America would remain on several maps for many years.

One of the most original aspects of Diogo Ribeiro's charts was his correction of the orientation of the axis of the Mediterranean, starting with the charts of 1529. In fact, he seems to have been the first to place the thirty-sixth parallel, which crosses the Strait of Gibraltar, north of Cyprus instead of north of Alexandria, as previous charts and many later ones did, which represents an error of five degrees to the south in the eastern Mediterranean.

The 1529 world map, preserved in the Vatican, is one of the best designed and illuminated of the era, innovative in its decoration with scientific instruments such as the astrolabe and the quadrant (see fig. 40.3).¹⁰² On this map, the world was redrawn, especially the New World, based on the information of Christopher Columbus, the brothers Gaspar and Miguel Corte-Real, Amerigo Vespucci, Vasco Núñez de Balboa, Francisco Pizarro, Ferdinand Magellan, Estevão Gomes, and Lucas Vázquez de Ayllón, among other explorers.

Only one world map is known by André Homem, dated 1559 (fig. 38.10). It was a large map unfortunately dismembered into ten pieces. From its abundant information, rigor of design, aesthetic beauty, and abundant legends in Latin, the map seems to have been drawn for an important person. The visconde de Santarém first studied it in 1841, when the map was still intact.¹⁰³ Legible features remain, such as the demarcation of the division of the world between Portugal and Spain by the Tordesillas meridian, the scale of latitudes from zero to ninety degrees, and tables of solar declination attributed to the Portuguese pilot Francisco Faleiro. These indicate Homem's persistent contacts with Portugal, further documented by his residence in Paris at the Portuguese embassy starting in 1560.

According to Gernez, between 1434 (when Gil Eanes first sailed beyond Cabo Bojador) and the year 1559 (the date of the world map of André Homem)—that is, in 124 years—the Portuguese had recognized more than 60,000 kilometers of coasts, of which more than 27,000 kilometers were in Africa, more than 21,000 in Asia, 5000 in Indonesia, and 7000 in Brazil, which rep-

100. The chart is so called because it was a present from the emperor Charles V to Baldassare Castiglione, ambassador of Pope Clement VII. See Belén Rivera Novo and María Luisa Martín-Merás, *Cuatro siglos de cartografía en América* (Madrid: Editorial MAPFRE, 1992), 75.

101. Estevão Gomes deserted in the Strait of Magellan, going into the service of Spain.

102. Surekha Davies, "The Navigational Iconography of Diogo Ribeiro's 1529 Vatican Planisphere," *Imago Mundi* 55 (2003): 103–12.

103. Manuel Francisco de Barros e Sousa, viscount of Santarém, *Atlas composé de mappemondes, de portulans et de cartes hydrographiques et historiques, depuis le VI^e jusqu'au XVII^e siècle* (Paris: E. Thunot, 1849). There are two facsimiles: *Atlas de Santarém*, with explanatory texts by Helen Wallis and A. H. Sijmons (Amsterdam: R. Muller, 1985), and *Atlas du Vicomte de Santarém* (Lisbon: Administração do Porto de Lisboa, 1989).

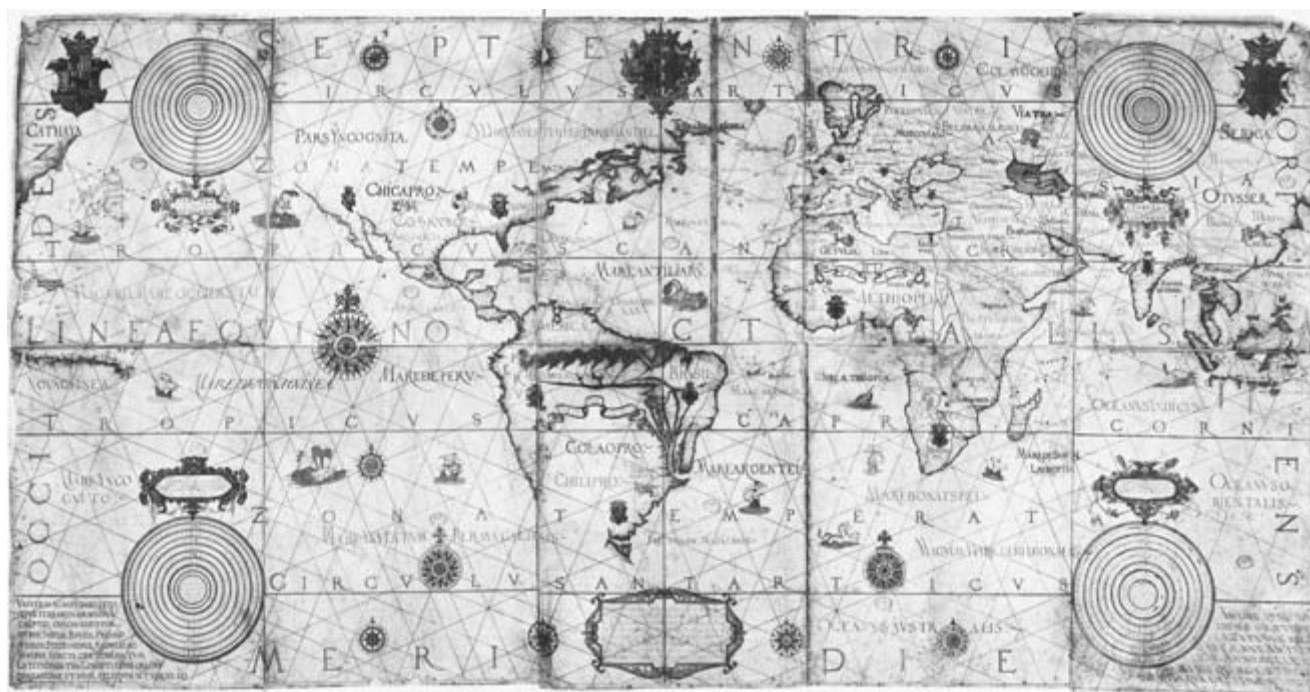


FIG. 38.10. WORLD MAP BY ANDRÉ HOMEM, 1559.

Size of the original: 150 × 294 cm. Photograph courtesy of the BNF (Ge CC 2719 Res).

resents an annual average of more than 480 kilometers.¹⁰⁴ In areas not yet explored, what was not known was left blank on Homem's map, a characteristic of this world map and of other Portuguese maps that clearly shows the practical character of that nation's cartography that was especially apparent in the first half of the sixteenth century. The centers of production of maps moved from Italy and Germany to northwest Europe, first Antwerp (ca. 1560–ca. 1575), then Amsterdam (especially after ca. 1590). Nevertheless, these printing centers in the Netherlands continued to use Portuguese sources until the creation of the Dutch East India Company in 1602.

Analysis by Region

This section analyzes the regional pattern of Portuguese cartographic production presented in appendix 38.2 and summarized in figure 38.11.

Charts of the Mediterranean and the Atlantic

Most Portuguese charts of the Mediterranean made during this period include part of the Atlantic. Only charts of subregions of the Mediterranean Sea do not portray the Atlantic (fig. 38.12). As appendix 38.4 shows, the number of maps of this area (327) is one of the largest among the groups defined, and the period of time in which they were made (ca. 1485–ca. 1654) covered approximately the same years as this study.

For maps of the Mediterranean and the Atlantic, there were three periods of great production (see fig. 38.11): between 1500 and 1520; from about 1540 to about 1600, with a very clear maximum between about 1560 and about 1570; and, finally, between about 1625 and about 1635. Each of these periods had at least one representative cartographer (or compiler). The years 1500–1520 had their main contribution from Valentim Fernandes. However, he must have only copied others' maps, and the sketches are very rough.¹⁰⁵ From 1530 until about 1600, the leading representative was Diogo Homem. João Teixeira Albernaz I was the main author of Portuguese cartography of the Mediterranean and of the Atlantic from 1628 until 1643.

Diogo Homem was one of the most prolific Portuguese cartographers,¹⁰⁶ or at least one of those who has had the most works preserved. We know eleven separate charts made between 1557 and 1576; seven atlases of Europe and the Mediterranean, with a total of fifty-two sheets, drawn between 1559 and 1574; and five universal

104. Désiré Gernez, "Importance de l'oeuvre hydrographique et de l'oeuvre cartographique des Portugais au 15.^e et au 16.^e siècles," in *Publicações*, 3:485–504.

105. Some "authors" copied others' work but were treated as cartographers in PMC. The case of Valentim Fernandes is paradigmatic.

106. We consider Portuguese the cartographers born in Portugal, although they may have worked outside of the country.

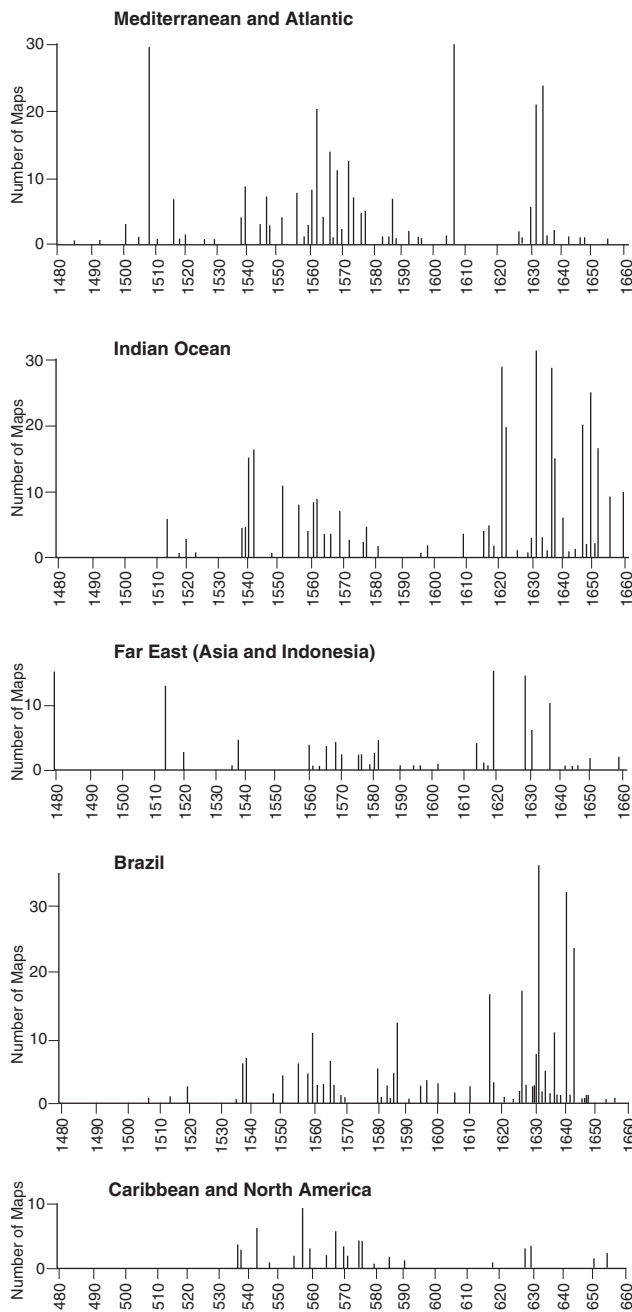


FIG. 38.11. NUMBERS OF EXTANT PORTUGUESE MAPS REPRODUCED IN *PMC*, BY DATE AND REGION COVERED.

atlases from 1558 to 1568, with eighty-one sheets, which amounts to a total of 144 charts of different parts of the world, especially the Mediterranean; they occupy most of volume 2 of *PMC*.

The type of ornamentation Diogo Homem used, rather heavy until 1569, changed substantially between 1570 and 1576. On the 1570 chart of the Mediterranean and the Atlantic (fig. 38.13), the relative frugality of orna-

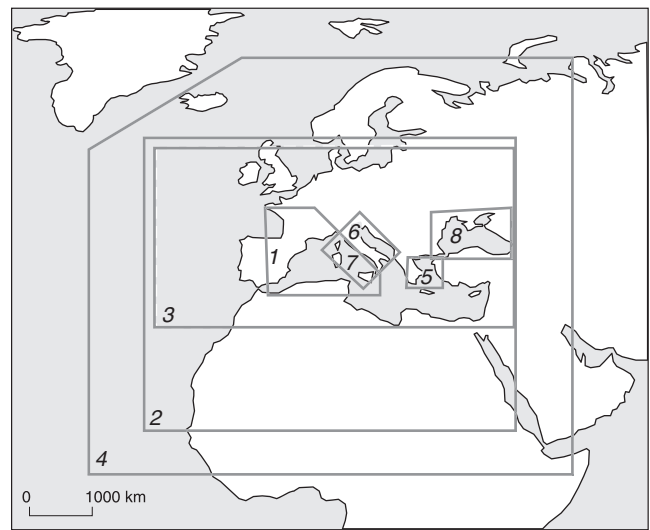


FIG. 38.12. EXAMPLES OF AREAS PORTRAYED IN PORTUGUESE MAPS OF THE MEDITERRANEAN AND THE NEAR ATLANTIC. Following are the dates for which charts of the numbered areas are documented. The charts may be by various makers, not only the ones cited as examples in parentheses. (1) Ca. 1500 (anonymous); (2) 1492–1566, 1580, and ca. 1632 (Diogo Homem); (3) 1510–1630 (Diogo Homem); (4) 1558, 1561–63 (Lázaro Luís); (5) 1538–1632 (Diogo Homem); (6) 1538–1632 (Diogo Homem); (7) 1559, 1561 (João Teixeira Albernaz I); and (8) 1559–72 (Diogo Homem).

mentation stands out, reduced to eight decorated compasses and eight heads that indicate the wind directions.

Charts of the Indian Ocean

Figure 38.11 shows the chronological order of Portuguese nautical cartographic production on the Indian Ocean, defined here as east of the Cape of Good Hope and west of Malacca and Sumatra.¹⁰⁷ Two periods of major activity stand out: from 1535 until 1580 and from about 1610 until 1660. In the first period, the most representative authors were João de Castro, Fernão Vaz Dourado, Diogo Homem, and Gaspar Correia; in the second, João Teixeira Albernaz I and especially Manuel Godinho de Erédia.

Among charts of small areas is the anonymous (possibly by Jorge Reinel) chart from 1510 reproduced as figure 38.14. This was the second Portuguese chart to show the Indian Ocean (the first was the Cantino map, 1502) based on surveys by pilots. It includes several legends and inscriptions quite different from those of the Cantino map, which indicates that the authors used different prototypes or sources.¹⁰⁸ The position of the compasses and the strong red pigment on the Red Sea are distinctive char-

107. When a map falls outside the given categories, it is classified in the category of the nearest large landmass.

108. The legends and inscriptions are discussed in *PMC*, 1:29 and 30.



FIG. 38.13. CHART OF THE MEDITERRANEAN BY DIOGO HOMEM, 1570.

Size of the original: ca. 72.4 × 110 cm. Photograph courtesy of the BL (Egerton MS. 2858).

acteristics of this chart. Another is the reference, twice, to the CIRCOLO DE CANCRI, one of them on the equator, an error that was corrected in very small letters: *equinocial chamam a esta linha* (this line is called equinoctial).

After 1580, with the union of the two Iberian crowns and the increased interest of the Dutch in areas controlled by the Portuguese, the maintenance and occupation of coastal places, however fortified, became difficult, necessitating military and urban cartography. More than 70 percent of the cartographic production of the period concerns forts, coastal cities, ports, capes, and small islands (277 charts), a clear symptom of the occupation of these places by the Portuguese.

The renewal of Portuguese cartography in the seventeenth century owes much to Manuel Godinho de Erédia. Erédia's style is quite different from that found on others' nautical charts. His miscellaneous atlas of 1615–22 includes several chorographical elements, that is, information on aspects of the interior, and the drawings are generally without coloring and artistic pretense. As a connoisseur of the Malay Peninsula, Indonesia, and the Indian Ocean who mastered local languages and had a strong spirit of observation, he bequeathed to us charts

and sketches on which he included data resulting from his own surveys, as well as information from Malays and from contemporary European charts.

In Erédia's miscellaneous atlas, the view of Cochim, where he spent some time, is very expressive.¹⁰⁹ Part of the observation was made from a high point above the horizon, somewhere in the sea. The urban area is delimited by the Cochim River, where the wharfs are clearly identified, along with the "river that goes to the estuary," crossed by a bridge, which allowed the city to communicate with a semiurban, semirural suburb of the city. In the interior of Cochim, unprotected on the side facing the sea because "this place had bulwark but the sea broke it," large areas near the Cochim River and the wharfs are dotted with impressive buildings, among which is a church. Toward the interior, the labyrinth of streets, with clearly defined blocks of houses and agrarian use, are preserved. On the other bank of the Cochim River, a fort is drawn, seen almost from above, and another church. Palm trees give a touch of tropical local color. The bazaars and the "weigh-

109. PMC, 4:53–60 and esp. pl. F, and Jorge Faro, "Manuel Godinho de Erédia," *Panorama*, 2d ser., 13–14 (1955).

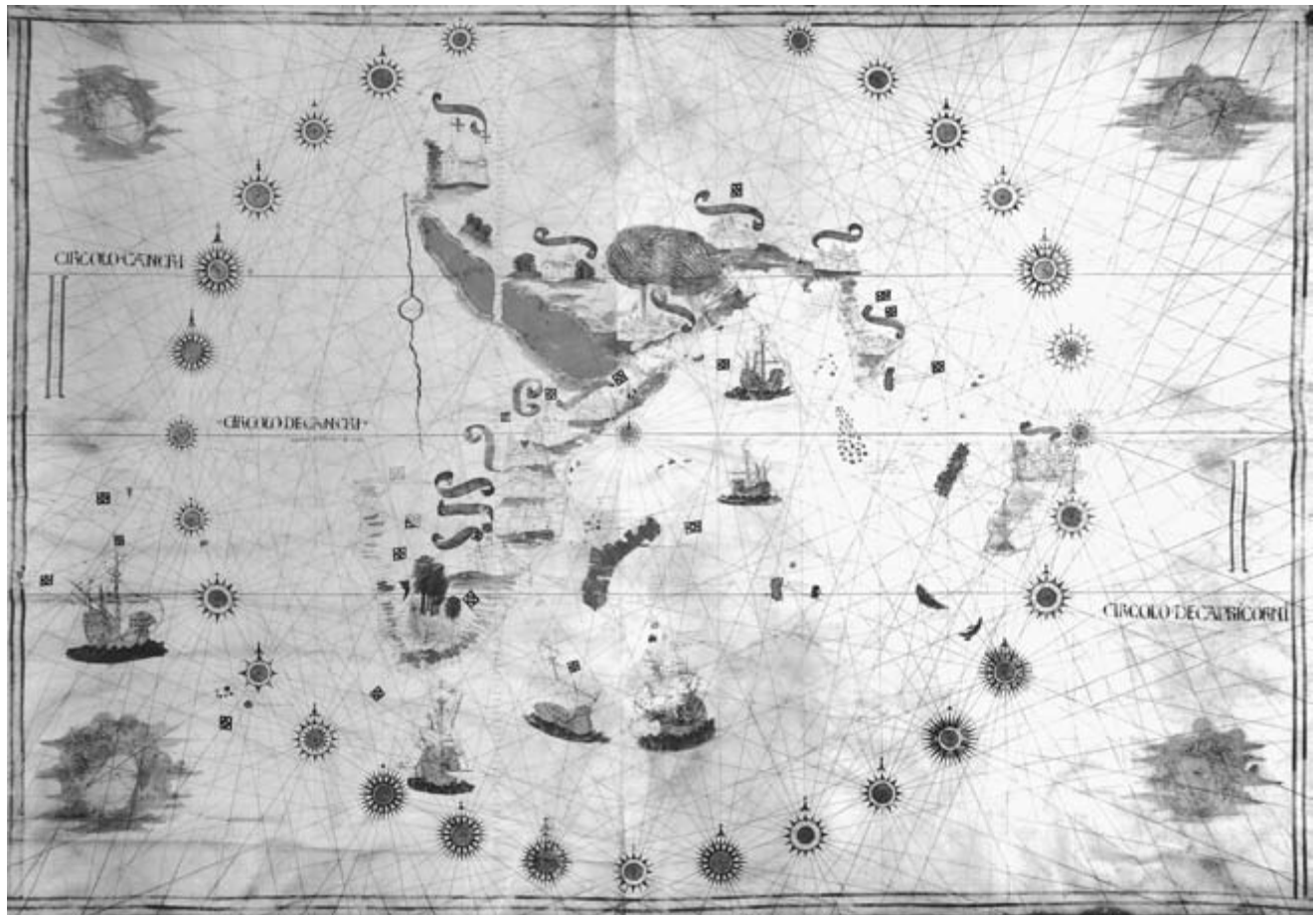


FIG. 38.14. CHART OF THE INDIAN OCEAN, ANONYMOUS (JORGE REINEL?), 1510.

Photograph courtesy of the Herzog August Bibliothek, Wolfenbüttel (Cod. Guelf. 98 Aug. 2 K4).

ing place of pepper” refer to the type of commerce. Figure 38.15 is an earlier (1610) version of Cochim by Erédia, similar in style and content but with fewer annotations.

Charts of the Far East (Asia and Indonesia)

Some 108 maps of the Far East made by Portuguese mapmakers are reproduced in *PMC*. The periods of most intense production were 1560–80 and from about 1613 to about 1650; the activity of Gaspar Viegas around 1513 also stands out (see fig. 38.11). These dates of activity roughly coincided with those for the Indian Ocean, a sign of the accordance between these areas.

The more important mapmakers for the area are mentioned in appendix 38.5. The most effective were those who lived a great part of their lives in contact with native cultures. Between 1560 and 1580, the authors of maps were numerous, with Fernão Vaz Dourado standing out, but there were also works by Diogo Homem, João de Lisboa, Bartolomeu Velho, and Luís Jorge de Barbuda. From the seventeenth century, only two Portuguese cartographers working on the Far East are known: Manuel Godi-

nho de Erédia and João Teixeira Albernaz I, who used some of the charts by Erédia.

Most maps of the period are of forts and cities, which reveals that maritime control of this large area was organized from islands and coastal cities, where it was necessary to build fortresses. The Portuguese did not succeed in imposing their presence on the interior. Inland commerce was controlled by the local owners (officials).

The world maps of Diogo Ribeiro (1525 and 1527), a Portuguese who settled in Spain in the service of Charles V, provided a new image of the eastern archipelago (here considered the area to the east of Ceylon). But these two world maps and the others that followed (except the anonymous one of ca. 1535) neither completed the outline of the island of Borneo nor gave a good image of the disposition of the islands to the south and southeast of this large island. Good cartographic knowledge was restricted to western Indonesia.

The first maps to acceptably represent the islands and peninsulas of the Far East were those of Fernão Vaz Dourado (atlases of ca. 1568, 1570, 1571, 1575,

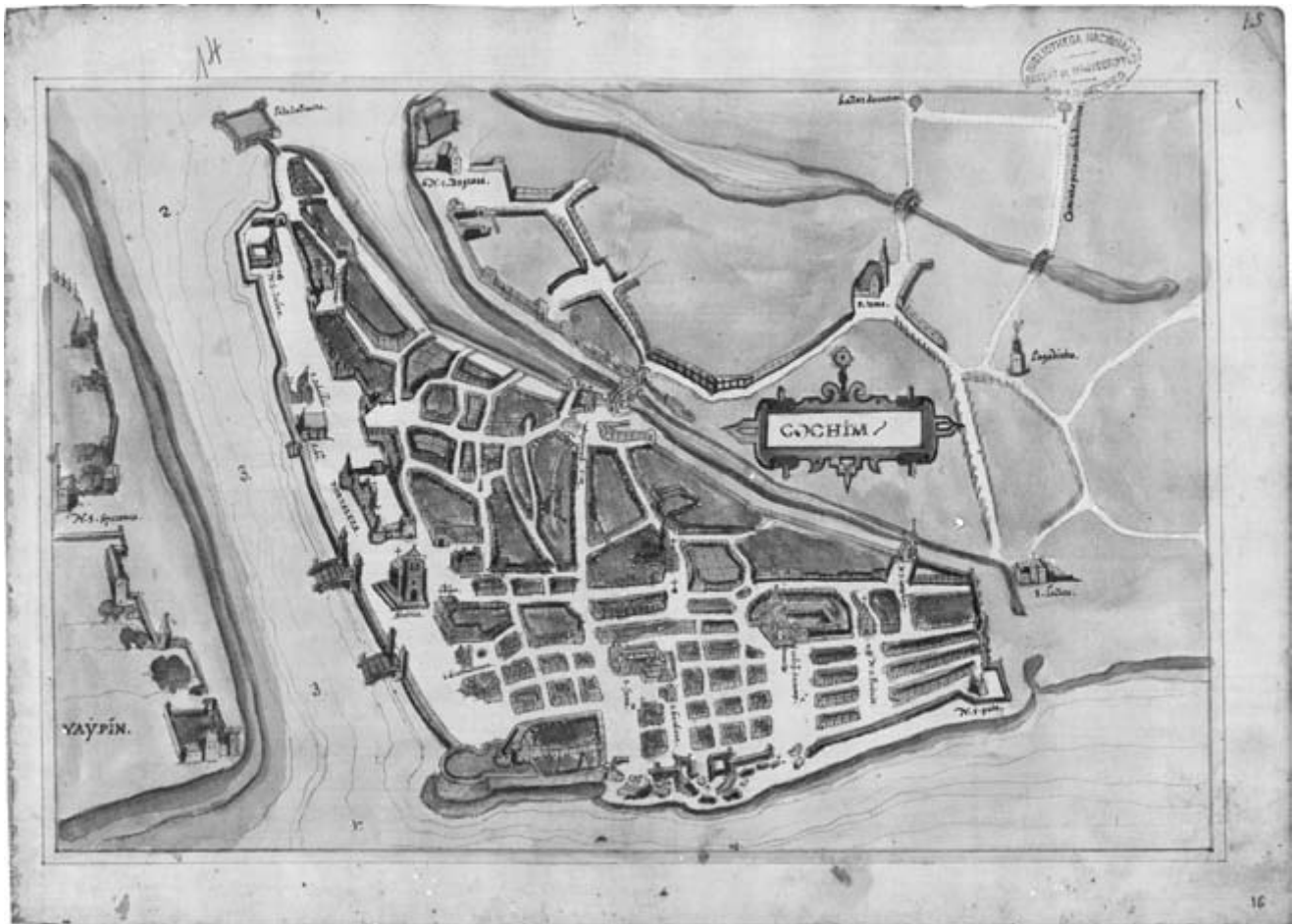


FIG. 38.15. VIEW OF COCHIM BY MANUEL GODINHO DE ERÉDIA. From Erédia's watercolored manuscript atlas "Plantas de praças das conquistas de Portugal . . .," 1610.

Size of the original: ca. 21.6 × 32.4 cm. Photograph courtesy of the Acervo da Fundação Biblioteca Nacional–Brasil.

ca. 1576, and 1580), which are quite similar in coastal design, although different in decoration. One of the sheets concerning the Far East is reproduced in plate 32. The map is completed by another sheet that includes the eastern coast of Asia and Japan.¹¹⁰ The outline of the Indochina Peninsula and the main islands—Sumatra, Borneo (though incomplete to the east), the Philippines north of Celebes, the Moluccas, and the small island of Timor—are perfectly identifiable. The northern coast of New Guinea is shown, without toponymy, but with a reference to its discovery by Magellan. Many new place-names are introduced, even in areas hardly traveled.

Three interrelated characteristics of Portuguese cartographic production on the Far East and the Indian Ocean may be summarized thus: a utilitarian purpose, navigation and commerce; the drawing of the outline of islands, forts, and urban centers that served as support for commerce; and a richness of toponymy of complex interpretation, for it was frequently based on local languages with corrupted translation.

The two main axes of regional trade were situated between Malacca and the Molucca Islands and between Malacca and China.¹¹¹ The small island of Timor, a base for the sandalwood trade, also appears on Portuguese maps from early on, at first showing only the northern coast.

As in the case of other areas of the globe, the portrayal of the trading centers of this area on maps did not have a linear progression. Until 1508–9, the years of the expedition of Diogo Lopes de Sequeira to Malacca and Sumatra,

110. The simplified design of this and other maps of the "Eastern Archipelago" made by Luís Filipe F. R. Thomaz, with the objective of reconstructing the coastlines and identifying the new toponymy that was being introduced, as well as the respective geographical origin, aids interpretation of this map. See note 111.

111. Luís Filipe F. R. Thomaz, "Da imagem da Insuúndia na cartografia," in *Diário de Notícias*, October 1994, *Rotas da terra e do mar*, fasc. 19 and 20, 394–421, and idem, "The Image of the Archipelago in Portuguese Cartography of the 16th and Early 17th Centuries," *Archipel* 49 (1995): 79–124.

Portuguese knowledge was limited to the Indian Ocean; some of the later maps, like those of Pedro Reinel from 1517 and that of Lopo Homem from 1519, maintained a conception of the area rooted in Ptolemy. With the expedition of Diogo Lopes de Sequeira and the establishment of the Portuguese in Malacca in 1511, thanks to the efforts of Afonso de Albuquerque, governor of India between 1509 and 1515, the control area was widened.

However, the expansion of the Portuguese dominion thereabouts would be interrupted by the change in politics of King Manuel. That monarch gave preference to the conquest of the Holy Land and in 1515 replaced Afonso de Albuquerque with a political ally, Lopo Soares de Albergaria. With João III, “liberal” politics were adopted, allowing navigation and commerce with restriction of the royal monopolies on some routes that the crown wanted to preserve.

Charts of Brazil

Brazil, a Portuguese territory until the nineteenth century, has the third-greatest number of Portuguese maps preserved (313). More than a half are works by the Teixeira family (appendix 38.6). João Teixeira Albernaz I stands out clearly, followed at a distance by his father, Luís Teixeira. João was responsible for the great number of maps between 1616 and 1642 (see fig. 38.11). The years between 1535 and 1570 have their main representatives in Diogo Homem, Gaspar Viegas, and Bartolomeu Velho; the production of maps of Brazil between 1580 and the beginning of the seventeenth century is owed fundamentally to Luís Teixeira.

Luís Teixeira drew the first atlas with local maps of the Brazilian coast (ca. 1586). The general chart (plate 33) was the first to show with relative rigor and detail the coast of the southern part of the American continent from the mouth of the Amazon River to the Strait of Magellan. It was also the first to show a division into *capitanias* (captaincies), an interesting image of the delegation of royal power. The lack of knowledge of the interior is shown by the extended parallels of latitude that separate the *capitanias*. In fact, the Portuguese occupied only a narrow coastal fringe of Brazil during the sixteenth and seventeenth centuries. The descendants of Luís Teixeira and, particularly, his son João Teixeira Albernaz I, completed the coastal reconaissance of Brazil, drawing several atlases (analyzed later).

Charts of the Caribbean and North America

Renaissance Portuguese cartography of Central and North America was neither abundant nor particularly innovative. Most of the sixty-one extant maps were made between 1537 and 1590 (see fig. 38.11), mainly by Fernão Vaz Dourado (appendix 38.7). One must not forget, however, that some of the Atlantic charts included in the

previous section on charts of the Mediterranean and the Atlantic included small parts of the American continent.

The first Portuguese to map North America as a whole was Manuel Godinho de Erédia in 1615. California began to interest cartographers when Cortés touched the southern part of the peninsula in 1524–26. Its shape was ignored until 1539–40, when Francisco de Ulloa explored it.¹¹² The first Portuguese cartographer to portray California was Bartolomeu Velho in 1560, followed by Sebastião Lopes in 1565, and later by Fernão Vaz Dourado in ten maps made between 1568 and 1580. João Teixeira Albernaz I was interested in this area around 1628.

The mapping of Central America and of the Antilles by the Portuguese began around 1537 with Gaspar Viegas.¹¹³ Following him were other cartographers such as João Afonso, about 1543; Bartolomeu Velho and João de Lisboa, about 1560; Diogo Homem, with works from 1561 and 1568; Bartolomeu Lasso, 1590; and João Teixeira Albernaz I, with maps dated from about 1628 and 1643. This part of America was one of the areas better mapped by the Portuguese, perhaps because of the antiquity of its discovery and its early occupation, despite the fact that on some maps there were fictitious islands, continuing a deep-rooted tradition in Portugal and in other countries.

In figure 38.16, the outline of Central America and the Antilles is shown as depicted on several maps by different authors (approximating as much as possible the scale of the maps). The outline of Central America and the Antilles is perfectly recognizable on all maps; the location of the equator and the Tropic of Cancer is quite correct; the extent of Central America and part of the peninsula of Florida is almost always exaggerated; imaginary islands proliferate, especially to the east of Florida; and certain “inventions” are repeated, such as a kind of gulf south of the Yucatan Peninsula.

No substantial progress appears to have been made between the first Portuguese map of this area, by Gaspar Viegas, from about 1537, and the last, by João Teixeira Albernaz I, from about 1643, which is probably explained by the fact that this region had not been occupied by the Portuguese and the sources of information were indirect. The good reputation of some cartographers did not extend to all areas that they mapped. The excellent maps of Brazil

112. The bibliography on the exploration, colonization, and cartography of America is extensive. A few works specifically mentioning Portuguese or Iberian cartography are *Cartografia histórica del encuentro de dos mundos* (Aguascalientes, Mexico: Instituto Nacional de Estadística, Geografía e Informática, 1992); Arthur Howard Robinson, “It Was the Mapmakers Who Really Discovered America,” *Cartographica* 29, no. 2 (1992): 31–36; and Max Justo Guedes, “Dos primórdios cartográficos nas Américas,” in *Diário de Notícias*, August 1994, *Rotas da terra e do mar*, fasc. 8 and 9, 186–206.

113. Here we use the expression “Central America,” although it became common only in the nineteenth century.

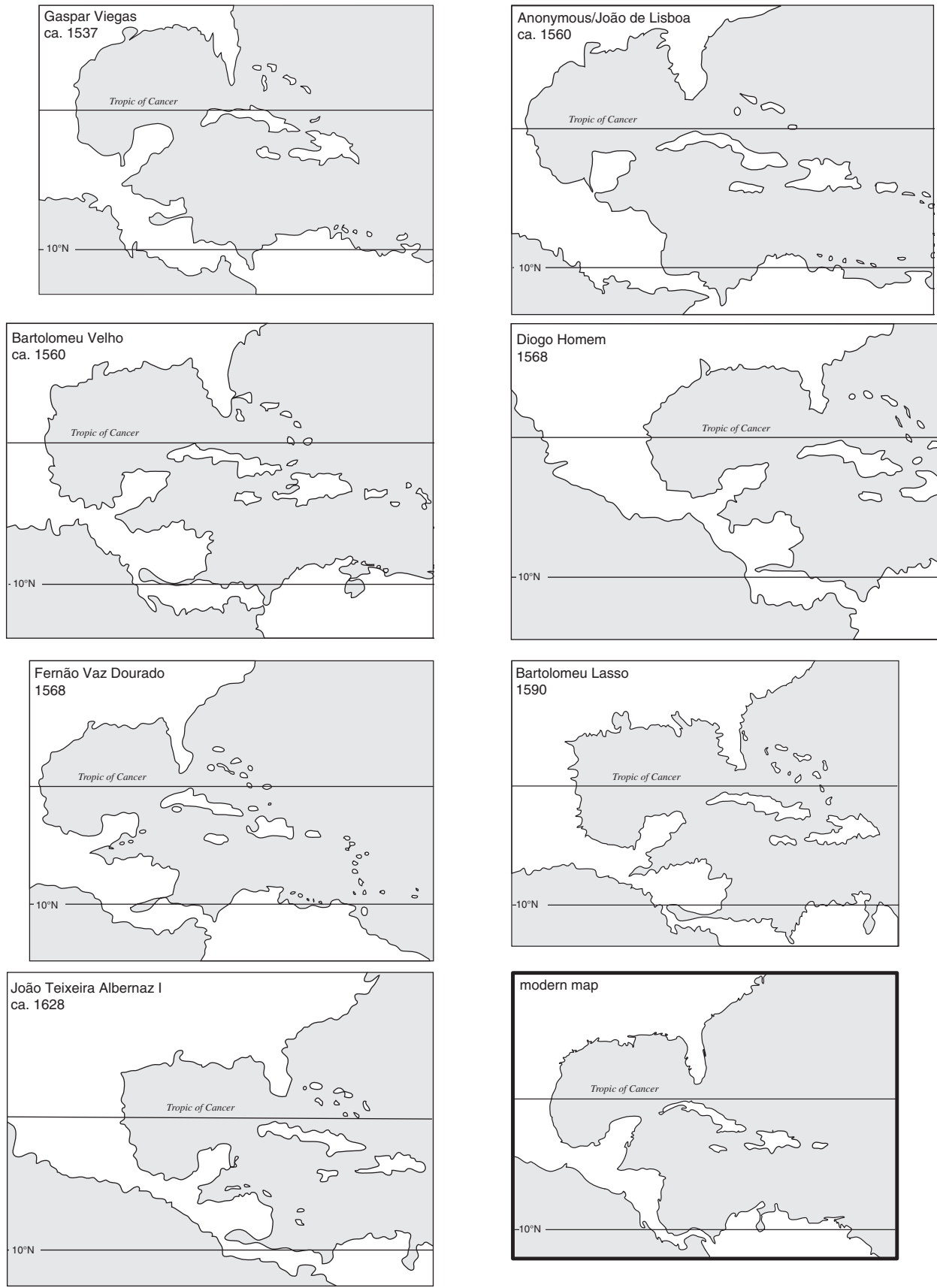


FIG. 38.16. COASTLINES AS SHOWN ON THE POR-
TUGUESE MAPS OF CENTRAL AMERICA AND THE AN-

TILLES, CA. 1537–1628, COMPARED WITH MODERN
COASTLINES.

by João Teixeira Albernaz I, for example, do not have an equivalent of such quality of Central and North America.

INSTITUTIONS AND POLITICAL POLICIES

The extent of the Portuguese maritime empire in the sixteenth century, along with its cartographic accomplishments, cannot be explained merely as the result of the personal momentum of its central figures or as the solitary work of its protagonists. The cartographers and their enormous output of maps were part of a collective historical process and generalized institutional and governmental policies. We will now briefly analyze some of the myths and truths associated with these agencies, with particular emphasis on cartography.

THE SO-CALLED SCHOOL OF SAGRES

In explaining the considerable momentum that Prince Henry gave to Portuguese navigation, historians of the Portuguese discoveries long believed that after the capture of Ceuta (1415), the prince gathered together a group of scholars in Sagres with the aim of making detailed logistical and scientific plans for future expeditions. We should note that this idea was completely foreign to authors contemporary with Henry. In contrast to his brothers, he was not extolled in the least for his intellectual gifts.¹¹⁴ It was not until much later, in the sixteenth century, that authors such as João de Barros and Damião de Góis began to attribute a scholarly character to the prince, mainly in the cosmographic sciences and as a reader of numerous authors from antiquity. Góis, in particular, wrote that Prince Henry had decided to withdraw to Sagres after the capture of Ceuta in order to better practice these virtues. There he built a villa, later named Vila do Infante, where he dedicated himself to a study of the movements of the stars and to sending out ships to explore the coast of Africa.¹¹⁵

We have seen (in a previous section) that Pacheco Pereira and Barros related that Prince Henry obtained the services of the Mallorcan cartographer Mestre Jácome to go to Sagres and teach his skills to the Portuguese. A century later, Samuel Purchas propagated this notion in his *Hakluyt Posthumus* (1625), adding to the record that one of Mestre Jácome's main charges was to "erect a Schoole of Marinership."¹¹⁶ Based on this record, Antoine Prévost, combining the traditions of Góis and Barros and Purchas, synthesized a history that became canonical for future generations, namely that the prince founded a school or academy in Sagres, headed by Mestre Jácome, where scholars and marine pilots worked together to plan future expeditions.¹¹⁷ Without entering into a detailed analysis of the various changes that the "School of Sagres" suffered in subsequent historical accounts, we may say that this idealized view of Prince Henry and the

origin of the discoveries came back to Portugal and reached its apogee in the work of the historian Oliveira Martins in 1891.¹¹⁸ Outside of Portugal, the works of Major and Beazley exerted considerable influence.¹¹⁹

Amid the mathematical, astronomical, nautical, and naval work attributed to the "School of Sagres," we wish to draw attention to its cartographic work. Foremost among the unfounded claims made for the school is that it saw the invention of nautical plane charts in which meridians and parallels were represented by perpendicular equidistant lines. This surprising claim appeared for the first time in *Hydrographie* (1643) by the French Jesuit Georges Fournier, who attributed the creation of a number of *cartes marines par lignes parallèles* to Prince Henry himself.¹²⁰ The same idea reappeared later in the writings of Jean Etienne Montucla and the Portuguese cosmographer Manuel Pimentel, who explicitly called them flat charts or "ordinary Portuguese charts."¹²¹ More prudently, the marine academic Stockler suggested that the prince's contribution, given the cartographic deficiencies of the times with regard to his purposes, was limited to suggesting to Mestre Jácome that he construct a new type of map "in which the degrees of the parallels are equal to those of the equator."¹²² As these charts implicitly as-

114. For a detailed analysis of the texts and chronicles in question, see Leite, *História dos descobrimentos*, 1:131–54.

115. Damião de Góis, *Chronica do príncipe Dom Ioam*, new ed. (Coimbra: Imprensa da Universidade, 1905), 14–16, and idem, *Fides, religio, moresque Aethiopiae* . . . (Louvain, 1540), Aiv. See also Barros, *Ásia*, 1:59–62 (*década* 1, bk. 1, chap. 14).

116. 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 MacLachlan and Sons, 1905–7), 2:11.

117. Abbé Prévost, *Histoire générale des voyages*, 25 vols. (La Haye: P. de Hondt, 1747–80), 1:4–5.

118. J. P. Oliveira Martins, *Os filhos de D. João I*, 7th ed. (1891; Lisbon: Edições S.L.T., 1947), 59–78.

119. Richard Henry Major, *The Life of Prince Henry of Portugal, Surnamed the Navigator, and Its Results* (London: A. Asher, 1868), and C. Raymond Beazley, *Prince Henry the Navigator: The Hero of Portugal and of Modern Discovery, 1394–1460 A.D.* (New York: G. P. Putnam's Sons, 1895), 160–67.

120. Georges Fournier, *Hydrographie contenant la theorie et la pratique de toutes les parties de la navigation* (Paris: Michel Soly, 1643), bk. 14, chap. 3, 505. Compare Luís Serrão Pimentel, *Prática da arte de navegar*, 2d ed. (Lisbon: Agência Geral do Ultramar, 1960), 59–78, and António Carvalho da Costa, *Compendio geographico* (Lisbon: J. Galvão, 1636), bk. 1, chap. 24.

121. Jean Etienne Montucla, *Histoire des mathématiques, dans laquelle on rend compte de leurs progrès depuis leur origine jusqu'à nos jours*, 2 vols. (Paris: C. A. Jombert, 1758), vol. 1, pt. 3, bk. 4, chap. 13, and Manuel Pimentel, *Arte de navegar de Manuel Pimentel*, ed. Armando Cortesão, Fernanda Aleixo, and Luís de Albuquerque (Lisbon: Junta de Investigações de Ultramar, 1969), pt. 2, chaps. 14–15.

122. Francisco de Borja Garção Stockler, *Ensaio Historico sobre a origem e progressos das Mathematicas em Portugal* (Paris: Na officina de P. N. Rougeron, 1819), 16–17, esp. 17.

sumed an equirectangular cylindrical projection, or *plate carrée*, some historians even termed it the “projecção do príncipe Henrique.”¹²³ More dubious still is Cardinal Saraiva’s claim that calculations of latitude and even of longitude were made in Sagres.¹²⁴ It is extremely unlikely that any of these innovations can be directly attributed to Prince Henry. Even Major, a devoted proponent of the “Henryesque myth,” urged caution toward exaggerations of this sort.¹²⁵ Recent studies have only confirmed that they are without foundation.¹²⁶

Near the beginning of the twentieth century, growing skepticism about the School of Sagres went beyond its supposed cartographic accomplishments and extended to the very existence of the school. Authors such as Mees, Leite, and Freitas—and, more recently, Albuquerque, Marques, and Randles—have been chipping away at the foundations of the myth little by little.¹²⁷ Some of the basic flaws that they have pointed out include the fact that Prince Henry came to settle more or less permanently in Sagres only during the final years of his life. There is no evidence that he had a scientific education, and it is doubtful that he had access to many of the classical authors that he is supposed to have read. There is no proof of any scholar’s having moved to Sagres to carry out work there in the service of the prince; it has already been noted that this was impossible in the case of Jafuda Cresques. In summary, the School of Sagres is not a historically documented institution.

There is nothing to suggest that Prince Henry did not surround himself with experienced men of the sea, gathering as much information about Africa and the Atlantic as possible as the discovery of those territories unfolded. But to extend this to belief in a School of Sagres, as even some recent studies have done, is a different matter.¹²⁸ Teixeira da Mota proposed that the term “School of Sagres” be retained in a symbolic sense to refer to the body of experience and practical knowledge that marine pilots passed on to one other as they confronted unknown horizons.¹²⁹ This could, in fact, be an elegant method for reconciling a long historical tradition with recent findings, allowing only that, if this route is taken, one should speak rather of the “School of Lagos.”

THE CASA DA ÍNDIA AND THE ARMAZÉNS DA GUINÉ E ÍNDIA

The nonexistence of the School of Sagres does not mean that Portuguese discoveries were made without the backing of an institutional infrastructure. Shortly after the 1415 conquest of Ceuta, trade and overseas administration were already being regulated by the Casa de Ceuta in Lagos. As discoveries progressed, this institution grew and changed its name. Around the middle of the fifteenth century, historical documents mention a Casa da Guiné,

succeeded by a Casa da Mina. After the return of Vasco da Gama from his voyage, these were merged into the Casa da Guiné, Mina e Índias, or, as it was simply called, the Casa da Índia.¹³⁰ By then, it had moved to Lisbon and was situated on the Tejo (Tagus) River in Ribeira das Naus, where King Manuel had also moved his residence. It was for this reason that the area came to be known as Terreiro do Paço (Palace Square).¹³¹

A concentrated legislative effort was made to define the characteristics and features of the Casa da Índia. One of the most notable was the *regimento* decreed by King Manuel in July 1509, which laid down the king’s most important instructions regarding the operation of the Casa. The Casa played an important regulatory role in the trade and administrative activities of the new empire. The *regimento* also mentions the Armazém da Guiné e

123. Pereira, “Importancia da cartographia portugueza,” 444.

124. Francisco de S. Luiz (Cardinal Saraiva), “Memoria em que se colligem algumas noticias sobre os progressos da marinha portugueza até os principios do seculo XVI,” in *Obras completas do cardeal Saraiva*, 10 vols. (Lisbon: Imprensa Nacional, 1872–83), 5:349–96, esp. 380.

125. Major, *Life of Prince Henry*, 54.

126. See Luís de Albuquerque, *Dúvidas e certezas na história dos descobrimentos portugueses*, 2 vols. (Lisbon: Vega, 1990–91), 1:29–38, and Cortesão, *Cartografia portuguesa antiga*, 123–40.

127. See Jules Mees, “Henri le navigateur et l’Académie portugaise de Sagres,” *Boletim da Sociedade de Geographia de Lisboa* 21 (1903): 33–51; Leite, *História dos descobrimentos*, 1:160–88; Jordão Apolinário de Freitas, *A vila e fortaleza de Sagres nos séculos XV a XVIII* (Coimbra: Instituto para a Alta Cultura, 1938); Albuquerque, *Dúvidas e certezas*, 1:15–27; Marques, “Realidades e mitos,” 347–61; and W. G. L. Randles, “The Alleged Nautical School Founded in the Fifteenth Century at Sagres by Prince Henry of Portugal, Called the ‘Navigator,’” *Imago Mundi* 45 (1993): 20–28.

128. Among the recent non-Portuguese studies in which credit has still been given to the “School of Sagres” are Francisco Valero Olmos, “Monarquías ibéricas, descubrimientos geográficos y antigüedad clásica: La *Cosmografía* de Ptolomeo en la Valencia de mediados del siglo XV,” in *Congreso Internacional de Historia, el Tratado de Torde-sillas y su Epoca*, 3 vols. (Valladolid: Junta de Castilla y León, 1995), 1:625–29, esp. 626; Rebecca Stefoff, *The British Library Companion to Maps and Mapmaking* (London: British Library, 1995), 149; and Paul Zumthor, *La medida del mundo: Representación del espacio en la Edad Media*, trans. Alicia Martorell (Madrid: Cátedra, 1994), 329. On another level, it is interesting to note that, even in Portugal, the myth of the “School of Sagres” is frequently used as bait for tourists in guidebooks and informational brochures on the Algarve.

129. A. Teixeira da Mota, “A ‘Escola de Sagres,’” in *Sagres, a escola e os navios*, ed. Roger Chapelet et al. (Lisbon: Edições Culturais de Marinha, 1984), 9–29, in English, “The School of Sagres,” in *Sagres, the School and the Ships*, ed. Roger Chapelet et al. (Lisbon: Edições Culturais de Marinha, 1985), 9–29.

130. José F. Ferreira Martins, “Casa da Índia,” *Publicações*, 4:365–84, and Gustavo Couto, *História da antiga Casa da Índia em Lisboa* (Lisbon: Libanio da Silva, 1932).

131. Gaspar Correia, *Lendas da Índia*, 4 vols. (1858–66; reprinted, intro. M. Lopes de Almeida, Porto: Lello & Irmão, 1975), 1:529.

Índia.¹³² In spite of what has often been claimed, it was the Armazém and not the Casa that took on functions related to the nautical sciences, including map production.¹³³ We will therefore turn our attention to the Armazém and its cartographic activities.

A variety of documents indicate that the Armazém da Guiné already existed as a separate entity in the early years of the reign of King João II (1481–95). A letter dated October 1500, written by Manuel, mentions Diogo Marques as the *recebedor* (receiver) for the Armazém between 1480 and 1487. In addition to containing details relating to provisions and weapons, this letter states that a number of nautical instruments were kept at the Armazém, but at no point does it mention maps.¹³⁴ Not much later, between 1494 and 1497, we find the post of *recebedor* filled by the famous navigator Bartolomeu Dias.¹³⁵ From this Teixeira da Mota concludes that by that time the Armazém already was serving as a hydrographic repository. According to this theory, the master world map (*carta padrão de el-Rei*) that served as the nautical cartographic basis for the discoveries was produced there.¹³⁶ Nevertheless, a few more years had to pass before evidence of such activity was to appear.

The first place that a Portuguese document made explicit reference to the Armazém as the site of cartographic work and a depository of maps was a letter dated January 1514 from Manuel to Jorge de Vasconcellos, *provedor* of the Armazém from 1501.¹³⁷ However, there is other indirect evidence that allows us to conclude that there was a certain amount of centralized cartographic activity during those years. The most significant is a royal charter dated 13 November 1504 that prohibited the makers of Portuguese nautical charts from depicting the African coast beyond the Congo (Zaire) River. It was Jorge de Vasconcellos himself who was charged with carrying out the censorship.¹³⁸ We can infer from this that by the beginning of the sixteenth century, the Armazém was carrying out cartographic duties.

We saw earlier that by the fifteenth century, the Portuguese royal court was already concerned with updating nautical charts to keep pace with discoveries. When the cartographic task was delegated to the Armazém, this practice not only continued in full force but also was systematically standardized. Several documents from the first three decades of the sixteenth century show that before any new expedition set out for the Orient, marine pilots were issued two nautical charts. They were obliged to return these, with their notations and revisions, when the expedition returned to Lisbon.¹³⁹ There is little doubt that this new knowledge was then applied to a master world map. In fact, this is confirmed in a *padrão de navegar* about which Lopo Homem wrote, “The charts that the king’s Armazém requires for its fleets and voyages to India are made in agreement with such a *padrão*.”¹⁴⁰ Un-

fortunately, not a single copy of such cartographic prototypes has been preserved. They were likely lost in the fires that followed the 1755 Lisbon earthquake. However, it is possible to deduce an idea of what the master world map must have been like from the famous Cantino map. Authors who have studied it agree that it was an illegal copy of the master map kept at the Armazéns.¹⁴¹

In 1547, the office of *cosmógrafo-mor* (grand cosmographer) was created. Its first occupant was Pedro Nunes, who held the post until his death. The position was closely associated with the activities of the Armazém from its creation. A *regimento do cosmógrafo-mor* dating from 1592, which might have been firmly based on a similar lost 1559 document, allows us not only to see the close cooperation that linked the new position with that of *provedor* of the Armazéns but also indirectly provides insight into the organization and varied functions of the Armazéns in the sixteenth century.¹⁴² In broad outline, the *regimento* clearly highlights its central role in Portuguese hydrography. It is thus little surprise that the working methods of the Ar-

132. Damião Peres, ed., *Regimento das Casaz das Índias e Mina* (Coimbra: Faculdade de Letras da Universidade de Coimbra, Instituto de Estudos Historicos Dr. Antonio de Vasconcelos, 1947), 11.

133. On the differences and distinct attributions of the Casa and the Armazéns, see Francisco Paulo Mendes da Luz, “Dois organismos da administração ultramarina no século XV: A Casa da Índia e os Armazéns da Guiné, Mina e Índias,” in *A viagem de Fernão de Magalhães e a questão das Molucas*, ed. A. Teixeira da Mota (Lisbon: Junta de Investigações Científicas do Ultramar, 1975), 91–105. For an example of the fact that confusion still exists between the two entities, see Steffoff, *British Library Companion*, 80.

134. Anselmo Braamcamp Freire, “Cartas de quitação del Rei D. Manuel,” *Arquivo Historico Portuguez* 1 (1903): 94–96, 163–68, 200–208, 240–48, 276–88, 328, 356–68, 398–408, and 447–48, esp. 401–2.

135. Braamcamp Freire, “Cartas de quitação,” 360. Compare Francisco Paulo Mendes da Luz, “Bartolomeu Dias e os Armazéns da Guiné, Mina e Índias,” in *Bartolomeu Dias*, 3:625–33.

136. A. Teixeira da Mota, “Some Notes on the Organization of Hydrographical Services in Portugal before the Beginning of the Nineteenth Century,” *Imago Mundi* 28 (1976): 51–60, esp. 52.

137. Viterbo, *Trabalhos náuticos dos portugueses*, 1:87.

138. Coelho, *Alguns documentos*, 139.

139. See the documents transcribed by Francisco Leite de Faria and A. Teixeira da Mota in *Novidades náuticas e ultramarinas: Numa informação dada em Veneza em 1517* (Lisbon: Junta de Investigações Científicas do Ultramar, 1977), 51, 68–69.

140. BNF (MS Coll. des Cinq Cents de Colbert, 298, fols. 6–8). The document was published by Luís de Matos as *Les Portugais en France au XVI^e siècle: Études et documents* ([Coimbra]: Por Ordem da Universidade, 1952), 318–22.

141. An idea expressed by Leite in “O mais antigo mapa do Brasil,” and later taken up in *PMC*, 1:7–13. Since then it has been repeated by virtually all scholars who have studied the map, most lately by Milano in *La carta del Cantino*.

142. See A. Teixeira da Mota, *Os regimentos do cosmógrafo-mor de 1559 e 1592 e as origens do ensino náutico em Portugal* (Lisbon: Junta de Investigações do Ultramar, 1969).

mazéns were to inspire the other European maritime powers, Spain, England, and the Netherlands.

THE POLICY OF SILENCE

In the modern historiography of Portugal, a *política do sigilo* (policy of silence) has become a veritable theory that is used to explain the gaps in documentation relating to the discoveries. The policy can be defined as the systematic and deliberate exercise of geographical, commercial, technical, and scientific secrecy with the aim of providing the best possible advantage to expansionism in the face of foreign pressures. Its practical results were that, among other measures, knowledge acquired on voyages of discovery was not disseminated, foreigners were excluded from preparing and participating in such voyages, documents and accounts were suppressed or falsified, and scientists who left Portugal to go to other countries were persecuted.

By the nineteenth century, authors such as Cardinal Saraiva were asserting that a large share of the documents relating to the Portuguese expansion had disappeared because of overt and deliberate policies.¹⁴³ However, it was Cortesão who raised the inferences drawn from a scattered set of references on the secrecy of the discoveries to the level of a historical theory.¹⁴⁴ Here we will examine the effects of the policy of silence only on cartography.

The derivation of the theory of the policy of silence in the cartographic sphere is based on a concrete, documented event, as well as a number of deductions. The historically documented event was the issuance by King Manuel of the royal charter of 13 November 1504.¹⁴⁵ The charter prohibited the making of globes of the earth (*po-mas*) and, with respect to nautical charts, prohibited the depiction of the African coast beyond the Congo (Zaire) River. King Manuel presented this measure as a continuation of a previous decree of a prohibition that had extended only as far as the São Tomé and Príncipe Islands. The mandate also applied to the “sea charts of Guinee.” This does not seem to have been a restriction that can be generalized to the whole of Portuguese cartography.

One might think that with these measures Manuel was attempting to protect the secret of the *carreira da Índia* (route to India). However, various portrayals that showed the sea route to India in detail had already been circulating throughout Europe for more than ten years. These included the world map of Henricus Martellus Germanus, the small printed world map of Francesco Rosselli based on Martellus, and the globe of Martin Behaim. It is true that these cartographic products were not characterized by any great accuracy in their depictions of the African coast. It has even been argued that they were based on misinformation provided by the Portuguese as part of the policy of silence.¹⁴⁶ However, this was not the case with

the Cantino world map, a work of remarkable precision, which had already been in the possession of Ercole d’Este, the duke of Ferrara, for several years.¹⁴⁷

The idea that the route to India was kept secret is also contradicted by the Declaration of Obedience offered to Pope Innocent VIII by Vasco Fernandes de Lucena on behalf of the Portuguese crown in December 1485. In this speech, published at the time in Rome and in a second edition in 1492, the Portuguese authorities publicly announced the latest voyages along the African coast to all Christendom and reaffirmed their conviction, at that time not yet verified experimentally, that the Atlantic and Indian Oceans connected.¹⁴⁸ It was João II who reaffirmed Portuguese domination of the route to India, thereby restoring Portugal’s claim to any future voyages and trade that might derive from the route. How can we then say that his successor tried to hide from prying eyes what was already known throughout Europe?

Amaral has recently called attention to the difference between signed and anonymous Portuguese charts. From this he makes the logical deduction that only the former were legally valid.¹⁴⁹ This would explain, for example,

143. Francisco de S. Luiz (Cardinal Saraiva), “Índice chronologico das navegações viagens, descobrimentos, e conquistas dos portuguezes nos paizes ultramarinos desde o principio do seculo XV,” in *Obras completas do cardeal Saraiva*, 10 vols. (Lisbon: Imprensa Nacional, 1872–83), 5:45–159, esp. 48.

144. The policy of silence was initially theorized by Jaime Cortesão in an article titled “Do sigilo nacional sobre os descobrimentos,” *Lusitania: Revista de Estudos Portuguezes* 1 (1924): 54–81. It was developed in his later works, one of the most important of which was *A política de sigilo nos descobrimentos: Nos tempos do Infante D. Henrique e de D. João II* (Lisbon: Comissão Executiva das Comemorações do Quinto Centenário da Morte do Infante D. Henrique, 1960). Numerous authors later declared themselves against Cortesão’s thesis, including Leite, in *História dos descobrimentos*, 1:411–49; Alvaro Júlio da Costa Pimpão, in *A historiografia oficial e o sigilo sobre os descobrimentos* (Lisbon, 1938); Damião Peres, in “Política de sigilo,” in *História da expansão portuguesa no mundo*, 3 vols., ed. António Baião, Hernâni Cidade, and Manuel Múrias (Lisbon: Editorial Ática, 1937–40), 2:17–21; and Albuquerque, in *Dúvidas e certezas*, 1:57–65. For an overall appreciation of the concept of silence in Portuguese historiography, see Francisco Contento Domingues, “A política de sigilo e as navegações portuguesas no Atlântico,” *Boletim do Instituto Histórico da Ilha Terceira* 45 (1987): 189–220, and idem, “Colombo e a política de sigilo na historiografia portuguesa,” *Mare Liberum* 1 (1990): 105–16.

145. Coelho, *Alguns documentos*, 139.

146. See Cortesão, *Os descobrimentos portugueses*, 2:529–30, and George H. Kimble, “Portuguese Policy and Its Influence on Fifteenth Century Cartography,” *Geographical Review* 23 (1933): 653–59, esp. 655–56.

147. On the history of the Cantino planisphere, product of an act of espionage, see Milano, *La carta del Cantino*, 96–98.

148. Vasco Fernandes de Lucena, *Oratio de obedientia ad Innocentium VIII* (Rome, 1485); in English, *The Obedience of a King of Portugal*, ed. and trans. Francis Millet Rogers (Minneapolis: University of Minnesota Press, 1958), 47–48.

149. Amaral, *Pedro Reinel*, 179–84.

why fifteenth-century Portuguese charts such as those of Pedro Reinel and Jorge de Aguiar do not extend beyond the latitude of the Zaire River. However, it is difficult to see any use for such limitations if the Portuguese rulers were fully aware that numerous cartographers in other countries were at the same time showing on their maps far more southerly newly discovered territories. The case of Martin Behaim is an illustrative example. Originally from Nuremberg, Behaim went to Portugal in 1484, where he married, served the king personally as an armed knight, and was authorized to undertake a voyage to Guinea. In 1490, he returned to his home city of Nuremberg and constructed a globe of the earth that showed a circumnavigable Africa. This did not prevent him from later returning to Portugal, nor did he suffer any punishment for “betraying” the geographical “secret.” In fact, he lived in peace with the court until his death in 1507.¹⁵⁰ While the globe reflected neither Portuguese knowledge nor Behaim’s personal experience in its depiction of Africa, it clearly shows the possibility of reaching India by the maritime route.

Domingues has proposed a hypothesis to explain these seeming contradictions. He suggests that the charter of 1504 was issued shortly following the discovery of Brazil, and the latitudinal limit of the Zaire River was therefore an indirect way to keep Portuguese cartographers from making explicit reference to Brazil and was imposed in order to preserve Portugal’s rights in the New World as granted by the Treaty of Tordesillas (1494).¹⁵¹ The policy of silence should therefore be understood not as a forceful imposition by the Portuguese monarchy, but rather as a specific measure to fit the circumstances, whose object was to protect the country’s scientific advantages and territorial claims. It comes as no surprise, for example, that both Portuguese and Castilians deliberately distorted their representations of Brazil to include the Rio de la Plata and Amazon estuaries within their respective spheres of influence.¹⁵² Around the mid-eighteenth century, Portugal employed the same strategy to give it an advantage in negotiations for the Treaty of Madrid (1750).¹⁵³ Nevertheless, this does not mean that a rigid overall policy of silence was in place throughout; rather specific, temporary measures were taken that related to diplomatic transactions.

Applying the theory to a different part of the era, some have advanced the argument that cartographic secrecy already existed in Portugal in the times of Prince Henry. One of the main pieces of evidence for this idea is the *mappa-mundi* of Fra Mauro (ca. 1459). It should be recognized that although the author of the map claimed to have used contemporary Portuguese charts, the shape of the coast of Africa shows knowledge of proven evidence only as far as Cabo Rosso. In explaining this discrepancy between Portuguese exploration and cartographic representation, some authors have concluded that the charts provided to

Fra Mauro had been deliberately censored, omitting the latest discoveries.¹⁵⁴ However, there are other possible explanations that do not involve a secrecy theory.

First of all, nautical charts and *mappaemundi* generally had different functions, styles, technical characteristics, and scales. It would be useless, therefore, to try to find a literal correspondence between the *mappamundi* of Fra Mauro and the Portuguese charts. Moreover, the *mappa-mundi* preserved in Venice is only a copy of Fra Mauro’s original map, which has been lost. We know from existing documents that Fra Mauro was working on his *mappamundi* in 1448, and he must have finished it the same year or soon after.¹⁵⁵ Ten years later, when Portugal made the final payment of 30 ducats for the map, Fra Mauro and his colleagues were finishing another *mappamundi*, which scholars assume was essentially the same as the first. While one of the copies was sent to Portugal, and has since been lost, the other remained in Murano. It is this map that can be seen today in Venice. Any examination of Fra Mauro’s *mappamundi* must therefore take into account that it is a copy of an older cartographic model. It is therefore no wonder that Fra Mauro’s map represents accurate knowledge only as far as the latitudes reached by Álvaro Fernandes in 1445–46.

It is true that there still are many unsolved problems regarding Portuguese discoveries to which gaps in the historical record and the current state of research do not permit solution. However, this does not justify systematically resorting to the policy of silence as the sole explanation. In terms of methodology, it would be a mistake to consider the absence of documentation as proof of the secrecy theory, because then any one of a number of reasonably logical hypotheses would be sufficient to confirm any merely suspicious or admissible event. One example is that of historians who attributed the absence of fifteenth-century Portuguese nautical charts to the policy of silence before the existence of maps proving the contrary had be-

150. For a biography of Behaim, see Ravenstein, *Martin Behaim*, 5–56.

151. Domingues, “A política de sigilo,” 213. See also Inácio Guerreiro, “A cartografia dos descobrimentos portugueses e a ‘política de sigilo,’” in *As rotas oceânicas (sécs. XV–XVII): Quartas Jornadas de História Ibero-Americana*, ed. Maria da Graça Mateus Ventura (Lisbon: Edições Colibri, 1999), 189–212, esp. 200–201.

152. A. Teixeira da Mota, *Reflexos do Tratado de Tordesillas na cartografia náutica do século XVI* (Coimbra: Junta de Investigações do Ultramar, 1973).

153. Max Justo Guedes, “A cartografia da delimitação das fronteiras no século XVIII,” in *Cartografia e diplomacia no Brasil do século XVIII* (Lisbon: CNCDP, 1997), 10–38, and Jaime Cortesão, *História do Brasil nos velhos mapas*, 2 vols. (Rio de Janeiro: Ministério das Relações Exteriores, Instituto Rio Branco, 1965), 2:149–273.

154. See, for example, Kimble, “Portuguese Policy,” 656–59.

155. On the documentation related to the world map of Fra Mauro, the groundbreaking work of Placido Zurla, *Il mappamondo di Fra Mauro Camaldolese* (Venice, 1806), remains extremely useful.

come known. It is sensible to be cautious in offering solutions to sparsely documented problems in history. This maxim also applies to those on the opposite side of the present argument, who deny the existence of any secrecy. The 1504 charter ordering cartographic secrecy was exercised at the beginning of the sixteenth century. It would be logical to suppose that similar measures already existed in the time of João II, for example, regarding the application to cartography of measurement of latitudes. The theory that a certain confidence in cartographic material was already in place in Prince Henry's time cannot be discounted, although firm evidence does not exist to prove it. What would be most difficult to prove is that the Portuguese crown imposed a strict overall structural policy of silence during the fifteenth and sixteenth centuries. All evidence suggests that the policy was rather a matter of imposing specific temporary measures associated with diplomatic dealings or a logical reticence to divulge technical advantages or rights acquired in competition with other countries. If future research should demonstrate that an overall policy of silence did exist and did apply to cartography, the least that could be said is that it was completely ineffective.

THE PLANO DA ÍNDIA

The voyage of Vasco da Gama to India (1497–99), rounding Africa by the Cape of Good Hope, was the result of a long process of planning on the part of the Portuguese crown known as the *plano da Índia*. This involved gathering geographic information and processing it in order to form a systematic plan of action that allowed the Portuguese to think of India as the objective of their Atlantic navigation. Dating the emergence of this idea has been the source of controversy. Some authors, such as Bensaúde and Cortesão, believed that Prince Henry had the intention of reaching India from the beginning.¹⁵⁶ Others, such as Leite, Godinho, and Albuquerque, thought this objective came to be part of the Portuguese overseas strategy at a later date.¹⁵⁷ Because the problem has an implicit cartographic dimension, not sufficiently understood, we propose here a brief reexamination of the question.

The first author to explicitly attribute the aim of reaching India to Prince Henry was Damião de Góis in 1567.¹⁵⁸ However, this was a rather late account, and the defenders of the “plano henriquino” have emphasized the importance of other documents contemporaneous with the prince in which India is mentioned indirectly as an objective of the Portuguese navigations. These documents are a chapter of the “Crónica dos feitos da Guiné” by Zurara; various passages of the papal bulls *Romanus pontifex* (1455) and *Inter coetera* (1456); an episode of the *Relação* of Diogo Gomes; and the epitaph of friar Gonçalo da Sousa (1469).

In all these cases, the defenders of the “plano henriquino” interpret the word “India” in a restrictive manner, as referring to the Deccan Peninsula. It is well known, however, that in the later Middle Ages considerable ambiguity and confusion existed in this regard. The most common concept of India after the travels of Marco Polo divided the territory in three parts: Greater India or India on this side of the Ganges, Lesser India or India on the far side of the Ganges, and Middle India or Ethiopic India. This last region was considered Asiatic because it lay beyond the Nile, although it encompassed the territories of eastern Africa. In general, we might simplify by saying that in the late Middle Ages the term “India” denoted the region of the shores of the Indian Ocean. Thus, there is no reason to conclude that when Zurara, speaking of the voyage of Antão Gonçalves, announced the wish of the prince to obtain information not only about the African coast but also about the Indies and the land of Prester John,¹⁵⁹ he was necessarily making reference to a restrictive concept of Asiatic India. In fact, in Portuguese cosmographic circles, Prester John was always placed in Africa.¹⁶⁰

A brief analysis of the other documents mentioned leads to similar conclusions. In the epitaph of friar Gonçalo de Sousa, for example, Prince Henry was praised because he discovered “the entire coast of Guinea down to the Indians.”¹⁶¹ Because the navigations of Henry reached only as far as the latitudes of Sierra Leone, one may deduce that the Indians referred to were probably in Guinea or, if we accept the idea that the dominions of Prester John of India covered the interior of Africa to the Atlantic, of an Ethiopian type. The same conclusion may be drawn from the *Relação* of Diogo Gomes, in which he referred to a certain Jacob, “an Indian whom the lord Prince sent with us so that when we arrived in India he might serve as our interpreter.”¹⁶² If we keep in mind that

156. Joaquim Bensaúde, *Origine du plan des Indes* (Coimbra: Imprensa da Universidade, 1929); idem, *A cruzada do Infante D. Henrique* (Lisbon: Divisão de Publicações e Biblioteca, Agência Geral das Colónias, 1942); Jaime Cortesão, *Teoria geral dos descobrimentos portugueses: A geografia e a economia da Restauração* (Lisbon: Seara Nova, 1940); idem, *A política de sigilo nos descobrimentos*; and idem, *Os descobrimentos portugueses*, 1:227–41 and 2:331–43.

157. Leite, *História dos descobrimentos*, 1:67–79, 96–122, 442–49; Vitorino Magalhães Godinho, “O plano henriquino e o âmbito dos desígnios do Infante,” in *Ensaios*, 2d ed., 4 vols. (Lisbon: Sá da Costa, 1978), 2:115–26; and Albuquerque, *Dúvidas e certezas*, 1:39–50.

158. Góis, *Chronica*, 14–16. For a discussion on this point in other Portuguese texts from the fifteenth and sixteenth centuries, see Leite, *História dos descobrimentos*, 1:97–122.

159. Zurara, *Crónica*, 41–43 (chap. 16).

160. See Godinho, “O plano henriquino,” and Francesc Relatño, *La emergencia de Africa como continente: Un nuevo mundo a partir del viejo* (Lleida, [Spain]: Edicions de la Universitat de Lleida, 2000), 81–102.

161. Leite, *História dos descobrimentos*, 2:420.

162. Diogo Gomes, “A Relação dos Descobrimentos da Guiné e das Ilhas,” in *Documentos sobre a Expansão portuguesa*, 3 vols., ed.

Gomes put the linguistic abilities of Jacob to the test in the interior of Africa, in the region of the Gambia River, it seems improbable that he was a person of Asiatic origin. It is most likely that Jacob was Ethiopian, perhaps one of the members of the group headed by the Abyssinian Jorge, which visited Lisbon in 1452.¹⁶³

Another argument habitually put forward by the defenders of the “plano henriquino” is related to the papal bull *Romanus pontifex*, signed by Nicholas V on 8 January 1455, in which he praised the efforts of Prince Henry to continue the voyages *usque ad Indos*.¹⁶⁴ Apparently one could conclude that the pontiff made reference here to the objective of reaching India. However, we should recall that at this time the Senegal River was generally thought to be a western branch of the Nile.¹⁶⁵ The bull itself states that, arriving in Guinea, the Portuguese discovered a *magnus flumen Nili reputatus*, beyond which, as we have indicated, the imagined geography of the period placed the territories of Ethiopia and the dominions of Prester John. Thus, it is plausible, once again, that the “Indians” of the bull may have been Africans instead of Asians. In fact, the text later states that the “Indians” adore the name of Christ, so it would be advantageous to contact them and mobilize them in the struggle against the Saracens and other enemies of the faith. In the mind of the prince, these enemies of the faith were limited basically to the Moors of Morocco or the northern part of Africa. It is not clear, then, how an alliance with the Nestorian descendents of Saint Thomas could be useful. It would be more logical to think of the Abyssinian subjects of Prester John, who, furthermore, recently had been received by Nicholas V when a delegation had traveled to Rome in 1450.¹⁶⁶ From the bull that the pope wrote a few years later, and from its confirmation by his successor Calixtus III (1456) in similar language,¹⁶⁷ the most reasonable conclusion is that Prince Henry aspired to reach Ethiopian India.

In a recent study, Guedes rejected this thesis and said he continues to think, along the lines of Cortesão, that the “Indians” of the papal bull *Romanus pontifex* could not be other than Asians.¹⁶⁸ His study is of particular interest here because, in addition to arguments already known, Guedes introduces cartographic evidence not previously given enough consideration. Guedes underlines the importance of the Catalan Atlas (ca. 1375) as a reflection of the geographic imagination of the period. An inscription from this work, written close to the indicator for Ormuz, attracts his attention: “This city is called Hormes (Ormuz), which is the beginning of the Indies.”¹⁶⁹ At the other extreme, slightly beyond the region of Bengal, an inscription announces “Finis Indie.” With these elements as his principal argument, Guedes concludes that from the last quarter of the fourteenth century, the concept of “India” in the European geographical imagination was always associated with the area to the east of the Persian

Gulf. Therefore, the “Indians” of the papal bull previously referred to must necessarily have been Asiatic. However, the concept of India in the Catalan Atlas or the text of Niccolò de Conti was far from hegemonic in the European cosmographic context. Even Vasco da Gama still referred to Ethiopia and the region of the Nile as the “Lower Indies.”¹⁷⁰

Yet more important, even granting that this was the dominant concept in the papal court, the bulls alluded to reaching the “Indians,” not “India” or the “Indies.” This distinction is important because, whatever the extent of India as a territory, throughout the entire fifteenth century the Ethiopians and the subjects of Prester John generally continued to be called “Indians.”¹⁷¹ Therefore, not only is it possible that the bulls made reference to African “Indians,” but, as we have previously noted, that interpretation is the most logical solution to our problem. In other words, it was undoubtedly Prince Henry who opened the “Guinea route,” creating a dynamic that later led to the discovery of the “India route.”

For the defenders of the “plano henriquino,” the genius of Prince Henry was not limited to his supposed objective of reaching India toward the East. Additionally, and as an integral part of the same *plano*, they have attributed to him the intention of reaching India by sailing toward the West.

Vitorino Magalhães Godinho (Lisbon: Editorial Gleba, 1956), 1:69–115, esp. 86.

163. *Monumenta Henricina*, 12:319–22, esp. 321 (doc. 154).

164. This famous bull has been reproduced on numerous occasions. See, for example, Coelho, *Alguns documentos*, 14–20; Marques, *Descobrimientos portugueses*, 1:503–8 (doc. 401); and *Monumenta Henricina*, 12:71–79 (doc. 36).

165. The idea of a double Nile, with one branch to the east and another to the west, is effectively represented in almost all contemporary maps, whether they are world maps or harbor charts. This idea is also confirmed in the texts, as evidenced, for example, by numerous passages of Zurara’s *Crónica*, such as 112–18, 122–24, 136–38, and 142–45 (chaps. 59–60, 63, 71, and 75). Pacheco Pereira was particularly explicit about this conception in Henry’s circle: “And when the Sanaga River was discovered and reconnoitered, the Infante [Prince Henry] said that it was the branch of the Nile that passes through Ethiopia to the west, and what he said was true”; see *Esmeraldo*, bk. 1, chap. 26 (p. 605 in Carvalho ed.).

166. Charles-Martial de Witte, “Une ambassade éthiopienne à Rome en 1450,” *Orientalia Christiana Periodica* 22 (1956): 286–98; *Monumenta Henricina*, 10:226–7 (doc. 165) and 288–93 (docs. 220–21).

167. Coelho, *Alguns documentos*, 20–22; *Monumenta Henricina*, 12:286–88 (doc. 137); and Marques, *Descobrimientos portugueses*, 1:535–37 (doc. 420).

168. Max Justo Guedes, “O plano da Índia seria do Infante, ou de D. João II?” *Revista de Ciências Históricas* 9 (1994): 79–88.

169. Guedes, “O plano da Índia,” 86. The Catalan Atlas is preserved in the BNF, MS. Esp., 30.

170. Alvaro Velho, *Diário da viagem de Vasco da Gama*, 2 vols., ed. Damião Peres (Pôrto: Livraria Civilização, 1945), 1:101.

171. Well into the sixteenth century, Góis continues to call the Abyssinians “Indi.” See Damião de Góis, *Legatio magni indorum imperatoris* (Anvers: Ioan Grapheus, 1532), 11–12.

This thesis suffers from being weakly supported in the existing documentation, although this scarcity of proof is often justified by appealing to the policy of silence. The only contemporaneous report that gives credence to this idea is the *Relação* of Diogo Gomes, in which we read: "Prince Henry, wishing to know the distant regions of the western ocean, in case there might be islands or land beyond that described by Ptolemy, sent caravels to look for lands."¹⁷² However, as Leite has pointed out, this passage is probably an interpolation by Behaim.¹⁷³ As to the evidence that supports the "plano occidental," the voyages of Diogo de Teive to the west of the Azores stand out, but not even in this case is it sufficiently shown that the objective and the real extent of these voyages were those advanced by Cortesão.¹⁷⁴ Once again, it was after the death of the prince that the greater number of supposed pre-Columbian voyages to the west were recorded. This does not mean that the Portuguese had reached American shores before Cabral. The Treaty of Tordesillas seems to indicate that João II was convinced of the existence of lands in the southern part of the West, but at the same time it seems unlikely that they had already been discovered, for if that had been the case, it would have been advantageous to declare the previous Portuguese discovery before Castile and all the Christian world.

There are numerous pieces of evidence that show that under João II there was already a clear and systematic *plano da Índia*. The different actions that make this clear are the continuing exploration of the coast of Africa by means of far-reaching expeditions (those of Diogo Cão and Bartolomeu Dias); the collection of information about the Indian region by means of land expeditions (those of Friar António de Lisboa and Pêro de Montarroi as well as Pero da Covilhã and Afonso de Paiva); the attempts to penetrate the interior of Africa in order to gather information about Prester John (those of João de Aveiro as well as Gonçalo Eanes and Pero de Évora); the nautical research and perfection of the calculations of latitude (those of Mestre Rodrigo, José Vizinho, Abraão Zaccuto, and Duarte Pacheco Pereira); and the attempts and proposals to explore the Atlantic toward the West (those of Fernão Domingues do Arco as well as Fernão Dulmo and João Afonso). It is true that many of these lines of action were initiated by Prince Henry and continued by Prince Pedro and King Afonso V, but as Thomaz has pointed out, it was mainly João II who integrated this overseas policy into a modern and coherent project.¹⁷⁵

It would be possible to think that, in addition to the reports of sailors and ambassadors, the Portuguese rulers might have had recourse to the global vision offered by cartography in conceiving the *plano da Índia*. Some have suggested that Prince Henry was able to predict the connection between the Indian and Atlantic Oceans by means of the Medici atlas.¹⁷⁶ Yet there is no documentary evi-

dence to support this hypothesis that, moreover, is improbable because of the late date that recent studies have assigned to that work.¹⁷⁷ Other images of the world to which the prince might have had access were the maps mentioned by António Galvão. Allegedly not only the Cape of Good Hope, but even the Straits of Magellan were represented there, but the existence of those maps as they are described is very doubtful.¹⁷⁸ In general, we have no evidence that the prince consulted any of the medieval world maps known today. Furthermore, the encircling ocean that generally appears in these works in no way implies that the mapmakers had any idea of possible circumnavigation.¹⁷⁹ The only world map in which, beyond this medieval convention, there appears to be a clear idea of the possibility of rounding Africa and continuing to India is the work of Fra Mauro. However, assuming that this map arrived in Portugal, it could have been of service only to Afonso V or, even more probably, to João II. In a recent study, Marques vehemently insisted that this was the case, but the evidence that he advanced in favor of this hypothesis (Covilhã and Münzer) is far from conclusive.¹⁸⁰

Besides the medieval world maps with their symbolic ocean, there are other cartographic works predating the first voyage of Vasco da Gama in which the viability of a maritime route to India is shown. Such are the world maps of Henricus Martellus and Francesco Rosselli and

172. Gomes, "Relação," 1:104.

173. Leite, *História dos descobrimentos*, 1:145–50, 352–53.

174. Jaime Cortesão and A. Teixeira da Mota, *El viaje de Diogo de Teive colon y los Portugueses* (Valladolid: Casa-Museo de Colón, Seminario de Historia de América de la Universidad, 1975), translation of *A viagem de Diogo de Teive*. Cf. Leite, *História dos descobrimentos*, 1:339–73.

175. Luís Filipe F. R. Thomaz, "O Projecto Imperial Joanino (tentativa de interpretação global da política) ultra marine de D. João II," in *Bartolomeu Dias*, 1:81–98. Cf. Alfredo Pinheiro Marques, *Vida e obra do "Príncipe Perfeito" Dom João II* (Figueira da Foz: Centro de Estudos do Mar, 1997). See also A. Fontoura da Costa, "As portas da Índia em 1484," *Anais do Club Militar Naval* 66 (1935): 3–62, and A. Teixeira da Mota, "A viagem de Bartolomeu Dias e as concepções geopolíticas de D. João II," *Boletim da Sociedade de Geografia de Lisboa* 76 (1958): 297–322.

176. Maria Alice Magno Corte-Real, "As Índias Orientais no plano henriquino," in *Congresso Internacional de História dos Descobrimientos: Actas* (Lisbon: Comissão Executiva das Comemorações do V Centenário da Morte do Infante D. Henrique, 1961), 3:93–96.

177. Although the calendar of the world map contained in the Medici atlas indicates a date of 1351, most scholars affirm that there were later revisions. For a brief discussion on the question and proposed dating, see Tony Campbell, "Portolan Charts from the Late Thirteenth Century to 1500," in *HC* 1:371–463, esp. 448.

178. See p. 983, note 53, in this chapter.

179. See Francesc Relano, "The Idea of Africa within Myth and Reality: Cosmographic Discourse and Cartographic Science in the Late Middle Ages and Early Modern Europe" (Ph.D. diss., European University Institute, Florence, 1997), 142–55.

180. Marques, *A maldição*, 151–202. The testimony of Covilhã and Münzer is discussed earlier in this chapter.

also the globe of Behaim. This once again confirms the preponderant role of Italy as the “theoretical storehouse” of the vision of the world seen in Portugal.¹⁸¹ It is not clear, however, that in relation to the *plano da Índia* the ideas of Italian origin exercised a greater influence on the Portuguese rulers than the information and indications gathered firsthand by their own subjects. When Vasco Fernandes de Lucena erroneously announced, before Pope Innocent VIII and all of Christendom, the conviction that the Portuguese crown had reached the “Asiatic” nations of southeast Africa (1458), the Portuguese diplomat and jurist ambiguously cited the ideas of the “most competent geographers” without specifying who they were.¹⁸² In any case, whether with the aid of cartography or not, we have the impression that when King Manuel ordered the voyage of Vasco da Gama, Portugal knew beforehand the route to follow to reach India. The route taken and the brief period of time required for the voyage, the surprising choice of Vasco da Gama as commander, and the eminently diplomatic character of the expedition seem to indicate that there was a plan that had been premeditated at length.

PORTUGUESE CARTOGRAPHY OF ITS OVERSEAS ROUTES AND TERRITORIES

The conquest of Ceuta in 1415 historically has been accepted as the beginning of the Portuguese discoveries. Between that year and 1460, when Prince Henry died and the Gulf of Guiné was reached, explorations were limited to the coast of the African continent. In the following two decades, a delay in general exploration took place, partly because of the crown’s decision, in 1468, to offer the merchant Fernão Gomes a monopoly on African coast commerce once he had reached the rate of discovering one hundred leagues of the coast per year.

After 1474, with João II as regent and then as king, the *plano da Índia* became stronger. However, it was in 1479, when the Tratado de Alcáçovas between Portugal and Castela was signed, and after the pope’s ratification of the treaty in 1481, that the Portuguese ownership of the Azores and the Madeira Islands was recognized, as well as the exclusiveness of the exploitations of the lands and seas to the south of the Canary Islands.

Some of the more important events of this progress south were the voyages of Diogo Cão to the mouth of the Zaire (1482) and to Cape Cross (1486), the voyage of Bartolomeu Dias toward the Cape of Good Hope, reached in 1488; in the same year, the departure to Ethiopia of Pero da Covilhã and Afonso de Paiva, who crossed the Mediterranean and the Red Sea; the departure of Vasco da Gama for India, reached in 1498; and, finally, the expedition of Pedro Álvares Cabral to India, reaching Brazil in 1500.

The first Portuguese discoveries in America belonged to Pero de Barcelos and João Fernandes Lavrador, who in 1495 arrived in Greenland; in the year 1500, Gaspar Corte-Real found Terra Nova. We do not have any proof of his presence there, on a second voyage, when he was lost; his brother Miguel looked for him without success.

In South America the Portuguese explorations along the coast started in 1501, shortly after Cabral discovered the Terra de Vera Cruz (Brazil). The surviving charts give us some information about the explorations of both margins of the Atlantic Ocean, the Indian Ocean, and the Indonesian and Asiatic coasts.

From the earliest maritime surveys carried out south of the part of the Moroccan coast that was traditionally navigated, the Portuguese mapped the new maritime routes and the coasts they explored.¹⁸³ On the classic navigational chart, the coasts were situated according to measurements of distance and bearing, with indications of latitudinal position. On this general type of drawing, the most significant coastal points (islands, capes, river mouths, and shallows) were marked. The pilots used these maps to record the route followed and also to choose their course from among the routes already known. As mentioned earlier, the Armazém da Índia regularly collected the maps, corrected and augmented by the pilots, and maintained an updated standard map from which partial copies were distributed to the pilots at the beginning of their voyages.

The fundamental navigational chart was complemented by drawings of great detail relative to the most important coastal points. Two types can be distinguished: the coastal views of nautical interest and the plans of fortresses and cities produced mainly for military purposes. The first type, intended for pilots, represented the *conhecenças*—the natural features or buildings that allowed pilots to identify from afar coastal places that were significant, either for the danger they presented (shallows) or for the shelter they provided—and the detailed nautical features that allowed boats to approach and anchor safely (depth of the sea, tides, and sheltered coves). These drawings normally accompanied a written report, or *roteiro*. The second type of chart, representing fortresses

181. The expression “theoretical storehouse” is taken from Thomas Goldstein, “Geography in Fifteenth-Century Florence,” in *Merchants & Scholars: Essays in the History of Exploration and Trade*, ed. John Parker (Minneapolis: University of Minnesota Press, 1965), 9–32, esp. 18.

182. Lucena, *Obedience of a King*, 47–48.

183. In a letter of 22 October 1443, King Afonso V said that Prince Henry had had the land lying beyond Cape Bojador explored, and that he had ordered a navigational chart to be made from it; see Luís de Albuquerque, Maria Emília Maderia Santos, and Maria Luísa Esteves, et al., *Portugaliae monumenta Africana* (Lisbon: CNCDP, Imprensa Nacional–Casa da Moeda, 1993–), 1:23.

and coastal features, was of interest to central or local government officials. Portraying places of special strategic or commercial importance, they showed the position or location, architectural structures, and military equipment of the strongholds on the coasts. Some represented a place before the arrival of the Portuguese, others at a certain time of Portuguese domination; still others collected information on enemy or allied territories. The two basic types of chart were not always distinct, because many views of coastal places existed in which the nautical aspects were associated with military or commercial functions. The main point of some views was to record a military occurrence (assault or naval battle) or a disaster such as a shipwreck.

Cartographic representations of local areas frequently included details observed from various viewpoints. The outline of the coast was generally drawn in plan view, the profile of the terrestrial relief as if it were observed from a boat situated at a short distance, and the houses and battlements as if they were seen from an imaginary high point in oblique view. We even have an indication of a relief model of a place of special interest, dated from 1549.¹⁸⁴ These mapping techniques were not innovative, because they had already been practiced, for example, in Italy, from at least the fourteenth century.¹⁸⁵ The sources used by the Portuguese cartographers included maps made directly by them *pelo natural*, as they would say, and they also may have included earlier views or plans, perhaps chiefly of Italian origin for the Moroccan ports, but very possibly of Arab, Persian, Indian, Javanese, or Chinese origin for those in Asian seas.¹⁸⁶

The cartography of the century and a half discussed here frames the very rapid development and the defensive consolidation of the eastern Portuguese empire. However, it only touches on the beginnings of the Portuguese colonial presence in Brazil, which began in the sixteenth century but developed mainly in the eighteenth. As for Africa, it is necessary to distinguish between mapping its coastlines and having knowledge of its *sertão* (interior). The coast continued to be the object of nautical surveys until the beginning of the seventeenth century. But only interior regions of special political, religious, and economic interest—the Congo, Abyssinia (Ethiopia), and Monomotapa (parts of Mozambique, mostly Zambezia)—became the objects of cartographic reconnaissance.

Portuguese overseas cartographic production during the sixteenth century and the first half of the seventeenth will now be presented in four sections: the cartography of the route to India at the time of the first discoveries and the later reconnaissances, the phases of mapping the harbors and fortresses of the state of India, terrestrial cartography in Africa, and the origins of the cartography of Brazil.

THE WAY TO INDIA

The “Esmeraldo de situ orbis,” by Duarte Pacheco Pereira, is the oldest known cartographic work regarding the Portuguese overseas territories. Unfortunately, the original codex and the maps that illustrated it have disappeared, with only their written description preserved in the part of the text surviving from eighteenth-century copies.¹⁸⁷ The author of this treatise on cosmography and navigation was a famous military officer and sailor with wide personal experience exploring the African coast, the western Atlantic, and India. The preserved part of the codex was written from 1505 to 1508. Originally it included a world map and eighteen maps or views of coastal places from the Strait of Gibraltar to the Cape of Good Hope (fig. 38.17).

The description of the maps and views included in the text allows us to reconstruct their characteristics.¹⁸⁸ Twelve drawings related to the Moroccan coast. They were views, probably oblique, of the different ports, combining urban and nautical aspects, and sometimes a cartographic sketch of the surrounding coast. The five drawings from the latitude of Cape Verde to the southern tip of Africa seem to have been more varied, including a navigational chart with rhumb lines representing Cape Verde and the archipelago of the same name. Comparison of the textual descriptions of the “Esmeraldo” with the oldest engravings of these places (in general, those of the *Civitates orbis terrarum*, by Georg Braun and Frans Hogen-

184. King João III ordered architect Miguel de Arruda, who was then working to improve the fortresses of Morocco, to bring him an earthenware model (*modelo em barro*) of a fort, with accurate dimensions; see the letter of 15 May 1549, quoted in Henrique Lopes de Mendonça, *Notas sobre alguns engenheiros nas praças de Africa* (Lisbon: Imprensa Nacional, 1922), 10.

185. P. D. A. Harvey, *The History of Topographical Maps: Symbols, Pictures and Surveys* (London: Thames and Hudson, 1980), 66–83, and Helen M. Wallis and Arthur Howard Robinson, eds., *Cartographical Innovations: An International Handbook of Mapping Terms to 1900* (Tring, Eng.: Map Collector Publications in association with the International Cartographic Association, 1987).

186. Suzanne Daveau, “A propósito das ‘pinturas’ do litoral marroquino incluídas no *Esmeraldo de situ orbis*,” *Mare Liberum* 18–19 (1999–2000): 79–132. See also pp. 1013 and 1015, notes 196 and 215, in this chapter.

187. The “Esmeraldo de situ orbis” was not published until the end of the nineteenth century; see Duarte Pacheco Pereira, *Esmeraldo de situ orbis*, ed. Raphael Eduardo de Azevedo Bato (Lisbon: Imprensa Nacional, 1892). There is an annotated English-language translation, Duarte Pacheco Pereira, *Esmeraldo de situ orbis*, ed. and trans. George H. T. Kimble (London: Hakluyt Society, 1937), and the critical edition already mentioned, by Carvalho (1991). There are several important studies on the author and the work by Carvalho. The only description of the manuscript, truncated but still with the cartographic illustration, appears in Diogo Barbosa Machado, *Bibliotheca lusitana*, 4 vols. (1741; Coimbra: Atlântida Editora, 1965–67), 1:738–41.

188. Daveau, “A propósito das ‘pinturas.’”

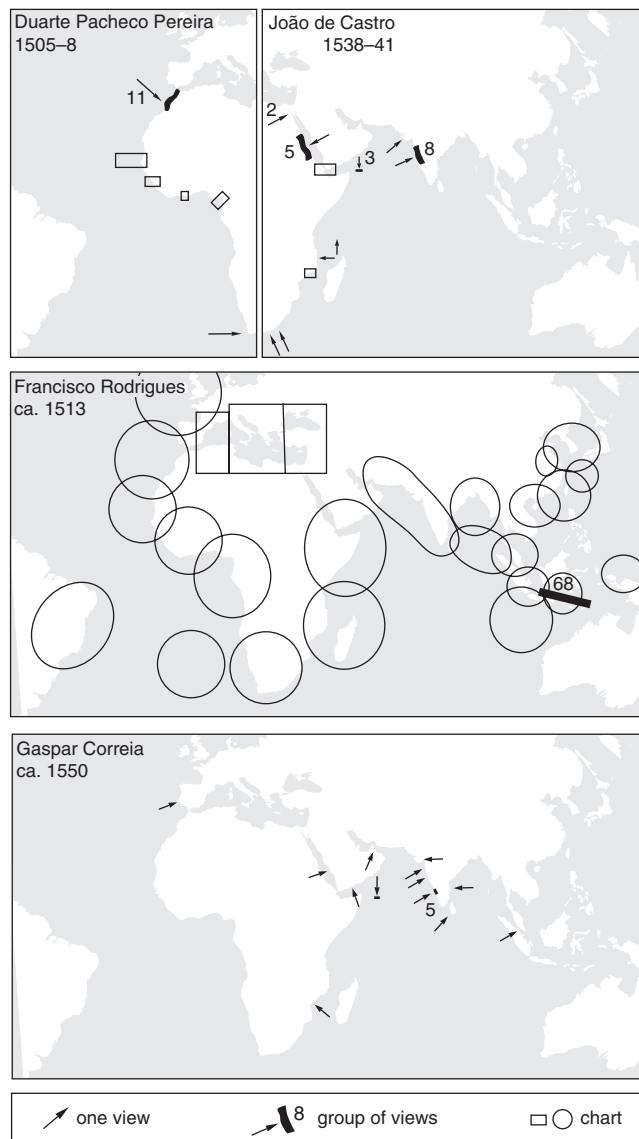


FIG. 38.17. LOCATIONS OF THE MAPS IN FOUR PORTUGUESE SOURCES. Shown are the locations of maps, views, and charts in the “*Esmeraldo de situ orbis*” (1505–8), by Duarte Pacheco Pereira (although only the written description is preserved); those in the *roteiros* of João de Castro (1538–41); those by Francisco Rodrigues (ca. 1513, preserved in the “*Livro de Francisco Rodrigues*”); and those in the “*Lendas da Índia*” (ca. 1550), by Gaspar Correia.

berg, 1572) reveals, in some cases, strong affinities that suggest the possible use of common prototypes.

The maps or views originally included in the “*Esmeraldo*” were chosen by Duarte Pacheco Pereira from the graphic documentation then available, but they were not drawn by him. Also, certain drawings of places in northern Morocco (Ceuta, Alcácer Ceguer, Tangiers, and Arzila) seem, from the descriptions of what was included in them, to have dated from before the text (1505), while

others (drawings of Larache and Anifé) probably resulted from the surveys of 1507 by Duarte de Armas on the Moroccan coast.¹⁸⁹ As for the drawing of the fortress of Santa Cruz de Água de Narba (at Agadir, in southern Morocco), it was clearly later than the construction of the fortress in 1505. Relative to the Castle of São Jorge da Mina (on the Gulf of Guinea), the author warned, “We placed it here painted from reality according to [the way] it is done nowadays,”¹⁹⁰ suggesting that, as much as possible, he had used recent documents that were arriving in Lisbon as he wrote.

At this time, detailed cartographic surveys were carried out by the Portuguese on the Moroccan coast because of their military projects. The personnel, among whom Duarte de Armas and Francisco Dansilho stand out,¹⁹¹ were the same as those who worked contemporarily on the mapping and fortification of the terrestrial border between Portugal and Spain. In some of the drawings of Portuguese fortresses included in the *Civitates orbis terrarum* (1572), one can still recognize the characteristic style for drawing the rocks that Duarte de Armas had used in his “*Livro das fortalezas*” of 1509.¹⁹²

Most of book 4 and all of book 5 of the “*Esmeraldo*” were lost by the eighteenth century. Those books dealt with the part of the maritime route from southern Africa to India and also with “all of sub-Egyptian Ethiopia and Arabia Felix with Persia and the multitude of things of the very opulent kingdoms of India.”¹⁹³ Fleets following Vasco da Gama’s first voyage of discovery (1497) sailed from Lisbon in 1500, in 1501–2 (with reconnaissance by Diogo Dias from the eastern coast of Africa to the entrance of the Red Sea), in 1503 (with Duarte Pacheco Pereira participating), and again in 1505 and 1506, and the results were probably included in the “*Esmeraldo*.”

A new phase of cartographic survey corresponds to the short period in which Afonso de Albuquerque governed India. Albuquerque conducted vast expeditions to locate

189. Damião de Góis, *Crónica do felicíssimo rei D. Manuel* [1566], new ed., 4 vols. (Coimbra: Ordem da Universidade, 1949–55), 1:27.

190. Pacheco Pereira, *Esmeraldo*, bk. 2, chap. 5 (p. 646 in Carvalho ed.).

191. Duarte de Armas, *Livro das fortalezas: Fac-simile do MS. 159 da Casa Forte do Arquivo Nacional da Torre do Tombo*, intro. Manuel da Silva Castelo Branco (Lisbon: Arquivo Nacional da Torre do Tombo, Edições INAPA, 1990; 2d rev. ed., 1997). Francisco Dansilho was a master of works of Biscayne origin. He went to Morocco to work on the fortification of the fortresses there. In 1513, he portrayed the city of Azamor, which the duke of Bragança had just conquered (Daveau, “A propósito das ‘pinturas,’” 122).

192. In the introduction to Armas, *Livro das fortalezas*, Manuel da Silva Castelo Branco establishes that the mapping of the fortresses (views and plans) was completed in 1509. Some of the drawings are discussed and reproduced in *PMC*, 1:71–75, pls. 28–33.

193. Pacheco Pereira, *Esmeraldo*, bk. 4, chap. 6 (p. 699 in Carvalho ed.).

strategic places that would allow the Portuguese to control commercial traffic throughout the Indian Ocean.¹⁹⁴ Having conquered Malacca in August 1511, Albuquerque found there “a large chart of a Javanese pilot. . . . The best thing I have ever seen.” This map combined information resulting from the recent Portuguese navigations in the Atlantic, such as “the Cape of Good Hope, Portugal and the land of Brazil,” with the representation of “the Red Sea and the Sea of Persia, the Clove islands, the navigation of the Chinese and the *Gores* [inhabitants of Formosa and the Ryuku Archipelago], with their rhumbs and direct routes followed by the ships, and the hinterland, and how the kingdoms border on each other.”¹⁹⁵ This map synthesized European and Eastern knowledge and had the added interest of giving nautical information as well as referring to terrestrial chorography. It constitutes proof that a cartographic practice had developed in Indonesia before the arrival of the Portuguese and is also evidence of the speed with which the cartographers from all countries assimilated the new information.¹⁹⁶

Unfortunately, this precious map was lost in the shipwreck of the *Flor de la Mar* off the Sumatran coast in December 1511. In April 1512, Albuquerque was able to send the king a copy of only the eastern part of the map, already translated from Javanese into Portuguese by Francisco Rodrigues. In his letter to the king, he insisted again on the value of the map: “Your Highness can see where the Chinese and *Gores* come from, and the course your ships must take to the Clove Islands, and where the gold mines lie, and the islands of Java and Banda, of nutmeg and mace, and the land of the King of Siam, and also the end of the navigation of the Chinese, the direction it takes, and how they do not navigate farther.”¹⁹⁷

At the same time, Albuquerque sent a fleet to discover the Spice Islands. One of the pilots was the same Francisco Rodrigues who had copied and translated the Javanese map. He brought from this voyage a series of sixty-eight panoramic drawings representing in profile the northern façade of the chain of islands connecting Alor to Java (see fig. 38.17). These representations are naturalistic, without any effort to schematize; they show essentially the profile of the mountain ridges, drawn as the boat advanced, decorated with many picturesque details of the houses of the inhabitants and the flora (fig. 38.18).

These are the oldest Portuguese-authored coastal views that are known. They were preserved because they were sent to Lisbon in 1514 and included in a codex, the so-called “*Livro de Francisco Rodrigues*,” which contains, in addition, twenty-six navigational charts.¹⁹⁸ Of these, fifteen are based on existing nautical maps; three are of the Mediterranean, and twelve concern the maritime route to India. More original are six maps of the Gulf of

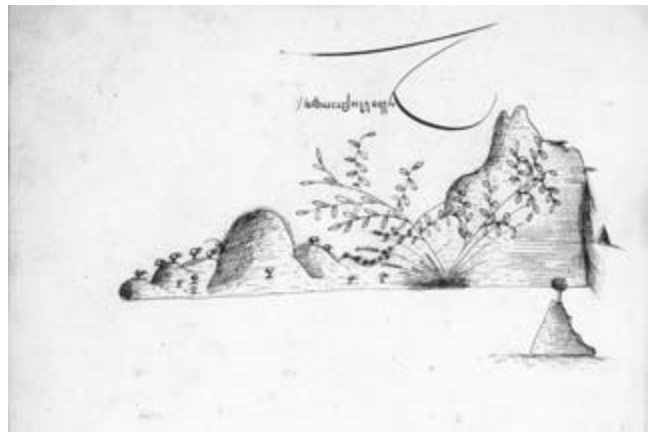


FIG. 38.18. PROFILE OF SUKUR ISLAND BY FRANCISCO RODRIGUES, CA. 1513.

Photograph courtesy of the Bibliothèque de l'Assemblée Nationale, Paris (MS. 1248).

Bengal and of part of Indonesia, only recently navigated by the Portuguese, and five rough sketches of the maritime routes of the Far East to China. It is very possible that these last five, at least, may have been derived from the aforementioned map by the Javanese pilot.

In 1513, Albuquerque, who was exploring the Red Sea, sent Francisco Rodrigues in a caravel commanded by João Gomes toward the Dahlak Archipelago and Mesewa (Eritrea). On 4 December 1513, Albuquerque wrote to the king: “He brought me Dahlak painted, islands and sea, the best that he could. I send Your Highness this copy.”¹⁹⁹ It was probably this same map that João de Barros saw later in Lisbon, with “the islands arranged as they lay.”²⁰⁰ Nothing more is known about the cartographer Francisco Rodrigues, except that he was young, that he was probably from Portugal (he compared a castle situated at the gate of the Red Sea with the one in Palmela, the seat of the Order of Santiago, situated south of Lisbon), and that he went to China in 1519.

194. For the historical context of the work of Afonso de Albuquerque, see Luís Filipe F. R. Thomaz, *De Ceuta a Timor* (Linda a Velha: DIFEL, 1994), 189–206.

195. *PMC*, 1:80.

196. On the cartography of the East at the time of Afonso de Albuquerque, see especially his correspondence, *Cartas de Afonso de Albuquerque*, 7 vols. (Lisbon: Academia Real das Sciencias de Lisboa, 1884–1935), and Armando Cortesão, ed. and trans., *The Suma Oriental of Tomé Pires . . . and the Book of Francisco Rodrigues . . .*, 2 vols. (London: Hakluyt Society, 1944), in Portuguese, *A Suma Oriental de Tomé Pires, e o Livro de Francisco Rodrigues* (Coimbra: Por ordem da Universidade, 1978).

197. Albuquerque, *Cartas*, 1:64–65, and *PMC*, 1:80.

198. On Rodrigues and his maps, see *PMC*, 1:79–84, pls. 34–36.

199. Albuquerque, *Cartas*, 1:221.

200. Barros, *Asia*, 2:366–69 (*década* 2, bk. 8, chap. 2).

Information on the cartographic activity during the short crucial period in which Albuquerque conquered Malacca, Goa, and Ormuz is summarized in a few passages of his correspondence with King Manuel and in the codex by Francisco Rodrigues. This scant documentation confirms that at this time, Portuguese cartography took advantage of previous Asian cartography, although practically no trace of it remains.²⁰¹ One question remains: Is the representation of the small islands in profile of Portuguese or Asian origin?²⁰² This type of representation appears on the maps by Francisco Rodrigues, and the information he gathered during his voyage is the raw material of these profiles, but it is not known if he invented the style or if he adapted or copied it from local influences.

Albuquerque immediately sent to the king all of the cartographic documentation that he had been able to obtain on the places he had explored. In April 1512, with the fragment translated from the Javanese map, he sent to Lisbon plans of two places where he had sought to establish himself: “a map [*padram*] of the island of Goa [and another] of Diu and of the island of the canal of Cambay, that they promised to you for the fortress and security of your factories.”²⁰³ The correspondence between the court of Lisbon and its highest representatives in the far-off overseas territories was slow and difficult. At a time when it was illusory to expect the reply to a question or the confirmation that an order had been carried out in less than a year and a half, cartographic documentation became an important element of information. The maps showed the routes followed by active local commerce, which the Portuguese intended to control, and detailed plans of the ports and fortresses gave life and concrete presence to the exotic Asian lands, which had suddenly become dependencies of the king of a small country from the other end of the Old World.

Several documents indicate that many cartographic representations of places in the East were already in Portugal at the time of King Manuel. According to João de Castro, “The King . . . commanded Jorge Reinel, master of nautical charts, to make for the King’s information a chart [*padrão*] with the leagues from place to place as far as Suez, and from there all the land as far as Alexandria.”²⁰⁴ In the inventory made at the time of the king’s death (1521) was “a cotton cloth with the painting of Aden.”²⁰⁵ Even more significant are the many Flemish tapestries made for the king to glorify his recent victories, such as those in Sofala, Mozambique, Quiloa, Mombasa, Brava, Socotra, and Ormuz. A sample description is this: “Sofala from reality, and the ships anchored with their flags and as they go ashore in the boats and set the monument [*padrão*].”²⁰⁶

Some ceremonial maps have come down to us, drawn on parchment and beautifully illuminated. The chart of the Indian Ocean attributed to Jorge Reinel, considered

to be from 1510, gives a good account of the western Indian Ocean, but it recognizes in a legend that “the very populous and noble and rich city of Malacca . . . is still neither known nor has it been discovered.”²⁰⁷ As for the chart from about 1517 attributed to Pedro Reinel, it already incorporates the surveys from the time of Afonso de Albuquerque, including the Red Sea, the Gulf of Bengal, and the China Sea; situating the peninsula of Malacca on the correct latitude; and representing several islands of Indonesia.²⁰⁸

Of very different style and intention is the magnificently illuminated collection of maps attributed to Lopo Homem and Pedro and Jorge Reinel and dated from 1519.²⁰⁹ It attempts a synthesis not only of the places effectively reconnoitered, but of all the physiognomy of the world. It thus constitutes a hybrid containing Ptolemaic ideas mixed with the results of recent voyages. On the world map signed by Lopo Homem, the Atlantic and the Indian Ocean are closed to the south by an enormous continental mass that connects Brazil to the peninsula of Malacca; on the other hand, on the pages dedicated to Indonesia and China, there appears a “Magnus Golfus Chinarum,” delimited to the east by a schematic coast in a north-south direction.

Afonso de Albuquerque died in 1515, and his immediate successor as governor of India was Lopo Soares de Albergaria. This change was perhaps reflected in a lesser interest in cartographic surveys in the East. For at least a

201. Gerald R. Tibbetts, “The Role of Charts in Islamic Navigation in the Indian Ocean,” and Joseph E. Schwartzberg’s chapters on South Asian cartography (“Introduction to South Asian Cartography,” “Cosmographical Mapping,” “Geographical Mapping,” “Nautical Maps,” and “Conclusion”), all in *HC* 2.1: 256–62 and 295–509, and Joseph E. Schwartzberg’s chapters on Southeast Asia (“Introduction to Southeast Asian Cartography,” “Cosmography in Southeast Asia,” “Southeast Asian Geographical Maps,” “Southeast Asian Nautical Maps,” and “Conclusion to Southeast Asian Cartography”), all in *HC* 2.2: 689–842.

202. According to Heinrich Winter, “Francisco Rodrigues’ Atlas of ca. 1513,” *Imago Mundi* 6 (1949): 20–26, the islands represented in horizontal profile “were not one of the means of expression of the Portuguese cartographers”; this type of representation had Eastern origins (p. 21).

203. Albuquerque, *Cartas*, 1:64.

204. João de Castro, *Obras completas de D. João de Castro*, 4 vols., ed. Armando Cortesão and Luís de Albuquerque (Coimbra: Academia Internacional da Cultura Portuguesa, 1968–82), 3:44, and *PMC*, 1:130.

205. Viterbo, *Trabalhos náuticos dos portugueses*, 1:131.

206. Coelho, *Alguns documentos*, 516–18, quotation on 517, and António Alberto Banha de Andrade, *Mundos novos do mundo: Panorama da difusão, pela Europa, de notícias dos descobrimentos geográficos portugueses* (Lisbon: Junta de Investigações do Ultramar, 1972), 443–47.

207. *PMC*, 1:29–31, pl. 9.

208. *PMC*, 1:33–34, pl. 10.

209. Assembled today in the BNF; see *PMC*, 1:55–61, pls. 16–24.

quarter of a century, there was no direct news of them. But we do have the large world maps attributed to Diogo Ribeiro,²¹⁰ which show some new material. The oldest (from 1525) shows the southern part of the Red Sea and correctly depicts the Persian Gulf and fragments of the peninsula of Malacca; Ribeiro prudently left the unknown places blank. The 1527 map has practically the same shape, one from 1529 (in Rome) incorporates the southern coast of Sumatra, and the other one from 1529 (in Weimar) completes the Gulf of Siam.

A new collection of original maps emerged in 1538 from the activity of João de Castro during his first voyage to India.²¹¹ The personality of this cartographer was quite different from that of the modest Francisco Rodrigues. Castro was of the high nobility, close to João III and especially to the king's brother and adviser, Prince Luís. When he went to India in 1538, Castro was charged with commanding a boat and trying to improve navigational techniques. He considered himself a disciple of the mathematician Pedro Nunes and had a literary education that was sufficiently reliable to allow him to use and discuss the ideas of classical geographers such as Ptolemy and modern cosmographers such as Martín Fernández de Enciso. Castro combined theory with observation and concrete experimentation. He made direct inquiries of the learned people in the lands he visited²¹² and had a notable aptitude for graphic expression, although it is evident that some of the drawings included in his rutters were made by assistants.

We know of three maritime rutters by João de Castro: the *roteiro* from Lisbon to Goa (6 April 1538–11 September 1538), the *roteiro* from Goa to Diu (21 November 1538–29 March 1539), and the *roteiro* of the Red Sea from Goa to Suez (31 December 1540–21 August 1541).²¹³ The first *roteiro* is preserved in two later copies; neither is complete, but one contains all of the drawings—six panoramic coastal views from the land of Natal, in southern Africa, to the Queimadas Islands near Goa, and one chart of the Bay of Mozambique, which seems to be a reproduction of an earlier document (see fig. 38.17). What is thought to have been the original second *roteiro*, from Goa to Diu, is lost, but it exists in a copy made before 1588 and was reproduced in the nineteenth century. Its fifteen illustrations are of estuaries, harbors, and principal places, and they combine sketches of the coast seen vertically and indicating bearings, horizontal views of the relief, and oblique views of the human landscape and buildings (fig. 38.19). In the *roteiro* of the Red Sea, three panoramic profiles of the northern coast of the island of Socotra, shown in magnificent naturalistic detail, stand out from the others. The twelve figures that represent the Red Sea ports are of the same type as those in the second *roteiro*, with profiles of the coast combined with a plan of the coastline. Some scholars believe

that João de Castro invented this type of representation, which was more widely disseminated by Lucas Jansz. Waghenauer.²¹⁴ There is no doubt that Castro methodically used whatever local cartographic information he was able to gather.²¹⁵

These documents are preserved partly because João de Castro had several manuscript copies made and distributed them to interested parties.²¹⁶ Several versions of his maps and views thus exist with very similar content but perceptible differences in style. Comparison of the textual descriptions of the figures shows that none of the extant versions of the maps of the *roteiros* is the original.

These local maps were a complement to the previous marine charts. A note regarding the estuary of New Goa indicates that it was “more than any other frequented and known,” and therefore it did not seem to Castro “necessary to make any *tauoa* [chart] of it.” On the contrary, for the neighboring estuary of Old Goa, Castro found it “fair to make a *tauoa*.”²¹⁷ The information from Castro's

210. PMC, 1:87–106, pls. 37–40.

211. J. B. Aquarone, *D. João de Castro, governador et vice-roi des Indes orientales, 1500–1548*, 2 vols. (Paris: Presses Universitaires de France, 1968), and Castro, *Obras completas*.

212. In particular regarding the flooding of the Nile, about which João de Castro inquired of some “important people of Abyssinia” in Mesewa in February 1541 (Castro, *Obras completas*, 2:236).

213. On the history of the manuscripts and editions of the *roteiros*, see PMC, 1:133–44. The *roteiro* of the Red Sea was published for the first time by Samuel Purchas in *Purchas His Pilgrimes, in Five Bookes*, 4 vols. (London: Printed by William Stansby for Henrie Fetherstone, 1625) in a summarized English version and in 1699 in a Latin version in Antonius Matthaëus, *Veteris ævi analecta, seu vetera aliquot monumenta quæ hactenus nondum visa . . .*, 10 vols. (Leiden, 1698–1710). The first Portuguese edition dates from 1833: João de Castro, *Roteiro em que se contem a viagem que fizeram os Portuguezes no anno de 1541*, ed. António Nunes de Carvalho (Paris: Baudry, 1833). The *roteiro* from Lisbon to Goa was published only in Portuguese: João de Castro, *Roteiro de Lisboa a Goa*, ed. João de Andrade Corvo (Lisbon: Academia Real das Sciencias, 1882). The *roteiro* from Goa to Diu also had only a Portuguese edition: João de Castro, *Primeiro roteiro da costa da India: Desde Goa até Dio*, ed. Diogo Köpke (Porto: Typographia Commercial Portuense, 1843). There are several manuscript versions of the figures of the two last *roteiros*. All the *roteiros* texts are included in Castro, *Obras completas*. A selection of figures is reproduced in PMC, vol. 1, pls. 53–70, and there is a facsimile edition, João de Castro, *Tábuas dos roteiros da India de D. João de Castro*, intro. Luís de Albuquerque (Lisbon: Edições INAPA, 1988).

214. A. Teixeira da Mota, “Evolução dos roteiros portugueses durante o século XVI,” *Revista da Universidade de Coimbra* 24 (1971): 201–28, esp. 218, and Lucas Jansz. Waghenauer, *Spieghel der zeevaerdt* (Leiden: Christoffel Plantijn, 1584–85).

215. Castro, *Obras completas*, 3:19 and 44. While in Goa preparing his expedition to the Red Sea, João de Castro called on “Arab and Gujarati pilots and from Malabar, who brought [him] their navigational charts” (p. 19).

216. Alonso de Santa Cruz, *Libro de las longitudes y manera que hasta agora se ha tenido en el arte de navegar*, ed. Antonio Blázquez y Delgado-Aguilera (Seville: Zarzuela, 1921), 32–33.

217. Castro, *Obras completas*, 2:21 and 23.

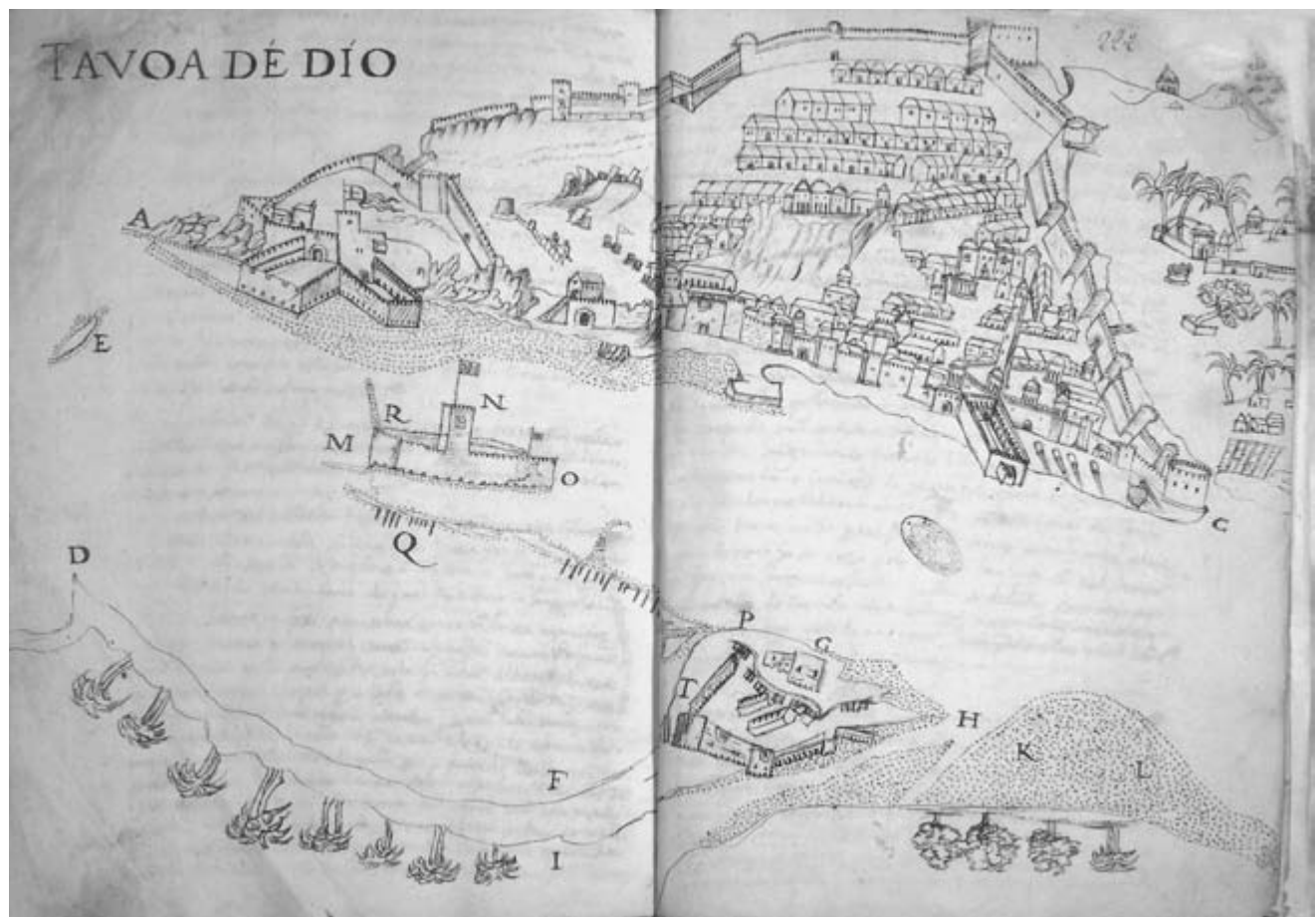


FIG. 38.19. VIEW OF THE FORTRESS OF DIU IN THE *ROTEIRO* FROM GOA TO DIU BY JOÃO DE CASTRO.

Size of the original: ca. 29.3 × 40.7 cm. Photograph courtesy of the IAN/TT (Coleção de. S. Vicente, vol. 15, fol. 244).

maps of the Red Sea were first recorded on the anonymous world map preserved in Vienna.²¹⁸

During his second stay in India (1545–48), João de Castro served as governor and was confronted with difficult economic and military problems, and therefore did not have time to carry out cartographic surveys personally. However, during his voyage there, he was charged with modernizing the fortress of Mozambique. In August 1545, he wrote to the king, “So that this may be better understood . . . I send to Y. H. the painting in which all these things are,” and the king answered him, in March 1546, sending “some drawings and some *lembranças* [notes]” on the subject.²¹⁹

In another letter of the same month, the king ordered from João de Castro “the drawings of the principal fortresses that I have in these parts.”²²⁰ The letter reveals both the technical competence of the king²²¹ and the persistent lack of organization of cartography in India. It also conveys information on the material characteristics of the products ordered. It is possible that these drawings were made, because João de Castro’s grandson Francisco men-

218. Cortesão thought this dated from about 1545, but it could be from two to three years earlier; see *PMC*, 1:155, pl. 79.

219. Castro, *Obras completas*, 3:68 an 135.

220. The letter is from João III to João de Castro, 8 March 1546: “I was pleased to see the sketch of the main fortresses that I have in these parts, and since the more particularly I can see it the more contentment I would get, I charge you muchly that if there may be some person who knows how to do it well send me every one of them and so the city or place where they may be, and the location of it, made on a plaque [of cardboard] or on some light wood, made entirely by scale and in such a way, that one may well be able to see what one may wish to know of them” (“*Cartas missives de D. João de Castro*,” 72, IAN/TT).

221. Francisco de Monzón, in his *Libro primero del espejo del príncipe Christiano* (Lisbon, 1544), said that the brothers of King João III knew much about the different branches of natural philosophy, such as movements of the sky, the composition of the world, astronomy, and geometry and arithmetic, and he thought that princes and important noblemen should know the art of navigation, the world map, and the navigational chart. Francisco de Hollanda, in his “*Lembrança ao muyto Sereníssimo e Cristianíssimo Rey Dom Sebastião: De quanto serve a sciencia do desenho*” (1571), deplored that the young sovereign did not understand and exercise the art of drawing, as had João III and his brothers; see Jorge Segurado, *Francisco d’Ollanda: Da sua vida e obras . . .* (Lisbon: Edições Excelsior, 1970), 156.

tioned in his “Crónica” an original manuscript of his grandfather’s “where there are the descriptions of all the fortresses that we have in India.”²²²

Graphic expression was widely used at the state level as a means of communication. In 1547, João de Castro ordered from Gaspar Correia, a good draftsman established in India since 1512, a series of portraits of the governors of India. The portraits were made with the assistance of a native painter and hung in the Palace of Governors in Goa.

Correia wrote an enormous manuscript between the end of the 1540s and 1561 (with the last touches added in 1563), the “Lendas da Índia.” He recorded in it events more suited to the celebration of half a century of Portuguese rule in the Eastern seas. He had been an eyewitness to many of them, because he had accompanied Afonso de Albuquerque as his secretary in almost all his movements from 1512 to 1515, had later lived in Cochim and in Goa, had participated in the expedition to Diu in 1533–36, and had traveled in several other parts of India. The history of this codex is not simple and remains imperfectly known.²²³ It included, originally, at least fifty-three illustrations. Among them were portraits of the governors, representations of the fleets (all of which were lost), and several other drawings. Nineteen figures represent coastal places of importance to the Portuguese (see appendix 38.8 and fig. 38.17).

There seems to be no doubt that the illustrations in the “Lendas” are from Gaspar Correia’s hand. It is possible that he learned to draw in Portugal before proceeding to India, when he would frequent the court as a page of the king’s chamber. His drawing style resembles that of Duarte de Armas, down to some significant details, such as the representation of rocks.²²⁴ Although Correia probably met Francisco Rodrigues in Goa, no reference is made to him in the “Lendas,” and the drawing styles of the two cartographers are very different. Correia’s drawings never contain scales or orientation devices, and he was interested only in the terrestrial elements of the landscape, not the nautical aspects.

Two views that occupy the verso of a first version of the text, of Calicut and Colombo, are contemporary with the final draft of the codex, produced in the early 1560s.²²⁵ But the date of the first draft and the sources of this iconographic collection are not known. Most of the illustrations represent not only a place but an event that happened there on a specific date (for example, the departure of the fleet from the Tagus, the entrance of the fleet into Dabul, and the assault of Aden). Because, in several cases, Gaspar Correia declared that he had portrayed the event from life or from reality, it is interesting to verify the years in which he was present in these places, according to his own testimony in the “Lendas” or other rare documents.²²⁶ It is clear that he must have been an eyewitness and sketched some events at the time they occurred. In other instances,

he went to those places before or after the events described or never went there at all. In those cases, he drew the views from graphic material gathered from other authors, which he reworked to obtain synthetic visions for the “Lendas.”

Two examples can illustrate this. In his spectacular view of Aden, Gaspar Correia included scenes of the assault on the walls of the city, which he had witnessed in 1513. But the image of the city, surrounded by a chain of fortified hills, very closely resembles the engraving included in the 1572 *Civitates orbis terrarum* (figs. 38.20 and 38.21). The illustration by Gaspar Correia is of only the central, urban part of the figure that is found in the *Civitates*, eliminating its extremities and simplifying the sketch. Thus, it cannot be its prototype. It seems more likely that Correia’s Aden derives from the same original used for the *Civitates*. It is known that the engravings assembled in the *Civitates* are based on earlier single engravings, some rather old.²²⁷ Indeed, it is very possible that the original drawing may date from one of the first approaches of the Portuguese to the city, in 1500 or 1502.²²⁸

222. Francisco de S. Luiz, *Obras completas do cardeal Saraiiva*, 10 vols. (Lisbon: Imprensa Nacional, 1872–83), 6:68. The book by João de Castro, considered an original manuscript, was directed to prince Luís. At the same time, the Italian banker Lucas Giraldi, established in Lisbon and a friend of João de Castro, promised to send him, for the year, the “paintings of the fortresses of the kings of Christianity and of the battles” that he requested; see Virgínia Rau, “Um grande mercador-banqueiro italiano em Portugal: Lucas Giraldi,” *Estudos Italianos em Portugal* 24 (1965): 3–35, esp. 29. In December of 1546, reconstructing the walls of Diu after the great siege, João de Castro wrote to the king: “The manner in which I make the fortress is by the sketch of Ceuta”; on 13 August 1547, he wrote to his own son, then occupied in that work: “I was very pleased with the sketch that you sent me and much more with the terms of geometry with which you declared it” (Castro, *Obras completas*, 3:307 and 434).

223. Correia’s original, rather mutilated, is today in the IAN/TT. Used in Lisbon at the beginning of the seventeenth century, the “Lendas da Índia” was lost until the end of the eighteenth century. It was published in four volumes in 1858–66 (Lisbon: Academia Real das Ciências), under the direction of Rodrigo José de Lima Felner. That edition was reprinted in four volumes with an introduction by M. Lopes de Almeida (Porto: Lello & Irmão, 1975). Twelve figures are reproduced in *PMC*, 1:167–68, pls. 85–86.

224. See Daveau, “A propósito das ‘pinturas,’” 89.

225. See the introduction by Lima Felner in the 1858–66 edition of Correia, *Lendas da Índia*, 1:X n. 13.

226. For example, a letter about the inhabitants of São Tomé reads: “In the year 534, Gaspar Correia drew this settlement from reality”; quoted by António da Silva Rego in *Documentação para a história das missões do padroado português do Oriente*, 12 vols. (Lisbon: Divisão de Publicações e Biblioteca, Agência Geral das Colónias, 1947–58), 2:254.

227. Skelton indicates that the drawings relative to the cities of India, Africa, and Persia were granted to Braun by Constantin von Lyskirchen, merchant of Hansa; see R. A. Skelton, “Introduction,” in *Civitates orbis terrarum*, “*The Towns of the World*,” 1572–1618, by Georg Braun and Frans Hogenberg, 3 vols. (Cleveland: World, 1966), 1:VII–XXIII. See also Daveau, “A propósito das ‘pinturas.’”

228. The vignette marking Aden on a map in the atlas attributed to Lopo Homem and the Reinels and dated 1519 already shows the city



FIG. 38.20. VIEW OF ADEN, FROM GASPAR CORREIA'S "LENDAS DA ÍNDIA," CA. 1550.

Size of the original: ca. 40.6 × 54.6 cm. Photograph courtesy of the IAN/TT (Lendas da India, vol. 2).



FIG. 38.21. VIEW OF ADEN FROM THE CIVITATES ORBIS TERRARUM, 1572.

Size of the original: ca. 19.5 × 46.5 cm. Photograph courtesy of the BL (G.3603).

João de Castro and Gaspar Correia both created views of Diu but in different years: Correia was there in 1513 and 1535, Castro in 1539 and 1546 (figs. 38.19 and 38.22). The drawing by João de Castro was included in the *roteiro* that he took to Lisbon in 1541, and therefore does not represent the reconstruction of the fortress with triangular bastions after 1546 by the master Francisco Pires (see fig. 38.25).

Correia's drawing includes a note (on the river) that says, "the fortress of Diu that was made by governor Nuno da Cunha" in 1535.²²⁹ When he left Portugal for India in April 1528, Cunha took with him a "figure of Diu," perhaps resulting from the 1513 visit of Albuquerque. With the works of 1535 finished, the governor immediately sent the king the new drawing of the fortress, but that official shipment was preceded by another delivered clandestinely by the adventurer Diogo Botelho, who did not hesitate to return from India to Portugal in a small pinnace so that he could be the first to deliver to the king this important document.²³⁰ These various episodes confirm that graphic representations of the strongholds of India were not uncommon and were considered important.

It seems, at first glance, that the image of Diu transmitted by Gaspar Correia was drawn directly from reality. Some graphic details fit perfectly with the corresponding textual description. But other details diverge from the text. For example, instead of "five round turrets" on the great wall at the right, only two appear in figure 38.22, although all five are present in the less artistic drawing by João de Castro (fig. 38.19). But Castro's image is much more exact and rich and is complemented by a textual description with abundant quantitative information. It includes two nautical elements that are completely lacking in Correia's drawing. On it, contrary to what the cited legend announces, appear two aspects of the work that Martim Afonso de Sousa would order to be done in 1545, in anticipation of the imminent siege.²³¹ It shows, for example, the new gate on the river, with a round turret and a quay, and the small sheltered port for pinnaces. The drawing by Correia constituted a kind of synthesis, somewhat impressionistic, made from several documents recording successive phases of fortification.

Another codex that has affinities with the "Lendas da Índia" is the "Livro de Lisuarte de Abreu,"²³² named for the person who had it made, probably in India. It includes color portraits of the governors and viceroys up to 1563, as well as representations of the fleets to India of the same period. In addition, it contains a number of drawings of cartographic interest: two coastal views (of Cape Agulhas and the island of Comoros) and a cartographic sketch of Mozambique, which accompany the relation of the armada of 1558 in which Lisuarte de Abreu went to India. The style of these drawings has affinities with those of Francisco Rodrigues because of the naturalistic profile of

the mountain ranges and the details, somewhat fantastical, of the fauna and flora. Other drawings, interspersed among those of the armadas, impressionistically evoke scenes of shipwrecks and naval encounters.

THE EASTERN PORTUGUESE EMPIRE

Portuguese India, already threatened with decadence by 1570, declined significantly in the following decade.²³³ Portugal had the same king as Spain from 1580 until 1640 and suffered the consequences of more powerful Spanish foreign policies. Because of the naval rivalry between Spain and England, the Portuguese routes in the Atlantic were threatened by the English fleet from 1585. On the other hand, after the rebellion of the Calvinist Netherlands, the creation in 1602 of the Dutch East India Company made navigation unsafe in the seas of the East. Consequently, in 1604 the port of Goa was blocked for three weeks by Dutch vessels. Despite efforts to maintain an annual maritime connection between Lisbon and the state of India, the latter had to live more and more independently and organize an autonomous economic network with a looser connection to Portugal.

Judging by the number of examples preserved today, Portuguese cartographic production seems to have diminished quantitatively during the second half of the six-

nestled at the foot of a mountain ridge crowned with castles (*PMC*, vol. 1, pl. 19).

229. Correia, *Lendas da Índia*, vol. 3, facing 625 (1858–66 ed.), and *PMC*, vol. 1, pl. 85D.

230. The episode is recounted by the various chroniclers of India. See especially Correia, *Lendas da Índia*, 3:660–70 (1858–66 ed.), and Barros, *Asia*, 4:333–37 (*década* 4, bk. 6, chap. 14).

231. Correia, *Lendas da Índia*, 4:424 (1858–66 ed.).

232. The codex is in the Pierpont Morgan Library, New York (MSS. 525). There is a facsimile edition, *Livro de Lisuarte de Abreu* (Lisbon: CNCDP, 1992), with an introduction by Luís de Albuquerque. See also *PMC*, 1:169–72, pl. 87.

233. In 1560, Gaspar Correia, who had been living in India since 1512, judged that the history of Portuguese India did not merit being counted beyond 1550. Van Linschoten, who lived in Goa from 1583 to 1589, and Pyrard de Laval, who was there between 1608 and 1610, described a still powerful Empire; see Jan Huygen van Linschoten, *Itinerario, voyage ofte shipvaert* (Amsterdam: Cornelis Claesz., 1596), and François Pyrard de Laval, *Discours du voyage des François aux Indes orientales* (Paris: Chez David le Clerc, 1611). Writing in 1663, Manuel Godinho thought that the state of India had reached its "perfect age" between 1561 and 1600, and then had begun to decline; see Manuel Godinho, *Relação do novo caminho* (1663; Lisbon: Imprensa Nacional–Casa da Moeda, 1974), 21–22. More recent opinions include those of Chaudhuri, who thinks that the culminant phase of the Portuguese empire in the East extended from 1520 to 1560, while Magalhães sees its greatest period as extending until 1570; see K. N. Chaudhuri, "O estabelecimento no Oriente" and Joaquim Antero Romero Magalhães, "Os limites da expansão asiática," both in *História da expansão portuguesa*, 5 vols., ed. Francisco Bethencourt and K. N. Chaudhuri (Lisbon: Círculo de Leitores, 1998–2000), 1:163–91, esp. 178 and 2:8–27, esp. 9.

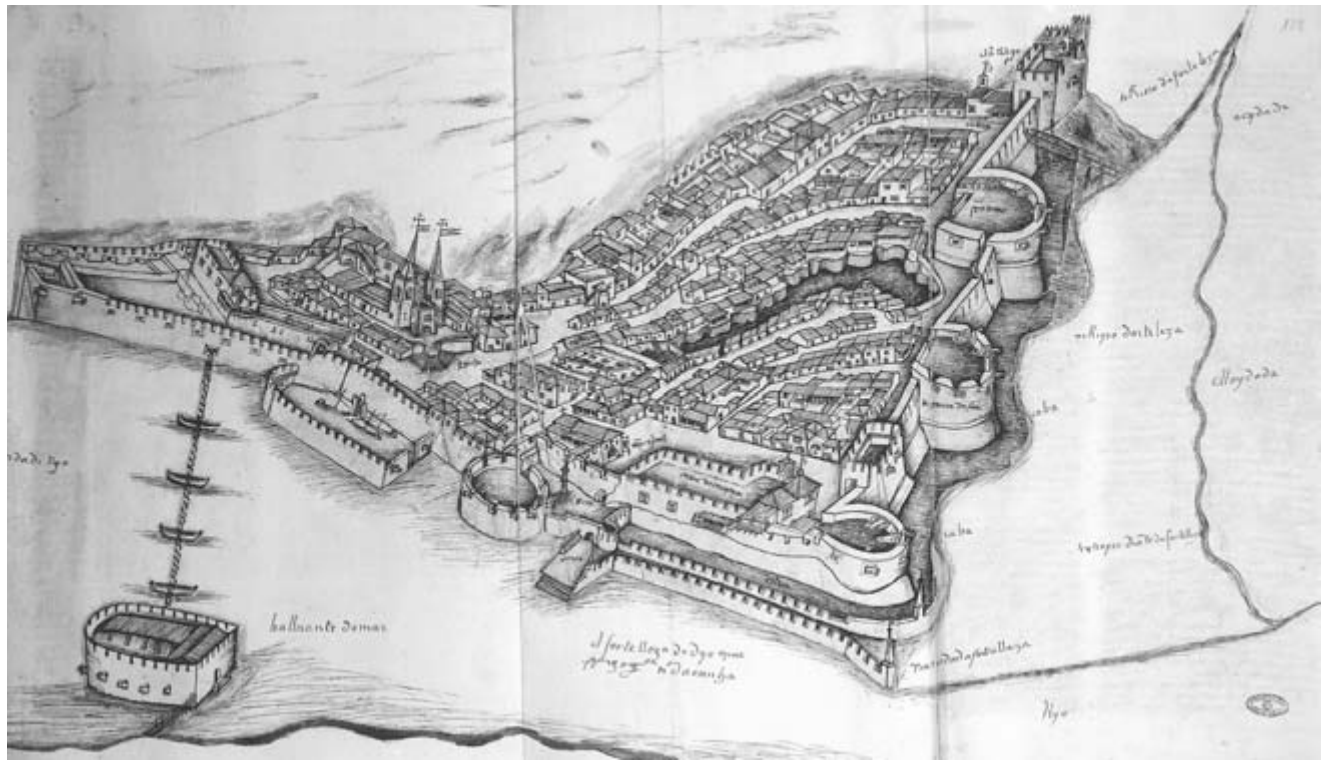


FIG. 38.22. VIEW OF THE FORTRESS OF DIU FROM GASPAR CORREIA'S "LENDAS DA ÍNDIA," CA. 1550.

Size of the original: ca. 42.8 × 72.5 cm. Photograph courtesy of the IAN/TT (Lendas da Índia, vol. 3).

teenth century, growing again in the seventeenth century (see fig. 38.11). But, at the same time, the worldwide dissemination of cartography of Portuguese origin increased immensely through the printing of several maps and views, mainly in the Netherlands. While the dissemination of geographic knowledge continued to be very restricted in Portugal—where only a few books, more historical than geographical and without maps, were published on the subject²³⁴—engraved maps and printed books were increasing in number across Europe. This was especially true in Italy and the Netherlands, where the dissemination of news about the discoveries and exotic lands spread to the more and more numerous literate classes. Braun and Hogenberg's *Civitates orbis terrarum* (from 1572) and François de Belleforest's *Cosmographie universelle* (1575) contained a number of Portuguese views of cities of Europe, Africa, and Asia, but the authors and the dates of the prototype views that were used are not yet generally known. In 1595, Jan Huygen van Linschoten published his *Itinerario* accompanied by several nautical charts explicitly based on Portuguese maps.²³⁵

While these maps gained wide international dissemination beginning in 1570, there was still new cartographic activity in the East. The improvement of the nautical

route linking Lisbon to Goa continued to attract the attention of the government, which had the southern part of the African coast mapped in more detail. Also, the graphic representation of strategic Portuguese ports and fortresses in the East continued to be requested by the central government. The successive atlases by Diogo Homem, especially those from 1558 and 1568, show that cartographic knowledge of the Far East continued to increase; for example, his maps include the Korean Peninsula and the Japanese Archipelago.²³⁶ But the few really

234. The first volume of Fernão Lopes de Castanheda's *História do descobrimento* was published in Coimbra in 1551; the first *década* of the *Ásia* by João de Barros was published in Lisbon in 1552.

235. François de Belleforest, *La cosmographie universelle de tout le monde*, 2 vols. (Paris: Chez N. Chesneau, 1575); see Mireille Pastoureau, *Les atlas français, XVI^e–XVII^e siècles: Répertoire bibliographique et étude* (Paris: Bibliothèque Nationale, Département des Cartes et Plans, 1984), 55–64, and Luís Silveira, *Ensaio de iconografia das cidades portuguesas do ultramar*, 4 vols. (Lisbon: [Junta de Investigações do Ultramar], 1955). Jan Huygen van Linschoten's *Itinerario* was translated into English, German, Latin, and French between 1598 and 1610, but the first Portuguese translation dates only from 1997: *Itinerário, viagem ou navegação para as Índias orientais ou portuguesas*, ed. Arie Pos and Manuel Loureiro (Lisbon: CNCDP, 1997); it includes facsimiles of the figures.

236. PMC, 2:13–15, esp. pl. 105, and 2:31–32, esp. pl. 140A and B.



FIG. 38.23. COASTAL VIEW IN THE *ROTEIRO* OF MANUEL DE MESQUITA PERESTRELO, CA. 1575. The view is from Cape Infante to the east of Cape Vacas. Size of the original: ca. 3.35 × 16.7 cm. Photograph courtesy of the BL (Add. MS. 16932).

new maps based on terrestrial or maritime exploration seem to have resulted more from private initiatives than from any coherent policy of the central government.

The need to improve knowledge of the route to India was felt at the time of King Sebastian because of the increasing number of catastrophic shipwrecks on the African coast. In 1575–76, Manuel de Mesquita Perestrelo (Perestrello) explored the South African coast from the Cape of Good Hope to Cape Corrientes and wrote a *roteiro* that contained one chart, which is preserved today in two copies.²³⁷ The text was also accompanied by eight coastal profiles to help the pilot situate himself along the coast (fig. 38.23). The graphic notation of the coastal outline here appears much more schematic and less naturalistic than the drawings of Francisco Rodrigues or João de Castro, with more importance given to the relative positions of the different elements than to the details of each element.

Meanwhile, under the direction of João Baptista Lavanha, the Portuguese cartographer that Philip II named chief cosmographer of Portugal in 1591,²³⁸ new maritime itineraries of the route to India were being prepared. Instead of describing the discovered coasts step by step as the old coastal itineraries had done, these new itineraries, which Teixeira da Mota named “route itineraries” or “navigational itineraries,” mainly indicated conditions of navigation on the high seas (dominant winds and currents as well as alternative routes as a function of the seasons).²³⁹ Examples include the “*Roteiro da carreira da Índia*,” by Manuel Monteiro and Gaspar Ferreira Reimão (1600), and the “*Roteiro da navegação e carreira da Índia*,” compiled and augmented by Reimão.²⁴⁰ Besides oceanic data, it included charts of particularly dangerous shallows and reefs and also coastal views, such as one of the “Craggy Peaks” that mark the eastern African coast north of Mozambique. Although the Conselho da Índia said that Reimão’s itinerary would have to be printed “with every possible caution,” and pilots were threatened

with a death sentence if they allowed it to be copied, it was printed in 1612 in Lisbon.²⁴¹

The western African coast south of Cabo Negro remained little known because it was normally avoided by the maritime routes. In 1613, Lavanha drafted instructions for a detailed map that seems never to have been completed. But the instructions give us an indication of the mapping methods used at the time. A map of large scale (“for each degree to have at least one span,” or about 1:500,000) had to be drawn and also, for each place that could serve as a port, a drawing “in a much larger form and size, to enable feet and paces to be measured, so that the places where settlements and fortresses can be made may be considered.”²⁴²

Two large atlases confirm that the Portuguese maintained their cartographic preeminence in this part of the world for a long time. The large atlas of the Africa coast by João Teixeira Albernaz II (“*Livro da descrição de toda a costa de Africa . . .*”) dates from 1665, and in 1700 the *Suite du Neptune françois*, which reproduces in seventeen charts all the maps of the 1665 atlas (with the indication on each one that it was “drawn by express order of the Kings of Portugal”), was published in Amsterdam.²⁴³

Little is known of the maps that were made in the state of India during the second part of the sixteenth century and the beginning of the seventeenth. The central power in Lisbon continued to request information on the places of importance to the Portuguese, and some of these requests have come down to us. It is known that chief architect Giovanni Battista Cairato went to India in 1584, and that he took back to Lisbon a report and sketch of the fortifica-

237. Manuel de Mesquita Perestrelo, *Roteiro da África do Sul e Sueste, desde o Cabo da Boa Esperança até ao das Correntes* (1576), anno. A. Fontoura da Costa (Lisbon: Agência Geral das Colónias, 1939), and *PMC*, 4:27–30, pl. 409B and C.

238. On Lavanha, see Cortesão, *Cartografia e cartógrafos portugueses*, 2:294–361, and *PMC*, 4:63–76.

239. Teixeira da Mota, “Evolução dos roteiros portugueses,” 212.

240. Manuel Monteiro and Gaspar Ferreira Reimão, “Roteiro da carreira da Índia, 15 de Março de 1600,” in *Roteiros portugueses inéditos da carreira da Índia do século XVI*, anno. A. Fontoura da Costa (Lisbon: Agência Geral das Colónias, 1940), 133–81, and Gaspar Ferreira Reimão, *Roteiro da navegação e carreira da Índia*, 2d ed. (1612; Lisbon: Agência Geral das Colónias, 1940).

241. The opinion of the Conselho da Índia, dated 28 February 1611, was published by Francisco Paulo Mendes da Luz in *O conselho da Índia* (Lisbon: Divisão de Publicações e Biblioteca, Agência Geral do Ultramar, 1952), 510–11.

242. BL, Add. MS. 28461, fols., 160–61 (*PMC*, 3:45 n. 17).

243. *PMC*, 5:36–41, esp. 40. The 1665 atlas is preserved in Paris, Archives Nationales, NN*20, Afrique n° 1. See also Pastoureau, *Les atlas français*, 351–56, and Suzanne Daveau, “O novo conhecimento geográfico do mundo,” in *Gravura e conhecimento do mundo: O livro impresso ilustrado nas coleções da BN*, ed. Joachim Oliveria Caetano (Lisbon: Biblioteca Nacional, 1998), 125–47, esp. 137–38.

tions, “without wanting to give a copy,” as the chief chronicler of India, Diogo de Couto, complained in November 1595.²⁴⁴ But in 1598, new royal instructions to the viceroy were arriving in India: “It is necessary that he send the drawing of all the fortresses of that State in the first ships or as quickly as possible so that Your Majesty can see them and have here information of their emplacement and form.”²⁴⁵ Another request, from 1633, did not specifically name fortresses but demanded “the descriptions of all the coasts, ports, inlets, and anchorages of this State, each government and captaincy separately.”²⁴⁶

Cairato may have been the last competent technician sent on a mission from Lisbon to make maps in India. After him, the recruitment of cartographers seems to have been solely from local origins, which suggests that there was little interest on the part of the central government. From 1600 to 1623, several examples of the prolific and diverse work of Manuel Godinho de Erédia are preserved. From 1626 to 1638, a pilot of French origin, Pierre Berthelot, was recruited by the Portuguese to draw maps after having served the Dutch in Indonesia. Later, between 1654 and 1660, maps were authored by André Pereira dos Reis, born in Goa and the son of a Portuguese pilot.²⁴⁷

Manuel Godinho de Erédia was born in Malacca in 1563, the son of a Portuguese nobleman of Aragonese origin and a Malay princess from Macassar. He studied successively at the Jesuit school in Malacca and at the seminary in Goa. He entered the Society of Jesus in 1579, but soon left it, in 1580 or 1584. Later he dedicated himself to cosmography and to “replacing the old drawings in the world-maps and atlases by new chorographical representations of Cathay and Meridional India.”²⁴⁸ This declaration suggests several original aspects of cartography that he engaged: his interest in terrestrial cartography and chorographic mapping, and not for only nautical or military purposes; the probable use of local cartographic sources of Asian origin; and his passion for the discovery of new lands, especially a southern continent, which he guessed existed south of Indonesia and he called “Southern India.”

Erédia’s professional life was divided between Malacca and Goa, and his cartographic production included both plans of cities and fortresses and chorographic maps of various scales. He never succeeded in obtaining from the authorities of Goa, Lisbon, and Madrid, whom he solicited persistently, the indispensable authorizations and resources to continue his explorations in the southern seas, which would have begun in 1601, according to a note included in the world map of the atlas of 1630 by João Teixeira Albernaz I.²⁴⁹ The oldest map by Erédia, which is known only through a copy, dates from 1601 and represents the Banda Islands. According to a letter by Nicolau de Montalgre, it was taken “from the drawings

of the Javanese, who know them very well, and with the painting embellished by Manuel Godinho.”²⁵⁰

Erédia made a collection of plans of coastal places in India in 1610, by order of the viceroy, who sent them to Lisbon. Preserved today in Rio de Janeiro, it includes plans of nineteen fortresses, spread from Mozambique to Malacca (see fig. 38.15). Two of the plans of Malacca, and one “chorographic description of the district of the lands of Goa,” were, without doubt, mapped by Erédia himself, but it is probable that some of the other plans may have been derived from previous surveys by architects or engineers.²⁵¹

Figure 38.24 shows the coverage of the maps by Manuel Godinho de Erédia that are published in *PMC*. Various places are represented at a variety of scales, and the maps range from local or chorographic cartography to a map of the entire Far East. Most are the result of compilations from other sources. The map of Hindustan, or Mogor, is notable for its exactness as to the courses of the rivers (the Indus, Ganges, and their tributaries), and it may have been based on surveys by the Jesuits who resided at the time at the court of the grand Mughal.²⁵²

To the best of our knowledge at present, several maps by Erédia seem to constitute cartographic innovations, for example, those of the surroundings of Goa, of the hinterland of Cochim, of Cape Comorim, of the region of Malacca, and of the straits of Singapore. Unfortunately, they have not yet been the object of study, and nothing is known of Erédia’s mapping techniques, of the information he used, or of the influence that his work may have had on later cartography.²⁵³ Only a few hypotheses can be sug-

244. Diogo de Couto, *Obras inéditas de Diogo de Couto, cronista da Índia, e guarda mor da Torre do Tombo*, ed. António Lourenço Caminha (Lisbon: Na Imprensa Imperial e Real, 1808), 88, and C. R. Boxer and Carlos de Azevedo, *A fortaleza de Jesus e os portugueses em Mombaça, 1593–1729* (Lisbon: Centro de Estudos Históricos Ultramarinos, 1960), in English, *Fort Jesus and the Portuguese in Mombasa, 1593–1729* (London: Hollis & Carter, 1960). The Italian architect Giovanni Battista (João Bautista) Cairato went into the service of King Philip II in 1577 and worked in Tangiers in 1581 before continuing to India, where he built or remodeled several fortresses.

245. *PMC*, 4:48.

246. António Bocarro, *Década 13 da Historia da Índia*, 2 vols. (Lisbon, 1876), 1:XVI; also quoted in *PMC*, 5:60.

247. On Pierre Berthelot, see *PMC*, 5:67–69, pls. 575–76, and on André Pereira dos Reis, see *PMC*, 5:27–29.

248. On Manuel Godinho de Erédia, see *PMC*, 4:39–60, pls. 411–22, esp. 4:40.

249. *PMC*, 4:111–18 and pl. 464.

250. *PMC*, 4:47 and pl. 411 A.

251. *PMC*, 4:47–48 and pl. 411 B–F.

252. *PMC*, 4:59 and pl. 415A and B.

253. Paul Wheatley, in “A Curious Feature on Early Maps of Malaya,” *Imago Mundi* 11 (1954): 67–72, shows that one of the maps by Erédia, dedicated to the peninsula of Malacca, portrays exactly the portage between the two rivers that allowed commercial trade between the east and west coasts.

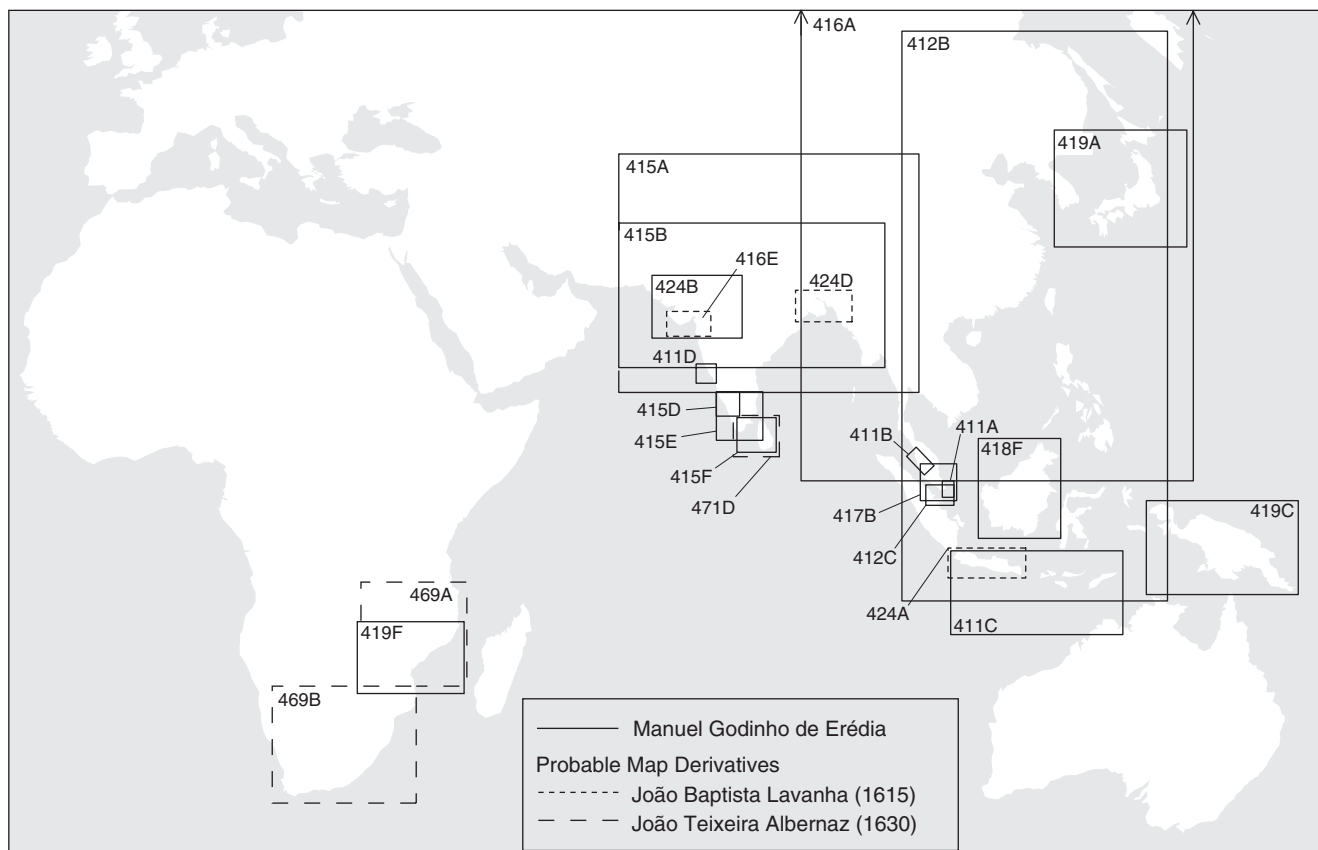


FIG. 38.24. COVERAGE OF THE MAIN CHOROGRAPHIC MAPS BY MANUEL GODINHO DE ERÉDIA AND DERIV-

ATIVES. The numbers refer to the corresponding plates in volume 4 of *PMC*.

gested. João Baptista Lavanha had three maps drawn and engraved for the posthumous volume of João de Barros's *Ásia* that was printed in Madrid in 1615.²⁵⁴ The three regions represented are included in the scope of preserved maps by Erédia, even though they may be much less detailed than the maps published in 1615. João Teixeira Albernaz I was familiar with the works of Erédia, and it is possible that the maps of southern and southeastern Africa in his atlas of 1630 were based on surveys by Erédia.

Seventeenth-century collections of graphic representations of Portuguese coastal fortresses in their Eastern maritime empire are preserved in many libraries around the world. Several are presented in *PMC* along with a synthesis of the information that has been gathered on them.²⁵⁵ The oldest dates from 1635, when António Bocarro, chronicler of India, drafted "O livro das plantas de todas as fortalezas, cidades e povoações do estado da Índia Oriental" at the request of the viceroy, the count of Linhares, who sent two copies to Lisbon, one of which is now in Évora (plate 34).²⁵⁶ The text was originally accompanied by a series of fifty-two drawings, which Bocarro said were not of his authorship. The collection at Évora is the result of compilation from documents made at different times by people of unequal abilities and in-

struction. Its great apparent homogeneity is essentially due to the intervention of a single draftsman. But it is rather doubtful that the copy from Évora, and another very similar one, both with figures so heavily illuminated that certain details become almost illegible, are the two original copies intended for the king.²⁵⁷ He probably would have wanted documents that were easier to read and less encumbered by color, as are those of the *Codice*

254. João Baptista Lavanha in João de Barros, *Quarta década da Ásia de João de Barros* (Madrid: Na Imprensa Real, 1615), and *PMC*, 4:71–72 and pl. 424.

255. *PMC*, 5:59–85 (table on 82–85).

256. It was first published in 1992, allowing a comparison between the text and figures: António Bocarro, *O livro das plantas de todas as fortalezas, cidades e povoações do estado da Índia Oriental*, 3 vols. (Lisbon: Imprensa Nacional–Casa da Moeda, 1992). Other iconographic collections have also been published recently: the collection of António de Mariz Carneiro in *Descrição da fortaleza de Sofala e das mais da Índia*, ed. Pedro Dias (Lisbon: Fundação Oriente, 1990), and the codex in the Biblioteca do Paço ducal de Vila Viçosa in Luís Silveira, ed., *Livro das plantas das fortalezas, cidades e povoações do estado da Índia Oriental* (Lisbon: Instituto de Investigação Científica Tropical, 1991). Two descriptions of Ceylon, with many maps, are reproduced in Jorge Manuel Flores, *Os olhos do rei: Desenhos e descrições portuguesas da ilha de Ceilão (1624–1638)* (Lisbon: CNCDP, 2001).

257. The similar copy was for sale at Oxford in 1961; see *PMC*, 5:62.



FIG. 38.25. VIEW OF THE FORTRESS AND ISLAND OF DIU, SEVENTEENTH CENTURY. From the “Livro das plantas das fortalezas, cidades e povoações do estado da Índia Oriental.”

Size of the original: 21 × 31.3 cm. Photograph courtesy of the Biblioteca do Paço Ducal, Vila Viçosa (Codice de Vila Viçosa, fol. 40).

de Vila Viçosa (fig. 38.25).²⁵⁸ In most cases, the maps are loosely referred to in the text. Bocarro emphasized the text, and he warned that he had not had time to realize the work as he had wished, “with the plans oriented and measured out, and drawn to scale, which was not possible for the great lack of persons skilled in these arts within this state. . . . I tried to put all the information in the description, which may be fully trusted, while no more is to be expected from the plans of the fortresses and towns than their form and figure, since in some the measurements are uniformly taken in proportion, while in others they have been less precisely determined; nor is the number of cannon painted in the plans to be accepted but the one given in the text.”²⁵⁹

It has been said that the author of the figures that accompany the text by Bocarro was Pedro Barreto de Resende,²⁶⁰ but this conclusion results from an incorrect reading of the preface of a version of the manuscript by Resende.²⁶¹ Resende was secretary to the count of Linhares, and when he returned with the viceroy to Portugal in 1636, he took advantage of the leisure on the voyage to complete a version of his own, “O livro do estado da Índia Oriental.” Resende explained in the preface that he had received Bocarro’s text in exchange for the set of plans that he had collected. He then used this text for his own version, correcting some accounts and adding to it the list of the fleets and governors and more illustrations of the fortresses of the Arabs, Dutch, and English, of which he had succeeded in getting news, as well as a map of the lands, forts, and rivers of the Cuama.²⁶²

There is no reason to think that Resende was the author of the drawings that accompany Bocarro’s text. In no

part of Resende’s preface did he say that he drew the plans; he said only that he had started his collection and “already had more of them” than Bocarro.²⁶³ Certainly he had, during his stay in India, more urgent tasks than making maps; at most, he may have copied some, or, more probably, he may have had them copied. Making and uniformly and carefully illuminating fifty-two drawings seems hardly a proper occupation for the secretary of a very active viceroy. Although the state of India lacked experts capable of making maps of the correct scale and orientation, there were certainly artists in Goa capable of the routine work of making good copies.

In general, Bocarro’s work deals more with the economic and military aspects of the state of India than with the nautical aspects, and, as the author warned, certain technical details referred to in the text do not appear in the corresponding drawings. The case of Mombasa is particularly elucidative. The text, which describes this place on the eastern coast of Africa, was written from graphic documentation much richer in information than the drawing finally included in the codex. Indeed, it represents the only case in which Bocarro indicated the sources he used: he said that the depths in fathoms of the sea channels that surround the island were given “according to the measurements that the cosmographer of this state took.”²⁶⁴ When Bocarro was writing, the cosmographer of India was Pierre Berthelot, but it is quite possible that Bocarro was referring to Manuel Godinho de Erédia, who died in 1623. There are discrepancies between Bocarro’s text and the figure that accompanies it, but there are similarities between his text and a known map by Erédia. The names and the shape of the bulwarks indicated in Bocarro’s text appear on Erédia’s map (1610), in addition to other matching names and data.²⁶⁵ Observations of this same type can be made about the fortress of Malacca, where the names of the bulwarks are not found in the figure incorporated in the Bocarro codex, but appear on a plan that Erédia made in 1604.²⁶⁶

258. This was also the case for the copy preserved in Madrid; see *PMC*, 5:63–64. The drawing of this copy was attributed to João Teixeira I in *PMC* and was considered a copy of the original made in India.

259. *PMC*, 5:60; author’s translation.

260. Cortesão, *Cartografia e cartógrafos portugueses*, 2:101–2, and *PMC*, 5:60–61.

261. Currently preserved in the BNF. See *PMC*, 5:65–67.

262. Cortesão, *Cartografia e cartógrafos portugueses*, 2:102–3. The Cuama rivers, including the Zambesi River, enter the Indian Ocean near that river.

263. *PMC*, 5:61.

264. Bocarro, *O livro das plantas*, 2:35.

265. *PMC*, 4:48. On Mombasa, see Boxer and Azevedo, *A fortaleza de Jesus*. Azevedo showed that the drawing by Erédia is hardly exact and includes even absurd details. The construction of the fortress began in 1593, according to a sketch by Giovanni Battista Cairato, but it was not finished in 1610.

266. Silveira, *Ensaio de iconografia*, vol. 3, pl. 815.

It seems, therefore, that Bocarro began writing his “Livro” using cartographic documentation that he had at hand but later decided to use the more complete, although technically inferior, collection of illustrations that Resende supplied. It is evident that not all the plans he consulted were by Erédia, because a significant number of the fortresses represented were conquered, constructed, or remodeled after Erédia’s death.²⁶⁷

Comparing the numerous seventeenth-century codices portraying the fortresses of Portuguese India with similar images incorporated in published works sheds light on contemporary routes of dissemination through Europe of information on the East and on the themes that most interested audiences then. These codices chiefly confirm that by this time there was a lack of cartographic professionals in India to perform surveys, for the Iberian states reserved them for work in Europe or Brazil.²⁶⁸ Erédia seems to have been the last creative Portuguese cartographer in the East.²⁶⁹

MAPPING AFRICA

By the time of the Cantino map (1502), the outlines of the African coast as mapped by the Portuguese approximated a modern representation, with the exception of the Red Sea. But the interior of the continent resisted European penetration for centuries, which drastically limited cartographic knowledge of it.²⁷⁰ During the second part of the fifteenth century, after the first contact of Portuguese sailors with the western coast of Africa from the Sahara to Sierra Leone, some adventurers traveled the principal commercial routes that connected points on the coast (the island of Arguim, the mouth of the Senegal River, and the island of Palma, later called Gorée) to the commercial centers of the interior, such as Ouadane in Mauritania and Djenné and Tombouctou on the Niger in Mali. These travelers left descriptions that showed a rather exact knowledge of the distances traveled.²⁷¹ But this knowledge was never depicted cartographically, as is demonstrated by the fact that until the nineteenth century, the great watershed between the western rivers (the Senegal and the Gambia) and the interior basin of the Niger was completely ignored by cartographers. One large river, Niger-Nile, went toward the Atlantic on the maps, dividing itself into a type of enormous delta made up of the different rivers that the Portuguese and, later, other Europeans, frequented only in the estuaries, which were accessible to their boats.

Likewise, the reconnaissance of the northern coast of the Gulf of Guinea—where the Portuguese established the important commercial *feitoria* (trading post) of São Jorge da Mina in 1482—essentially did not extend past the narrow coastal strip where commercial trade occurred.²⁷² Only south of the mouth of the river Zaire, in the southern hemisphere, were the Portuguese able to de-

velop stable, friendly relations with the king of the Congo and establish themselves in the vast region corresponding to present-day northern Angola.

In East Africa, the Portuguese firmly established themselves in two places: on the island of Mozambique, a crucial point of support for their navigation to India, and in Sofala, a fortress established in the swampy mouth of the Cuama rivers, where the gold produced in the interior of Monomotapa arrived.²⁷³ In 1552, João de Barros published a geographical description of this semimythical empire that implied previous explorations, possibly accompanied by cartographic sketches.²⁷⁴ We know, for example, of the voyage of António Fernandes from Sofala to Monomotapa in 1514.²⁷⁵ The text of João de Barros was used by the Italian cartographer Giacomo Gastaldi when he published a map of Africa in 1564 that modified, for the first time, the Ptolemaic maps.²⁷⁶

267. The fortresses of Quelba, Libedia, Madá, and Doba, in the vicinity of Mascate on the coast of Arabia, were conquered in 1623 or 1624; the fort of Damão was built in 1625; the fortress of Cambolim was founded in 1629; and the slips of palm trees, which appear in the drawing of the fortress of Caliture, in Ceylon, replaced the stone wall only after the rebellion of 1630.

268. João Baptista Lavanha made the map of Aragon in 1610–11; it was published in 1620 (*PMC*, 4:69–70, pl. 423). Agustín Hernando Rica, *La imagen de un país: Juan Bautista Labaña y su mapa de Aragón (1610–1620)* (Zaragoza: Institución “Fernando el Católico,” 1996). On Brazil, see pp. 1028–34.

269. Thomaz, “Archipelago in Portuguese Cartography,” 94.

270. The fundamental bibliography on the penetration and terrestrial cartography of Africa is La Roncière, *La découverte de l’Afrique*. See also Yūsuf Kamāl (Youssef Kamal), *Monumenta cartographica Africae et Aegypti*, 5 vols. (Cairo, 1926–51); Maria Emília Madeira Santos, *Viagens de exploração terrestre dos portugueses em África*, 2d ed. (Lisbon: Centro de Estudos de História e Cartografia Antiga, 1988); I. Norwich, *Maps of Africa: An Illustrated and Annotated Carto-Bibliography* (Johannesburg: Ad. Donker, 1983); and Francesc Relajo, *The Shaping of Africa: Cosmographic Discourse and Cartographic Science in Late Medieval and Early Modern Europe* (Aldershot: Ashgate, 2002).

271. The main description of the interior lands was assembled in 1506 by the German printer Valentim Fernandes from the oral reports of João Rodrigues, who traveled the Sertão de Arguim (present-day Mauritania) starting in 1498. See *Códice Valentim Fernandes* (Lisbon: Academia Portuguesa da História, 1997); Santos, *Viagens de exploração terrestre*, 33–41; and Suzanne Daveau, *A descoberta da África Ocidental: Ambiente natural e sociedades* (Lisbon: CNCDP, 1999).

272. The northern coast of the Gulf of Guinea is described in detail in the “Esmeraldo de situ orbis” by Pacheco Pereira (1505–8); see Santos, *Viagens de exploração terrestre*, 45–53.

273. On the Portuguese cartography of Africa south of the equator, see especially W. G. L. Randles, *L’image du sud-est Africain dans la littérature européenne au XVI^e siècle* (Lisbon: Centro de Estudos Históricos Ultramarinos, 1959), and A. Teixeira da Mota, *A cartografia antiga da África Central e a Travessia entre Angola e Moçambique, 1500–1860* (Lourenço Marques: Sociedade de Estudos de Moçambique, 1964).

274. Barros, *Asia*, 1:391–98 (*década* 1, bk. 10, chap. 1).

275. Hugh Tracey, *António Fernandes, descobridor do Monomotapa, 1514–1515*, trans. Caetano Montez (Lourenço Marques: Arquivo Histórico de Moçambique, 1940).

276. Teixeira da Mota, *Cartografia antiga*, 25–30.

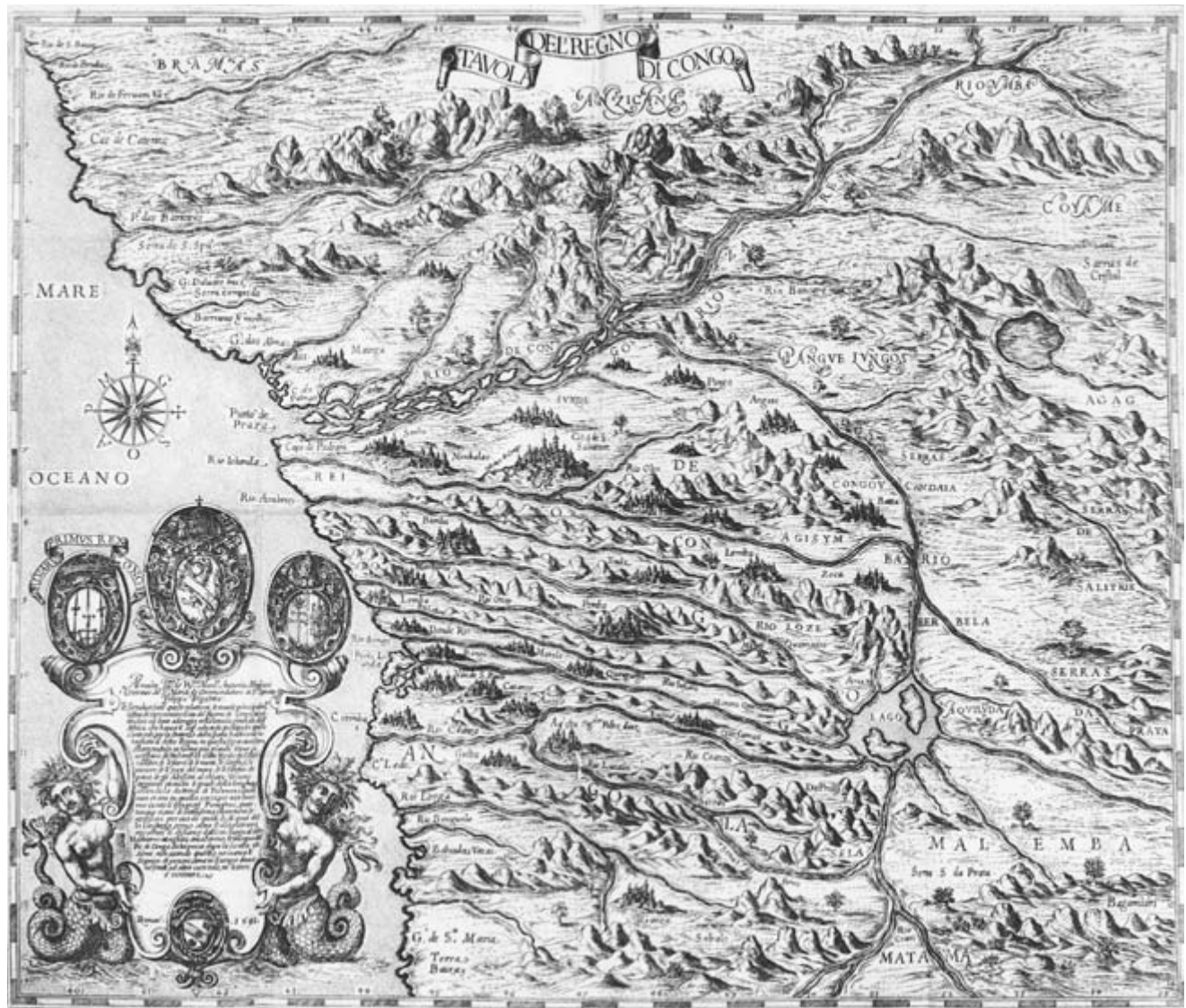


FIG. 38.26. MAP OF THE CONGO PUBLISHED BY PIGAFETTA, 1591. In Duarte Lopes and Filippo Pigafetta, *Relatione del Reame di Congo et delle circonvicine contrade*

(Rome: Bartolomeo Grassi, 1591).

Size of the original: ca. 43.3 × 50.2 cm. Photograph courtesy of the BL (G.7151).

The Portuguese Duarte Lopes, who had been living at the court of the king of the Congo from 1578, was sent to Rome as the ambassador of this king and took there a map of Africa that served as a basis for the two maps published by Filippo Pigafetta in 1591. One of these maps, on a scale of about 1:4,500,000, represents the kingdom of the Congo crossed by several rivers labeled in most cases with their current names (fig. 38.26). The other map represents the eastern two-thirds of the African continent and compiles the knowledge that, directly or indirectly, the Portuguese had by then obtained of it. The author of the map that Duarte Lopes obtained, probably in Portugal where he went in 1584, is unknown.²⁷⁷

A series of early seventeenth-century maps of the area around the mouth of the Zambezi is also preserved. These

were possibly based on prototypes from the sixteenth century that represented the market towns of Monomotapa.²⁷⁸ On one of these maps, dated from about 1636 (fig. 38.27), there is a small lake, which marks the southern extremity of Lake Nyasa. We know of several explorations that were ordered at this time and of a map “made by a Portuguese who traveled many years in the kingdoms of Monomotapa,” which Father Manuel Godinho said in 1665 that he had seen.²⁷⁹

277. PMC, 3:103–8 and pl. 386A–B, and Duarte Lopes and Filippo Pigafetta, *Relatione del reame di Congo et delle circonvicine contrade* (Rome: B. Grassi, 1591).

278. PMC, vol. 4, pl. 419F, and vol. 5, pls. 579A–D and 580A–B, and Teixeira da Mota, *Cartografia antiga*, 41–57.

279. Godinho, *Relação*, 218–19.



FIG. 38.27. SEVENTEENTH-CENTURY MAP OF THE RIOS DE CUAMA (NEAR THE MOUTH OF THE ZAMBEZI RIVER).

Size of the original: 19.6 × 30.2 cm. Photograph courtesy of the Bildarchiv, Österreichische Nationalbibliothek, Vienna (Atlas Stosch [vol. 281], map 30).

Another part of Africa on which the Portuguese received early information was Abyssinia. Probably first to arrive in the West were cartographic sketches brought by Abyssinian monks. These, along with other data—especially resulting from the voyage of the Portuguese ambassador Rodrigo de Lima (1519–27), described and published in 1540 by Father Francisco Álvares²⁸⁰—were used by cartographers, but they placed features of Abyssinia too far south. Around 1645, the Jesuit Manoel de Almeida made a map of Abyssinia, where he had traveled between 1624 and 1633. With the help of an astrolabe, he located the latitudes of places. He drew with greater exactitude the course and the source of the Blue Nile, which had been described in 1618 by the Spanish Jesuit Pedro Páez. An engraved version of Almeida's political-administrative map of the Abyssinian empire was included in *História geral da Etiópia a alta* in 1660 and thus was widely distributed (fig. 38.28).²⁸¹

To compensate for the lack of firsthand knowledge of the majority of the interior of the African continent, European cartographers resorted to two strategies. First, they widened the space covered by the toponyms referring to Abyssinia, pushing them out to the equatorial regions and to the southern part of the continent. Second, they adopted Ptolemaic ideas regarding the sources and the course of the Nile. The hydrography proposed by the Alexandrian geographer began at the Mountains of the Moon, south of the equator. From them and flowing north emerged several rivers that arrived at two large parallel lakes situated approximately at the same latitude, still in the southern hemisphere. New watercourses flowed from each of these lakes and converged to form the main course of the Nile, to the north of the equator. Downstream, the



FIG. 38.28. ENGRAVED VERSION OF MANOEL DE ALMEIDA'S MAP OF ABYSSINIA, 1660. Manoel de Almeida, *História geral de Etiópia a alta* . . . , ed. Balthazar Telles (Coimbra, 1660).

Size of the original: ca. 26.6 × 36.4 cm. Photograph courtesy of the BL (984.f.15).

great African river received several Abyssinian tributaries and ran north, emptying into the Mediterranean.

From the beginning of the sixteenth century, this image of the African interior appeared in Portuguese cartography. It is observed, for example, on the anonymous maps known as King-Hamy (ca. 1504) and Kunstmann III (ca. 1506). But it was through the maps printed by Martin Waldseemüller (1507 and 1516) that the Ptolemaic scheme of central Africa was perpetuated by generations of cartographers that followed.

The first variant was the work of Giacomo Gastaldi, who published a map of Africa (Venice, 1564) on which the Mountains of the Moon were not represented and one of the large interior lakes was portrayed as serving as a source not only of the Nile but also of most of the rest of the African rivers. These ideas had already been present in the description that João de Barros gave in 1552 of the Monomotapa empire, a description that Gastaldi must have read in an Italian translation in the second edition of volume 1 of *Navigazioni e viaggi* (1554).²⁸² The drawing by Gastaldi of 1564 was adopted by Ortelius in his *Theatrum orbis terrarum* (1570), which popularized it among European cartographers of the following periods.

280. Álvares, *Ho Preste Joam das Indias*, and Santos, *Viagens de exploração terrestre*, 57–68.

281. Manoel de Almeida, *História geral de Etiópia a alta* . . . , ed. Balthazar Telles (Coimbra, 1660); *PMC*, 5:108–16, pls. 607–8, quotation on 110; Teixeira da Mota, *Cartografia antiga*, 65–69; and Santos, *Viagens de exploração terrestre*, 109–17.

282. Giovanni Battista Ramusio, *Primo volume, & seconda editione delle navigazioni et viaggi*, 2d ed. (Venice: Nelle stamperia de Givnti, 1554).

Even with the variants that it introduced, the scheme of Barros-Gastaldi for central Africa continued the main lines of the hydrographic system proposed by Ptolemy. The first real alternative for the representation of this region was the map of Africa acquired by Lopes and published by Filippo Pigafetta in 1591.²⁸³ On this map, the Mountains of the Moon no longer played an important role as the source of the Nile, and the origin of the river was depicted north instead of south of the equator. The great lakes of central Africa were not side by side at the same latitude, but were depicted vertically on the same meridian. Nothing like this version had appeared in printed European cartography, although some of the elements had already been present, embryonically, on previous Portuguese manuscript maps. For example, some essential aspects were already suggested on André Homem's world map (1559);²⁸⁴ two years later, they appeared in a more defined form on the map of Africa by Bartolomeu Velho;²⁸⁵ and finally, there is a similar scheme on the maps by Pedro de Lemos (ca. 1583) and Bartolomeu Lasso (1584 and 1590).²⁸⁶

Consequently, the greatest contribution of the map published by Pigafetta was that it systematically elaborated these ideas concerning central Africa and made them known in Europe. The problem was that, in the absence of texts that disseminated the results of exploration, most European cartographers remained faithful to the Ptolemaic model. Due to the action of the Iberian Jesuits, knowledge of Abyssinia was much improved after 1660, and cartographers were obligated to modify substantially their representation of central Africa. Although they cleared the area of most of the toponymy that did not correspond to it, the sources of the Nile continued to be drawn according to the classical tradition for a long time.

THE BRAZILIAN COASTS

Intense discussion surrounds the issue of whether Pedro Álvares Cabral's arrival at Porto Seguro (16°18'S, 38°58'W) on 23 April 1500 was intentional or not. The controversy persists, though at present the prevailing thesis is that the discovery was intentional, regardless of the term we use to describe it.²⁸⁷ Perhaps more interesting than the question of intentionality, however, is an examination of how the conceptualization of this unknown territory gained shape and currency from that point onward. Maps naturally occupy a central place in this conceptualization.

One of the fundamental doubts surrounding the configuration of the territory reached by Cabral had to do with whether it was an island or a continent, and how big this island or continent was. Another conundrum was presented by the new territory's spatial relationship with Asia. And then there was the question of the relationship

between the lands farther north—later to be designated North America but identified as the “Antilles of the King of Castile” in the Cantino map of 1502—and South America.²⁸⁸

In the Old World, these new and distant lands—the Antilles (discovered by Christopher Columbus, 1492–98), Nova Scotia (possibly by John Cabot, 1497?), South America near the equator (by Duarte Pacheco Pereira, 1498?), Brazil (by Amerigo Vespucci, 1498?), Surinam (by Martín Alonso Pinzón and Diego de Lepe, 1499/1500), Porto Seguro (by Pedro Álvares Cabral, 1500), and Newfoundland (by the Corte-Real brothers, 1501/2)—were known under a profusion of different names, and the surviving maps from this early period clearly attest to the difficulties encountered in conceptualizing these unknown tracts of territory, whose extent was only just beginning to be appreciated and whose delineation remained confused.

The area that came to be known as “America,” in tribute to Amerigo Vespucci after the Waldseemüller map of 1507, was variously known as the “Fourth Continent,” the “New World,” the “West Indies,” the “Castilian Indies,” and “Terra Firma.” Only one expression, “Fourth Continent”—and this the least current and from texts much later than the discoveries—makes explicit reference to a continent rather than an island. The New World stood in opposition to the Old, though neither its form nor its extent was known; and the West Indies, or Castil-

283. Francesc Relaño, “Against Ptolemy: The Significance of the Lopes-Pigafetta Map of Africa,” *Imago Mundi* 47 (1995): 49–66.

284. Made in Antwerp, preserved in the BNF; see *PMC*, 2:67–71, pl. 191.

285. Preserved in Florence; see *PMC*, vol. 2, pl. 203, and Teixeira da Mota, *Cartografia antiga*, 31–39.

286. Lemos, ca. 1583, world map preserved in the BNF, attributed with doubts to Sebastião Lopes by Armando Cortesão, reproduced in *PMC*, vol. 4, pl. 408; Lasso, 1584, *PMC*, 3:95–96, pl. 380; and Lasso, 1590, fifth chart of the Atlas of Rotterdam, *PMC*, 3:91–92, pl. 375.

287. As Guedes has remarked, “Rivers of ink have flowed in the discussion surrounding chance or intention of the arrival of Cabral's fleet in Brazil”; see Max Justo Guedes, “O descobrimento do Brasil,” *Oceanos* 39 (1999): 8–16, esp. 13. This edition of *Oceanos* is entirely dedicated to “O achamento do Brasil,” the title work. Also worth mentioning are Jaime Cortesão, *Introdução à história das bandeiras*, 2 vols. (Lisbon: Portugalia, 1964); idem, *História do Brasil*; idem, “América,” in *Dicionário de história de Portugal*, ed. Joel Serrão, 4 vols. (Lisbon: Iniciativas Editoriais, 1963–71), 1:128–43; idem, *A expedição de Pedro Álvares Cabral e o descobrimento do Brasil* (Lisbon: Imprensa Nacional–Casa da Moeda, 1994); and *A construção do Brasil, 1500–1825*, exhibition catalog (Lisbon: CNCDP, 2000). Opinions vary on whether the term *achamento* designates “accidental” and *descoberta* connotes “intentionality.”

288. Not until 1538, with Gerardus Mercator, was there a clear distinction between the concepts of “America pars septentrionalis” and “America pars meridionalis.” The term “Central America” did not gain currency until the nineteenth century with the applied exploration of the interior and the intellectual and material appropriation of the continent as a whole.

ian Indies, stood in opposition to the other, fabled Indies, thenceforth known as the East Indies, whose frontiers and dimensions were equally unknown. Even the expression “Terra Firma” did not necessarily denote a continent, for it could equally have been applied to a relatively extensive body of land in the midst of an immense ocean.

The land that would later be known as Brazil was also designated in various ways. The expression “Terra de Vera Cruz” had its origins in the letter sent to King Manuel by João Faras, physician and astronomer to the fleet of Pedro Álvares Cabral, after the discovery of 1500. Faras datelined his letter “Ilha [Island] de Vera Cruz.” The later designation “Província de Santa Cruz,” used by Manuel in a letter to Ferdinand and Isabella notifying them of the discovery, is an alteration of the earlier form, perhaps used for political purposes.²⁸⁹ “Brazil” did not gain currency until after 1508; it was a designation that perhaps served to fix the mythical isle of Brazil, which had drifted around the Atlantic at the whim of cartographers ever since it was first mentioned in a 1325 chart by Angelo Dalorto. “Brazil wood” was perhaps named in deference to the first valuable resource to be yielded by this vast and unknown territory.

Although neither the geographical extent nor the economic importance of Brazil was known at the time, the respective limits of the dominions of Portugal and Castile were already indicated in the earliest surviving map of Portuguese origin, the Cantino map of 1502, in the form of the Tordesillas meridian. The important thing was to indicate the division of the world between the two Iberian powers, independent of the actual form, dimension, or importance of the newly discovered territory. The many world maps that followed the Cantino successively recorded new information provided either by the pilots dispatched by the Portuguese crown and other countries or by individual initiative. Because there was a close correlation between the earliest coastal explorations and the earliest maps in the first two decades of the sixteenth century (a correlation that later disappeared with the proliferation of cartographers, explorers, and accounts by inhabitants), it is this correlation that we will examine first.

The Early Explorers of Brazil and Maps: From the Cantino Map (1502) to That of Reinell (1519)

The representation of Brazil on the Cantino map²⁹⁰ was fundamentally based on the third voyage of Columbus (1498), on which the coast of modern Venezuela was sighted; the (unconfirmed) discovery by Duarte Pacheco Pereira in 1498, to which Pereira assigned a latitude of around 3°30' south;²⁹¹ the voyages of Martín Alonso Pinzón and Diego de Lepe in present-day Surinam in 1499 and 1500; and, above all, the expedition of Pedro

Álvares Cabral, of which Gaspar de Lemos, sent by Cabral to Portugal, gave an account, and the later expedition by Gonçalo Coelho and Amerigo Vespucci (1501–2), which covered the Brazilian coast from Rio Grande do Norte to Cananeia at about 25° south. All these sources contributed to the form given to the Brazilian coast in the Cantino map.

Two Portuguese maps made after the Cantino, the so-called Kunstmann III of about 1506 and the chart included in the “Livro” of Francisco Rodrigues of about 1513, added hardly anything new,²⁹² despite the fact that the commercial and geographical jurisdiction over the Brazilian coastline had been awarded to Fernão de Loronha in 1502. That jurisdiction had clear parallels with the similar concession made to Fernão Gomes for the African coast.²⁹³ In fact, there are indications that in the early years of the sixteenth century, the principal interest of the Portuguese crown lay not in Brazil but in the Orient.

The chart of about 1519 attributed to Jorge Reinell, and the map in the atlas by Lopo Homem and the Reinells

289. The erection of a large wooden cross to indicate watering places for later fleets was probably the origin of the name “Santa Cruz,” used by Manuel I in the letter. See *A construção do Brasil*. Later, the substantive “terra,” or sometimes “província,” was added.

290. The main bibliography on this world map is given on p. 993, note 99, in this chapter.

291. Pacheco Pereira, *Esmeraldo*, bk. 1, chap. 7 (p. 553 in Carvalho ed.). On the subject of the supposed voyage of Pereira, see Max Justo Guedes, *O descobrimento do Brasil* (Lisbon: CTT, 2000), 10: “If Duarte Pacheco Pereira was in the equatorial regions of Brazil, why does the table of latitudes of Brazil kept in the *Esmeraldo* only go as far [north] as the bay of São Roque, at 3°30'S? Might he perhaps have lost interest in the region after reckoning the rights of the Portuguese crown to the territory to be debatable?”

292. In the Kunstmann III chart (see fig. 30.17), the Brazilian coast is well to the east of its true location, and there are errors in the latitudes given for some points already known, such as Cabo de Santo Agostinho and Rio de Cananeia. Nevertheless, there are improvements, as in the general orientation of the coastline. And this chart featured, for the first time, the island of Trinidad, discovered in 1503 (Guedes, “Dos primórdios cartográficos nas Américas,” 190).

The twenty-six charts in the “Livro de Francisco Rodrigues” are almost entirely dedicated to the Orient, as suggested on the opening page, titled “Piloto maior da primeira frota que descobriu Banda e as Molucas.” Rodrigues’s chart of the Moluccas was the first. The only chart of Brazil in the “Livro” has no toponymy but locates the Abrolhos reef for the first time.

293. In the lease awarded in 1502, a consortium of merchants led by Fernão de Loronha was given exclusive rights to the commercial exploitation of Terra de Santa Cruz on the condition that every year they carry out a survey of three hundred leagues of coastline and pay four thousand ducats to the crown. Whether the contract remained in force until 1512 or only until 1505 is uncertain, but we do know that in 1513 the monopoly on the brazil wood trade belonged to Jorge Lopes Bixorda, under terms unknown. See Jorge Couto, “Dos modelos de colonização do Brasil,” *Diário de Notícias*, August 1994, *Rotas da terra e do mar*, fasc. 9, 10, and 11, pp. 210–42, esp. 10. See also Francis Dutra, “Brazil: Discovery and Immediate Aftermath,” in *Portugal, the Pathfinder*, ed. George D. Winius (Madison, 1995), 145–68.

(called the Miller Atlas) of the same year, were probably the first to record anything significantly new. Jorge Reinel's was the first Portuguese chart to plot the coastline continuously from the Panama isthmus (on the Pacific side) down to the mouth of the Rio de la Plata. The map of Brazil in the atlas by Lopo Homem and the Reinels of 1519 features the South American coast from the Amazon Delta to the mouth of the Rio de la Plata²⁹⁴ and differs from earlier representations in three fundamental aspects: its toponymy is far more abundant; its iconographic treatment of the interior is fascinating, especially in its references to brazil wood; and its legends provide valuable information on the inhabitants of the Brazilian interior.²⁹⁵

The Proliferation of Charts and Cartographers:
From Diogo Ribeiro (1525) to
Sebastião Lopes (ca. 1583)

After the early years of the sixteenth century, the reconnaissance of the Brazilian coast and the commercial potential of brazil wood attracted the interest of not only the Portuguese and Spanish but also the French and Italians; slightly later came the Dutch. The length of the coastline, and the fact that the fabled Orient dominated Manuel's thoughts, made a survey of Brazilian territory difficult.²⁹⁶ Therefore, the maps made at that time, in Portugal and elsewhere, drew on a diversity of sources—a phenomenon that prompted Guedes, to whom we owe the most important studies on Brazilian cartography, to describe this period as one of "cartographic cosmopolitanism."²⁹⁷

Few of the Portuguese maps featuring Brazil made prior to the detailed surveys of Luís Teixeira about 1566 introduced any real improvement to the form of the coastline. As for the interior, geographical information was limited to the major rivers, the Amazon and the Plata, which were thoroughly navigated by Portuguese and Spanish explorers. So in some maps, the interior is filled in with beautiful illuminations that, like the missives of the earliest visitors, tell us something of the territory's inhabitants and their customs—so alien to European eyes—and its natural resources.²⁹⁸

The world maps by Diogo Ribeiro of 1525, 1527, and 1529 were made in Spain and differ little in their representation of the coastline, and the chart of about 1532 followed their precedent. But these maps did, naturally enough, record information from the expeditions sent by Spain, namely those led by the Portuguese explorers Juan Díaz de Solís (a resident of Castile) and his brother-in-law Francisco Torres in 1515/16 to the mouth of the river Solís (later renamed the Rio de la Plata).²⁹⁹ Diogo Ribeiro's maps recorded the Strait of Magellan for the first time (it was navigated by Magellan in 1520), as well as the information gathered on the expeditions of Giovanni da Verrazzano in 1524, in the service of François I.

294. The main sources appear to have been the expedition of Gonçalo Coelho in 1503, the outcome of which was the first trading post in the bay of Guanabara; the voyage of the royal herald Diogo Ribeiro (the cartographer's namesake) with Estêvão Fróis in 1513, in a fleet assembled by the Spaniard Cristóbal de Haro; the voyage in the same year of a new fleet, again assembled by Cristóbal de Haro in conjunction with Nuno Manuel, one of whose caravels, captained by João de Lisboa, explored the area south of Cananeia as far as the mouth of the Plata; and finally, the expedition of Vasco Núñez de Balboa in 1516–17, on which the Pacific was sighted. See Joaquim Antero Romero Magalhães, "O reconhecimento da costa," *Oceanos* 39 (1999): 102–12, and Inácio Guerreiro, "A revelação da imagem do Brasil (1500–1540)," *Oceanos* 39 (1999): 114–26.

295. "This is the chart of the region of great Brazil and on the western side it reaches the Antilles of the King of Castile. Its people are somewhat dark in colour. Savage and very cruel, they feed on human flesh. These same people are most skillful in the use of bow and arrows. Here are multi-coloured parrots and innumerable other birds and monstrous wild beasts. And many kinds of monkeys are found and there grows in great quantity the tree called brazil, which is considered proper for dyeing clothes in purple" (*PMC*, 1:57).

296. A remark that is borne out by figures: around 1540, only about two thousand Portuguese and perhaps three or four thousand slaves were settled in Brazil, while in India there were some ten thousand. Even as late as 1650, the coastal belt had not been fully colonized.

297. Guedes, "Dos primórdios cartográficos nas Américas," 200. An inventory of the maps is found in Rivera Novo and Martín-Merás, *Cuatro siglos de cartografía en América*, clearly illustrating the exchange of sources also observed in María Luisa Martín-Merás, *Cartografía marítima hispana: La imagen de América* (Barcelona: Lunwerg, 1993), and J. B. Harley, *Maps and the Columbian Encounter: An Interpretive Guide to the Travelling Exhibition* (Milwaukee: Golda Meir Library, University of Wisconsin, 1990).

298. We can recall the best-known and most important missives here. Pero Vaz de Caminha's "Carta," written in 1500 to Manuel after the arrival of Pedro Álvares Cabral in the "Terra de Vera Cruz," is a valuable account of the Europeans' first contact with nature and natives, written from a perspective evincing both fascination and affection. Not published until the nineteenth century, the letter was first studied by Cortesão in Pero Vaz de Caminha, *A carta de Pero Vaz de Caminha*, ed. Jaime Cortesão (Rio de Janeiro: Livros de Portugal, 1943). Of the six controversial letters by Amerigo Vespucci, perhaps written shortly after 1500, we can recall the first two here: the letter known as "Mundus novus," addressed to Lorenzo di Pierfrancesco de' Medici, with no indication either of place or date, and the "Lettera di Amerigo Vespucci delle isole nuovamente trovate in quattro suoi viaggi," published in Latin in 1507 and known as the *Lettera*. The authenticity of these letters has often been called into question. For the ample bibliography on Vespucci, see Max Justo Guedes, "Vespúcio, Américo," in *Dicionário de história dos descobrimentos portugueses*, 2 vols., ed. Luís de Albuquerque (Lisbon: Caminho, 1994), 2:1073–77.

299. On the life and work of Diogo Ribeiro, see the earlier discussion in this chapter. The difficulty in correctly locating the Tordesillas meridian, believed to pass through the Amazon Delta and the mouth of the Rio de la Plata, was the cause of ongoing political friction between Portugal and Spain for possession of the latter estuary. The orientation of the northern coastline—very nearly east-west—and the problem of longitude were motives for a series of expeditions, of which we can list, besides that leading to the discovery of the Amazon Delta in 1500 (possibly by Vicente Yáñez Pinzón), those of Estêvão Fróis (1513), Diogo Leite (1531), João de Barros and Aires da Cunha (1536), and João de Barros's sons (1556 and 1561). See Synésio Sampaio Góes [Filho], "Navegantes do Brasil," *Oceanos* 39 (1999): 34–52; *A construção do Brasil*; and Maria Fernanda Alegria, "Representações do Brasil na



FIG. 38.29. DETAIL OF THE EAST COAST OF SOUTH AMERICA, ANONYMOUS [DIOGO RIBEIRO], CA. 1532. Compare this to figure 38.30. Note the different extent of the coastline to the east of the mouth of the Maranhão River. This chart is also attributed to Alonso de Chaves; see figure 40.15. Photograph courtesy of the Herzog August Bibliothek, Wolfenbüttel (Cod. Guelf. 104A and B Aug.)

It is to Gaspar Viegas that we owe thanks for the first partial maps of Brazil, that is, charts of small portions of the coastline assembled in collections, as well as the earliest charting of the discoveries made during the important and meticulously recorded 1530–33 expedition of Martim Afonso de Sousa and his brother Pero Lopes de Sousa from the Amazon Delta to the mouth of the Rio de la Plata. This expedition was commissioned by the king of Portugal, João III, in response to the alarm generated by the fleets of Sebastian Cabot and Diogo Garcia, in the service of Charles V, and involved a variety of obligations.³⁰⁰ Viegas recorded new names in the coastal belt, coined by Martim Afonso de Sousa,³⁰¹ and corrected the course of the rivers Paraguay and Paraná. The mouth of the Rio de la Plata, notwithstanding its generous dimensions, was more accurately depicted. Gaspar Viegas also drew on the maps of Diogo Ribeiro for his representation of the mouth of the Plata, but he did not follow the lead of Ribeiro (or possibly Alonso de Chaves) in his outline of the northern coast of South America. In fact, perhaps due to his respect for and friendship with Sebastian Cabot, Ribeiro reduced the extent of the coastline to the east of

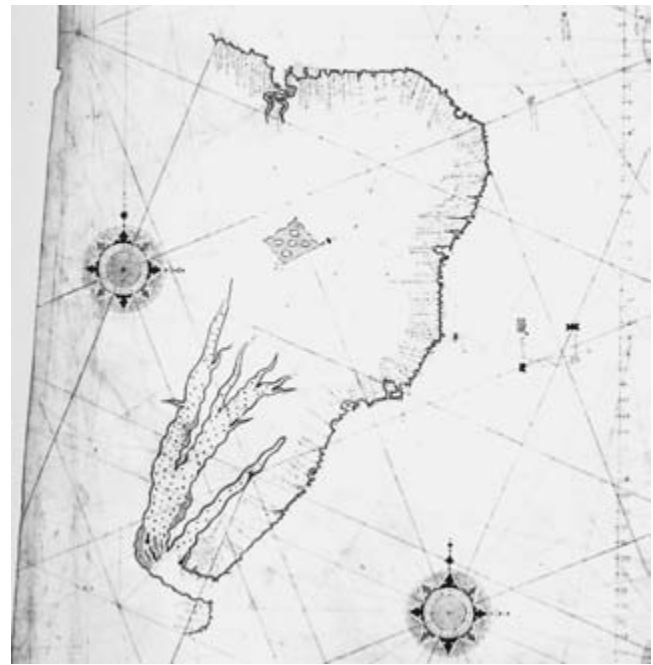


FIG. 38.30. DETAIL OF THE EAST COAST OF SOUTH AMERICA, GASPAR VIEGAS, 1534. See the caption to figure 38.29.

Size of the entire original: 96 × 70 cm. Photograph courtesy of the BNF (Rés. Ge B 1132).

the mouth of the Maranhão, a feature that is absent from the charts of Gaspar Viegas (figs. 38.29 and 38.30). The latter made a clear distinction between Furna Grande, the name given by the Spanish to the Amazon Delta, and the Maranhão of the Portuguese, with an innovative design reminiscent of a tooth complete with roots (the rivers Mearim and Itapicuru).

The first map to feature the entire course of the Amazon and the Maranhão (i.e., the delta, known until then

produção dos cartógrafos Teixeira (c. 1586–1675),” *Mare Liberum* 10 (1995): 189–204. On the expedition by Juan Díaz de Solís and his brother-in-law in search of the “Southern Sea” in 1515/16 (from Cabo de Santo Agostinho to the mouth of the Plata), Solís was eaten by the natives. Francisco Torres remained on the continent and appropriated an interest in the brazil wood trade, which caused Manuel to protest strongly to Spain. A few years later, the French explorations began, followed in 1524 by the expedition of the Verrazzano brothers Giovanni and Girolano.

300. The objectives of the expedition of Martim Afonso de Sousa were various: to survey the coast south of Cananeia, placing *padrões* in strategic spots; to drive the French out of the territory now known as Paraíba, Rio de Janeiro; to prospect for precious metals; and to set up experimental farms and launch the colonization of the territory. St. Vincent (1532), Santos (1545), Pernambuco (1535), and Olinda (1535) were founded as a result of this expedition.

301. Some of those recorded include “b. de diogo leite” on the north coast, “sam p^o” (São Pedro), and “Rio de mti a.^a de sousa” (i.e., river of Martim Afonso de Sousa).

as Mar Dulce) was Sebastian Cabot's map of 1544 (engraved in London in 1553). António Pereira, in his chart of about 1545, was probably the first Portuguese cartographer to record information from the voyage of Francisco de Orellana of 1542,³⁰² on which the Spaniard had navigated the entire length of the Amazon, even recording toponyms that Cabot had failed to indicate.

A decade later, another Portuguese map drew on Cabot, plotting the course of the Amazon in sweeping, serpentine curves—the Lopo Homem world map of 1554. This was an image that was later repeated in many maps by other cartographers of various nationalities. New coastal settlements, such as Salvador (founded in 1549), were recorded in anonymous charts of about 1560, one of which is attributed to João de Lisboa, as were the leading cities of the interior, for example, Quito. As we can see, the information necessary for the creation of new maps was in circulation, even if the political strategists prized secrecy.

Sebastião Lopes and Bartolomeu Velho, among other Portuguese cartographers, clearly represented Brazil as an island.³⁰³ Lopes's maps of 1558, about 1565, about 1570, and about 1583 depicted it as a self-contained area separated from the rest of the continent by tributaries of the Amazon and the Plata, which intercommunicated via one or more lakes, as can be seen on the charts of about 1570 and about 1583. These were basically exaggerated representations, if schematically accurate, that conferred geographical autonomy on an area marked out for political autonomy: the Plata basin and the tributaries of the Amazon were no more than an artificial conceptualization of a huge swamp area and the hydrographic systems emanating from it.³⁰⁴ Bartolomeu Velho's chart of 1561 maintained the concept of Brazil as an island and was the first to feature the subdivision of the territories into captaincies, as ordered by João III on the return of Martim Afonso de Sousa in 1533.³⁰⁵

The study of Ventura on the presence of the Portuguese in the expeditions of Spain contains this observation: "The sixteenth-century expansion in America must be seen, on the one hand, in light of an extremely complex framework of mental and cultural references, and on the other as spurred by pressing economic motivations that in no way correspond to questions of nationality. . . . In this period the Iberian states found it extremely difficult to impose a political awareness of territory, for people felt more affinity with their immediate neighborhood . . . than with speakers of the same language, or those subject to the same law."³⁰⁶ The Portuguese may have discovered Brazil, but other countries, Spain in particular, contributed to the cartographic record of the exploration of the new territory and the later colonization of the interior.

Brazilian Cartography by the Teixeira Family (ca. 1586–1642)

The cartographers who brought knowledge of the Brazilian coast to a new degree of perfection were Luís Teixeira and João Teixeira Albernaz I. Figure 38.31 indicates the location of each sheet in the seven atlases compiled between about 1586 and 1642. The series began with an atlas by Luís Teixeira of which twelve pages survive (one illustrating the whole coastline) and continued with João Teixeira Albernaz I and a progressive survey of other stretches of the Brazilian coastline, which by 1642 had been fully charted.³⁰⁷ But it was not just the extent of the area covered in these atlases that marked the improvements we are referring to. The scale of the maps (indicated on each), the figurative treatment of phenomena, and the legends also attest to the progress being made. Luís Teixeira did not indicate scale in any of his partial maps, although he did in his general chart. João Teixeira Albernaz I indicated scale in some maps in his atlas of 1631 and in all maps in his atlas of 1640. The accuracy improved, too, especially in the more frequented, more heavily inhabited sections of the coast.

All the Teixeira atlases of Brazil—those by Luís Teixeira, João Teixeira Albernaz I, and the latter's grandson

302. At least two Portuguese took part in this expedition.

303. This conception was first represented by João Afonso, ca. 1543 (there is no doubt that he was Portuguese by nationality), and later by André Homem in his world map of 1554. A comprehensive list of the Portuguese maps showing Brazil as an island can be found in Alfredo Pinheiro Marques, *A cartografia do Brasil no século XVI* (Lisbon: Instituto de Investigação Científica Tropical, 1988).

304. The graphic representations of "island-Brazil" did not draw on a common prototype. In charts by Bartolomeu Velho of 1560 and 1561, for example, the great central lake is connected to the Amazon and the S. Francisco, which in turn connects to the Paraná downstream from Assunção, while in the chart by Sebastião Lopes of ca. 1570 these connections do not exist. In the latter chart, the great central lake is connected to a smaller lake, located to the west, into which debouches a small river flowing from the Andes. The absence of the connection between the central lake and the Amazon is a feature of the atlases of Fernão Vaz Dourado (1568, 1570, 1571, 1575, ca. 1576, and 1580), in which the course of the rivers is also considerably different. See Maria Fernanda Alegria, "A produção cartográfica portuguesa sobre o Brasil (1502–1655): Tentativa de tipologia espacial e temática," in *Portugal e Brasil no advento do mundo moderno*, ed. Maria do Rosário Pimentel (Lisbon: Edições Colibri, 2001), 59–89.

305. This is also the oldest Portuguese chart to feature depth readings, indicated next to Newfoundland.

306. Maria da Graça Mateus Ventura, "Portugueses nas Índias de Castela: Percursos e percepções," in *Viagens e viajantes no Atlântico quinhentista* (Lisbon: Edições Colibri, 1996), 101–31, esp. 101. The doctoral thesis of this author addresses the same problem: *Portugueses no descobrimento e conquista da Hispano-América: Viagens e expedições (1492–1557)* (Lisbon: Edições Colibri, 2000).

307. Based, with some modifications, on the article by Alegria, "Representações do Brasil."

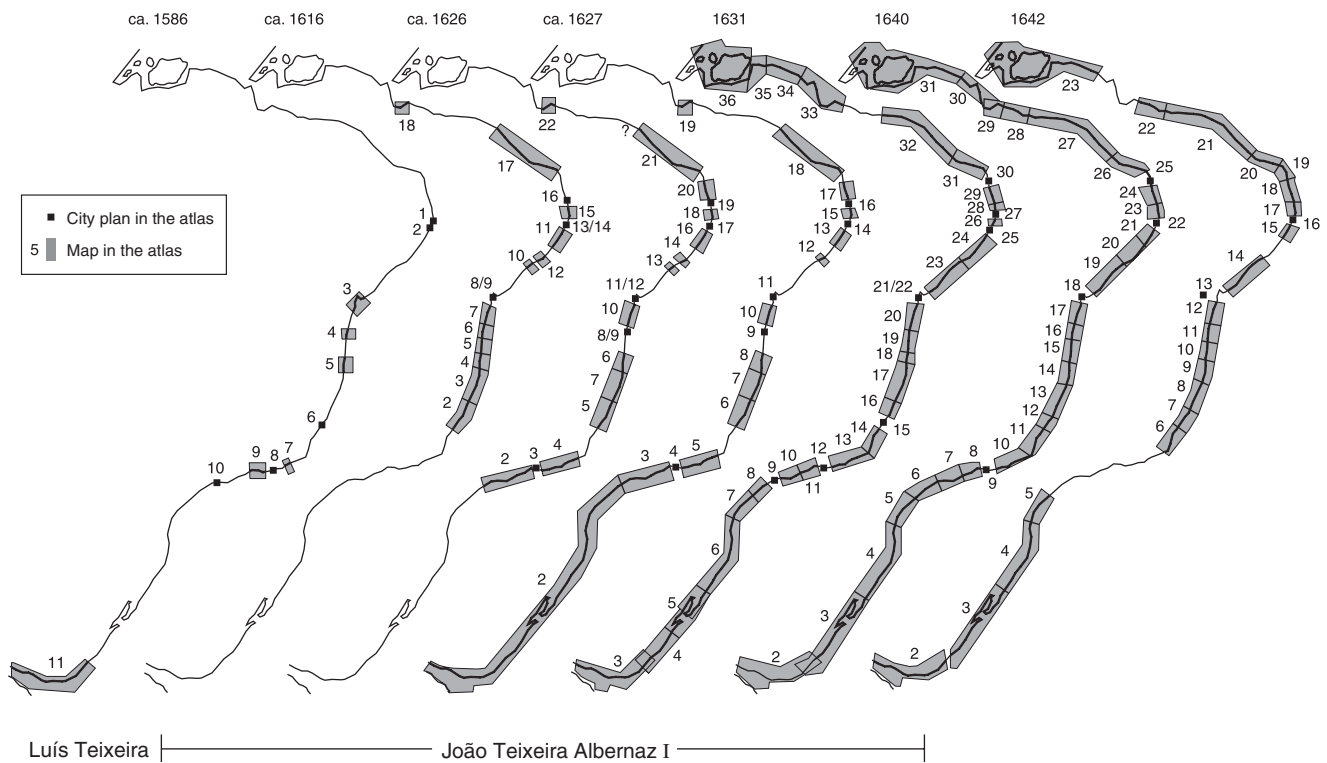


FIG. 38.31. MAPS AND CITY PLANS OF THE BRAZILIAN COAST IN THE ATLASES OF LUÍS TEIXEIRA AND JOÃO TEIXEIRA ALBERNAZ I. Based on Maria Fernanda Alegria, “A produção cartográfica portuguesa sobre o Brasil (1502–

1655): Tentativa de tipologia espacial e temática,” in *Portugal e Brasil no advento do mundo moderno*, ed. Maria do Rosário Pimentel (Lisbon: Edições Colibri, 2001), 59–89, esp. 71.

João Teixeira Albernaz II—included a general chart of the American subcontinent or of Brazil, often the first chart in the atlas, followed by partial charts that varied in number from eleven (Luís Teixeira, ca. 1586) to thirty-five (João Teixeira Albernaz I, 1630), as illustrated in figure 38.31. A cursory comparison of the general charts in some of the Brazilian atlases of the Teixeira family shows that although nearly all the atlases contained the word “Brazil” in their title, the area covered in the general charts was not always the same. Some showed an area extending as far south as Tierra del Fuego and well to the west of the Amazon Delta, such as the chart by Luís Teixeira of about 1586 (see plate 33) and the 1626 chart by João Teixeira Albernaz I; others showed the area east of the Tordesillas meridian, which was believed (wrongly) to pass through the deltas of the Amazon and the Rio de la Plata.³⁰⁸

The outline given to Brazil by Luís Teixeira remained largely unchanged in the charts of his descendants, except for a few amendments: south of the Tropic of Capricorn, the orientation shifted from NNE-SSW to NE-SW, and the outline of the mouth of the Rio de la Plata was improved. Luís Teixeira’s silhouette of Brazil is remarkable, which explains its adoption with no great modification in later charts. However, both correct and incorrect outlines were copied.

For the continental interior, the information varied greatly from one chart to another. In many cases, this area was left blank or featured just the most important rivers, not always with the correct course; alternatively, the unknown territory was filled in with representations of indigenous fauna and flora or pictures of everyday activities, such as tree felling or work on sugar plantations.

The chart of Baía de Todos os Santos (All Saints Bay) in the 1640 atlas by João Teixeira Albernaz I (plate 35) does not offer a full précis of the wealth of information contained in the many partial charts in the same cartographer’s atlases of Brazil, but it does convey an idea of their diversity. Salient features are the orientation, indicated by the wind rose with the characteristically Portuguese fleur-de-lis; the general outline of the bay (perfectly recognizable to modern eyes); the principal islands with the names of their owners, including the large island of Taparica; the estuaries of the principal rivers; indications of depths in fathoms; and, in the interior, the representation of the main sugar plantations. The importance of the various plantations can be gauged by the fact that only four actually bear the word *engenho* (mill); the

308. A graphic comparison of the coverage in seven atlases of Brazil by the Teixeiras is in Alegria, “Representações do Brasil,” 197.

others are represented by a drawing of a mill building and a legend, such as “Do Aragoão” or “Do Soares,” indicating ownership. The omission of the word *engenho* is indicative of the importance of the sugar trade, which was also depicted in other maps by the same cartographer. In addition to the sugar plantations, missionary centers are indicated with a building surmounted by a cross. Scattered trees decorate the unknown tracts, as in so many charts of the same period by Portuguese cartographers and their counterparts of other nationalities.

TERRESTRIAL CARTOGRAPHY IN PORTUGAL

Sixteenth- and seventeenth-century terrestrial cartography in Portugal has been little studied, certainly due in part to the overshadowing prestige and abundance of contemporary nautical cartography, as well as to the implicit admission—although far from proven—that these two cartographic modes were completely separate. Not many terrestrial maps of Portugal have survived, and most of the few studies of these have had an overly nationalistic focus, more interested in searching for technical innovations in Portuguese cartographic accomplishments than in explaining the role of these maps as cultural and political documents.

One must, in fact, take into account the national and international conditions of Portugal, which was defined as a distinct country with stable borders from the thirteenth century and equipped with a relatively strong central government and a royal administration that exercised tight control over the various forms of local power. From this early time, the Portuguese had good centralized knowledge of the territory and, in particular, the local administrative units (*vilas* or *concelhos*), as well as the routes linking them.

The first known geographical description of the country is attributed to a herald of the count of Barcelos and was written in 1416 for the Portuguese delegates to the Council of Constance. This work is a description of the principal countries of Europe. Portugal is first presented as a whole and then as divided into six regions. One can tell that the author was used to reading maps because of the way he compared the forms of the Iberian Peninsula and of Asia Minor—he said the first is “similar to a huge tail situated between two seas, and very like the Asia Minor that is also situated between two seas”—and also because of the importance he gave to the orientation of the Portuguese regions in the first Ptolemaic maps of the Iberian Peninsula that he might have seen during a trip to Italy that he made in 1407–8.³⁰⁹

But the earliest extant chorographic descriptions of specific Portuguese regions date only from the sixteenth century—those of Entre Douro e Minho from 1512, of Lamego from 1532, and of Entre Douro e Minho and

Trás-os-Montes from 1548.³¹⁰ These were the result of private initiatives, but they were supported by abundant and precise administrative statistical information. Surviving royal *Inquirições* dating from the twelfth century have been preserved, as well as a list of 3000 churches dating from the middle of the fourteenth century and a list of 1325 administrative centers with the number of crossbowmen available to the king in 1417. Several censuses of residents were conducted, at the government’s initiative, beginning at least in 1496.³¹¹

The most important and best preserved of these censuses is the *Numeramento* of 1527–32, already the object of several studies.³¹² The king commissioned it from the *corregedores* (regional representatives of the central administration), who carried it out in six large districts, or *comarcas*. However, part of the census was directly accomplished by envoys of the central authority, and, from 1530 on, a new directive was added to the original instructions requesting that the distance in leagues between the administrative seats be indicated—useful information for the construction of a map. Information on orientation, indispensable for cartographic purposes, appears only sporadically in some reports and is systematically present only in the last report of the *Numeramento* concerning the lands belonging to the military orders of the

309. Nascimento, *Livro de arautos*, 192, and Suzanne Daveau and Orlando Ribeiro, “Conhecimento actual da história da geografia em Portugal,” in *História e desenvolvimento da ciência em Portugal*, 2 vols. (Lisbon: Academia das Ciências de Lisboa, 1986), 2:1041–60; on the use of maps by the herald and for the quotation, see esp. 1051.

310. Luciano Ribeiro, “Uma descrição de entre Douro e Minho por Mestre António,” *Boletim Cultural [Câmara Municipal do Porto]* 22 (1959): 442–60; Rui Fernandes, “Descrição do terreno em roda da cidade de Lamego duas leguas,” in *Collecção de livros ineditos da historia Portuguesa*, 5 vols., ed. José Francisco Correia da Serra et al. (Lisbon: Officina da Mesma Academia, 1900–1983), 5:546–613; and João de Barros, *Geographia d’entre Douro e Minho e Tras-os-Montes*, ed. João Grave (Porto: Tipografia Progresso de D. A. da Silva, 1919). The basic study of the geographic descriptions of Portugal is Joaquim Antero Romero Magalhães, “As descrições geográficas de Portugal, 1500–1650: Esboço de problemas,” *Revista de História Económica e Social* 5 (1980): 15–56.

311. For a general overview of these problems, consult volumes 4 and 5 of the series *Nova história de Portugal*: António Henriques R. de Oliveira Marques, ed., *Portugal na crise dos séculos XIV e XV* (Lisbon: Editorial Presença, 1987), and João José Alves Dias, ed., *Portugal do Renascimento à crise dinástica* (Lisbon: Editorial Presença, 1998).

312. Júlia Costa Pereira Galego and Suzanne Daveau, *O Numeramento de 1527–1532: Tratamento cartográfico* (Lisbon: Centro de Estudos Geográficos, 1986), and João José Alves Dias, *Ensaio de história moderna* (Lisbon: Editorial Presença, 1988). The *Edição crítica do Numeramento*, by João José Alves Dias, Patrimónia Histórica, Cascais, is in progress; the *comarcas* of Entre Douro and Minho e Entre Tejo e Guadiana were published by Dias under the title *Gentes e Espaços: Edição crítica do Numeramento de 1527–1532, Dicionário Corográfico do Portugal Quinhentista* (Cascais: Patrimónia, 1999). See also Suzanne Daveau, “A descrição territorial no Numeramento de 1527–32,” *Penélope* 25 (2001): 7–39.

Alentejo (1532). Yet even here, orientation is almost always given only in relation to the eight main bearings, seemingly insufficient information to permit the construction of a map, however rudimentary.

The *Numeramento* was the work of royal clerks with skills as jurists; they were accustomed to dealing with numbers, drawing up lists, and checking documents. The enormous number of toponyms that they compiled could have served as a source for a map, but a comparative toponymic study shows that a lot of place-names listed in the nearly contemporaneous Hamburg Codex or those mapped by Fernando Álvaro Seco (ca. 1560) do not exist in the *Numeramento*. The clerks who conducted this census had good practical knowledge of the country, shaped by the itineraries that they usually followed between administrative headquarters or when they accompanied the court in its frequent displacements,³¹³ but they do not seem to have had a truly cartographic vision of the Portuguese territory.

Although Portugal's borders have remained unchanged since the thirteenth century, and the last war with neighboring Castile occurred in 1476 (the Battle of Toro), concern for the clear definition of the border with Castilian lands and for its effective fortification continued until 1580, when the king of Spain also became the king of Portugal. Although the Portuguese military was focused on Morocco, "Algarve de Além-Mar" (overseas Algarve) and the kingdom's frontier with Muslim lands, from the beginning of the fifteenth century, the Portuguese government did not forget the traditional rivalry with Castile, and both sides maintained fortresses on the border.

The strategic position of Portugal changed completely after 1580. While the eastern border lost much of its political and military meaning, the Portuguese littoral became much more exposed to foreign incursions. Portugal became directly involved in the naval war between England and Spain, and the kings of Spain ordered the improvement of the fortification of the harbor entrances as well as a cartographic survey of the coast to be conducted by professionals, primarily Portuguese and Italian.³¹⁴

With Portugal once again independent after 1640, the borders with Spain were again battlefields. War between the two countries continued, almost without interruption, from 1640 to 1668. Military technicians of several nationalities took part in the struggle on both sides, conducting new cartographic surveys. Although terrestrial cartography theoretically belonged exclusively to the central authority, with the urgency of the wars and the functional disorganization that resulted from the partition of 1640, Portugal was forced to rely mainly on mercenary engineers and officers.

None of the travelers who left descriptions of itineraries throughout Portugal in the fifteenth and sixteenth centuries seem to have used maps. Not even in the interesting

journal of the abbot of Cluny's 1535–36 journey throughout Spain and Portugal does one find—anywhere—the suggestion of a spatial image of the area traveled.³¹⁵ Mestre António, the author of the description of Entre Douro e Minho of 1512, was the only one to allude to a spatial image, albeit a distorted one, of the land he described by saying that its length (meaning between Porto and Valença) was eighteen leagues and its width varied from four to ten leagues.³¹⁶ A copy of the Strasbourg edition (1513) of Ptolemy's *Geography* belonged to Domingos Peres,³¹⁷ master of mathematics for the children of the duke of Bragança in the middle of the century, but there is no evidence that he was interested in the maps. It seems that the humanist and chorographer Gaspar Barreiros began to get interested in maps when he went to Rome for the first time (1546). In two extant works, he used comparatively the modern maps of Ptolemy and a few other modern Italian maps.³¹⁸ But he ignored (or did not mention, perhaps on purpose) the map of Portugal drawn by Fernando Álvaro Seco, although it was printed in Italy in the same years in which Barreiros was in Rome for the second time. Neither André de Resende nor Duarte Nunes do Leão seem to have consulted this map while describing the rivers of Portugal in their erudite works, although it was accessible in the *Theatrum orbis terrarum* from 1570.³¹⁹

313. For descriptions of routes throughout Portugal, see especially J. García Mercadal, ed., *Viajes de extranjeros por España y Portugal: Desde los Tiempos mas Remotos, hasta fines del siglo XVI* (Madrid: Aguilar, 1952). For royal itineraries, see Júlia Costa Pereira Galego, Maria Fernanda Alegria, and João Carlos Garcia, *Os itinerarios de D. Dinis, D. Pedro I, e D. Fernando I.: Interpretação gráfica* (Lisbon: Centro de Estudos Geográficos, 1988).

314. On Spanish activities during this period, see chapter 39 in this volume.

315. Claude de Bronseval, *Peregrinatio hispanica: Voyage de Dom Edme de Saulieu, abbé de Clairvaux, en Espagne et au Portugal, 1531–1533*, 2 vols., ed. Maur Cocheril (Paris: Presses Universitaires de France, 1970).

316. Ribeiro, "Douro e Minho," 446.

317. Lisbon, Biblioteca Nacional (CA 152 V); see Luís de Matos, *A corte literária dos duques de Bragança no Renascimento* (Lisbon: Fundação da Casa de Bragança, 1956).

318. Gaspar Barreiros, *Chorographia de alguns lugares que stam em hum caminho* (Coimbra, 1561); a facsimile is also available: idem, *Chorographia* (Coimbra: Por ordem da Universidade, 1968). See also Justino Mendes de Almeida, "Um inédito de Gaspar Barreiros: 'Suma, e descripçam de Lusitania' (Cód. 8457 DA B.N.)," in his *Páginas de cultura portuguesa* (Amadora: Lusolivro; Distribuição, Delme, 1994), 113–75, and Suzanne Daveau, "A obra de Gaspar Barreiros: Alguns aspectos geográficos," *Revista da Faculdade de Letras* 27 (2003): 97–127, esp. 120–24.

319. André de Resende, *Libri quatuor de antiquitatibus Lusitaniae* (Evora, 1593); idem, *As antiguidades de Lusitânia*, ed. Raul Miguel Rosado Fernandes (Lisbon: Fundação Calouste Gulbenkian, 1996); and Duarte Nunes do Leão [Nunez do Lião], *Descrição do reino de Portugal* (1610; Lisbon: Centro de História da Universidade de Lisboa, 2002). See also Daveau and Ribeiro, "Conhecimento actual da história," 1053–56.

FIG. 38.32. PAGE FROM THE “LONGITUDO ET LATITUDO LUSITANIAE,” KNOWN AS THE HAMBURG CODEX.

Photograph courtesy of the Staats- und Universitätsbibliothek, Hamburg (Codex in scrinium 136, fols. 2v–3r).

For unequivocal evidence of map use in Portugal, we must wait for the testimony of Luís Mendes de Vasconcelos (1608) referring to a *soldado* (soldier), an outstanding military figure at the court of João III, reputed to have consulted a “topographia” of the Lisbon district representing so many inhabited sites that he was unable to count them all. He likewise referred to another *fidalgo* (nobleman) who frequented the same court and was “*douto* [erudite] in the humanities and some esteemed arts,” and who consulted the atlas of Abraham Ortelius.³²⁰ However indirect these references may be, these are the only evidence of the existence of both regional maps and a diffusion in Portugal of the cartography printed in the Low Countries in the sixteenth century. But they confirm that at this time the use of terrestrial cartography was reserved to a restricted elite close to the center of authority. It is significant that João de Barros, convinced as he was of the importance of maps, abandoned the incorporation of them into his history of the Portuguese discoveries (*Ásia*),³²¹ as well as his projected “Universal geography,” which he had conceived of as an atlas to be accompanied by commentaries.

THE HAMBURG CODEX

The existence of a chorographic map of Portugal prior to 1536 is suggested by a codex in Hamburg dedicated to Prince Afonso.³²² This Hamburg Codex lists 1533 toponyms and gives the longitude and latitude for roughly

1450 of them, along with twenty-nine names of mountains and eight names of regions, all located in Portugal (fig. 38.32). The toponyms are grouped in nineteen alphabetical sections, but only the first letter is taken into account, a widespread contemporary technique for organizing documents, such as the indexes that accompanied the regional reports of the *Numeramento* of 1527–32. Information for the location of sixty-two toponyms is missing. These toponyms are generally found at the bottom of the various alphabetical groups. About seventy toponyms appear more than once, sometimes with slightly different notations concerning their locations. The codex was very carefully written in several colors and without corrections, and it does not show signs of frequent use. It was probably compiled as a prestigious gift and copied from a former working document.

The idea of establishing a list of geographic locations was evidently inspired by the editions of Ptolemy’s *Geography* that proliferated after 1507. The longitude and latitude notation in the Hamburg Codex appears in degrees and fractions of degrees. These are represented by one or two fractions in a sequence, a system rather like the one used in contemporary editions of the *Geography*.³²³ But the system adopted for the Hamburg Codex has a more complex appearance, including the use of fractions with three elements, for example, one-third of a quarter or three-quarters of a sixth. This manner of expressing frac-

320. Luís Mendes de Vasconcelos, *Do sitio de Lisboa* (Lisbon: Na Officina de Luys Estupiñan, 1608), 2d ed. (Lisbon, 1803), 1–2 and 188. According to Barbosa Machado, in *Bibliotheca lusitana*, 3:114–15, the “soldier” was Martim Afonso de Sousa, who led the fleet to Brazil in 1530–33 and was governor of India in 1542–45, and the “politician” was the count of Castanheira, the *vedor da fazenda* (finance minister) and the author’s grandfather.

321. João de Barros published the first three *décadas* of his *Ásia* in Lisbon in 1552, 1553, and 1563. The fourth *década* was published in Madrid in 1615, after Barros’s death, by João Baptista Lavanha and included maps.

322. The first description of the codex is in Luís Silveira, *Manuscritos portugueses da Biblioteca Estadual de Hamburgo*, vol. 1 of *Portugal nos arquivos do estrangeiro* (Lisbon: Instituto para a Alta Cultura, 1946), 32–33. Its first attempted use is in Cândido Ferreira Alves et al., “O mais antigo mapa de Portugal,” *Boletim do Centro de Estudos Geográficos* 12–13 (1956): 1–66, and 14–15 (1957): 10–43. An important study is by Kevin Kaufman, “An Early Portuguese Geographical Index: The *Longitudo et Latitudo Lusitaniae* and Its Relation to Sixteenth-Century Mapping Techniques” (master’s thesis, University of Wisconsin–Madison, 1988), and see also Suzanne Daveau, “À propos de la première carte chorographique du Portugal (1526–35)” (paper presented at the 19th International Conference on the History of Cartography, Madrid, 2001).

323. Germaine Aujac, *Claude Ptolémée, astronome, astrologue, géographe: Connaissance et représentation du monde habité* (Paris: C.T.H.S., 1993), 162. According to Thomassy, “Guillaume Fillastre,” Jacopo Angeli, who translated Ptolemy’s *Geography* into Latin at the beginning of the fifteenth century, made parallel use of the division of degrees into both fractions and minutes, as if the sexagesimal division were still a little-known innovation.

tions was common at the time and has been carried on into the present in common parlance.³²⁴ For a long time, the exact reading of this type of notation was hindered because the denominator of the second fraction remained implicit when it was identical to the denominator of the first fraction.³²⁵

In most cases, the internal order of each of the nineteen alphabetical groups seems to have been a direct result of the reading scheme of an original map, which allowed for the determination of the longitude and latitude of the places enumerated. The reading would start in the Lisbon region, followed by the southern part of the country, and ending in its northern regions.³²⁶ With the help of a pair of compasses, one transferred to an *abaco*³²⁷ the distances between a specific point and the nearest lines representing the longitude degrees (0 to 3°E) and the latitude degrees (37 to 42°N), whose presence on the map was used as a grid. The corresponding fractions of degree were then read on the *abaco*. The list thus obtained constituted a convenient tool with which one could, again by using a pair of compasses and an *abaco*, find the location of any place on the map.

The codex was dedicated to Prince Afonso, fourth son of King Manuel. He was ordained cardinal at age seven and in November 1524 received the title of archbishop of S. Brás—the same title that appears in the dedication. This makes it possible to date the codex from sometime between then and 1536, when Afonso's title changed to bishop of S. João and S. Paulo.³²⁸

Along with his brothers, Prince Afonso received a solid, diverse education that included the rudiments of mathematics and cosmology, certainly enough to enable him to understand this document.³²⁹ The management of the vast ecclesiastic domains would have made the list of toponyms valuable to the cardinal, yet it is not known whether he actually used it. The dedication probably indicates that the gift came from someone closely attached to him, perhaps one of his teachers.

An important nucleus of educated people surrounded João III—members of his council and teachers of his brothers—many of whom possessed multifaceted knowledge of law, theology, and mathematics.³³⁰ Many of them had studied at the University of Paris, to which Manuel and his son João III sent numerous grantees,³³¹ while others attended Spanish or Italian universities. The following persons may have been involved in or associated with the production of the codex and the map from which we believe it was made.

Francisco de Melo, whom Lopo Homem called “the most knowledgeable in mathematics and cosmography in Portugal,” studied in Paris until 1521 and subsequently dedicated mathematical works to Manuel.³³² In Paris, he met several mathematicians, among whom was probably Jean Fernel, who measured the meridian of Paris, and Oronce Fine, who drew up a map of France in 1525 using

coordinates of longitude and latitude. He took part, along with Homem and Pedro Margalho, in the work of the Elvas-Badajoz Commission (1524) on the problem of the longitude of the Moluccas, the coveted Spice Islands.³³³ Melo was the rector of the University of Lisbon from 1529 until 1533, after which he became established at the court in Évora, because he was at the time master for the youngest princes and members of the Royal Council.

Pedro Margalho, primarily known as a theologian and philosopher, also studied in Paris and was the author of the *Physicus compendium*, published in Salamanca (1520), in which the longitude problem was discussed. He served as master to Cardinal-Prince Afonso from 1530.

Pedro Nunes, who studied medicine in Salamanca and Alcalá de Henares, simultaneously was appointed cosmographer of the kingdom and professor of philosophy at the University of Lisbon in 1529. In the book refuting the errors of Oronce Fine (1546), Nunes claimed to have

324. For example, in the *Numeramento* of 1527–32, the bishop of Évora was said to have had the right, in Mira, to “two parts of the third of the tithes.” Still today, in Chaviães (Melgaço), one of the beneficiaries of the irrigators' association receives on a certain day “1/2 of a quarter, plus 1/16” (that is, 3/16) of the available water; see Fabienne Wateau, *Conflitos e água de rega: Ensaio sobre organização social no Vale de Melgaço* (Lisbon: Publicações Dom Quixote, 2000), 262.

325. The Lisbon coordinates are indicated in the Hamburg list in the following manner: longitude 0 1/3 1/2/6, latitude 39 1/6 1/3. The longitude can be read this way: 0°20' + 5' = 0°25'; the denominator of the fraction in the right-hand column is, as a rule, the double of the one in the middle column. But the case of the Lisbon latitude exemplifies the principal difficulty that had prevented the deciphering of the notation used in the list until recently. It should read as follows: 39 1/6 1/3/6 = 39°10' + 3.3' = 39°13.3', assuming that the fraction of the column at the right carries an implicit denominator of equal value to the one in the middle column. This rule was empirically verified in several places of known relative position. Other examples of this type of notation can be seen in figure 38.32.

326. Kaufman, “Portuguese Geographical Index,” 81–91.

327. *Abaco* here is referring to a graphic table used to make numeric calculations without using numbers.

328. Fortunato de Almeida, *História da igreja em Portugal*, new ed., 4 vols., ed. Damião Peres (Porto: Portucalense Editora, 1967–71), 2:580.

329. Monzón, *Libro*, and Luís de Matos, “O ensino na corte durante a dinastia de Avis,” in *O humanismo português: 1500–1600*, ed. José V. de Pina Martins et al. (Lisbon: Academia das Ciências de Lisbon, 1988), 499–592.

330. On the topic of the intellectual atmosphere at the Portuguese court, see J. S. da Silva Dias, *A política cultural da época de D. João III* (Coimbra: Instituto de Estudos Filosóficos, Universidade de Coimbra, 1969–); Reijer Hooykaas, “Science in Manueline Style: The Historical Context of D. João de Castro's Work,” in *Obras completas de D. João de Castro*, 4 vols., ed. Armando Cortesão and Luís de Albuquerque (Coimbra: Academia Internacional da Cultura Portuguesa, 1968–82), 4:231–426; and Leonor Freire Costa, “Acerca da produção cartográfica no século XVI,” *Revista de História Económica e Social* 24 (1988): 1–26.

331. Luís de Matos, *Les Portugais à l'Université de Paris entre 1500 et 1550* (Coimbra: Universidade de Coimbra, 1950).

332. Matos, *Les Portugais en France*, 321.

333. Cortesão, *Cartografia e cartógrafos portugueses*, 1:70–85.

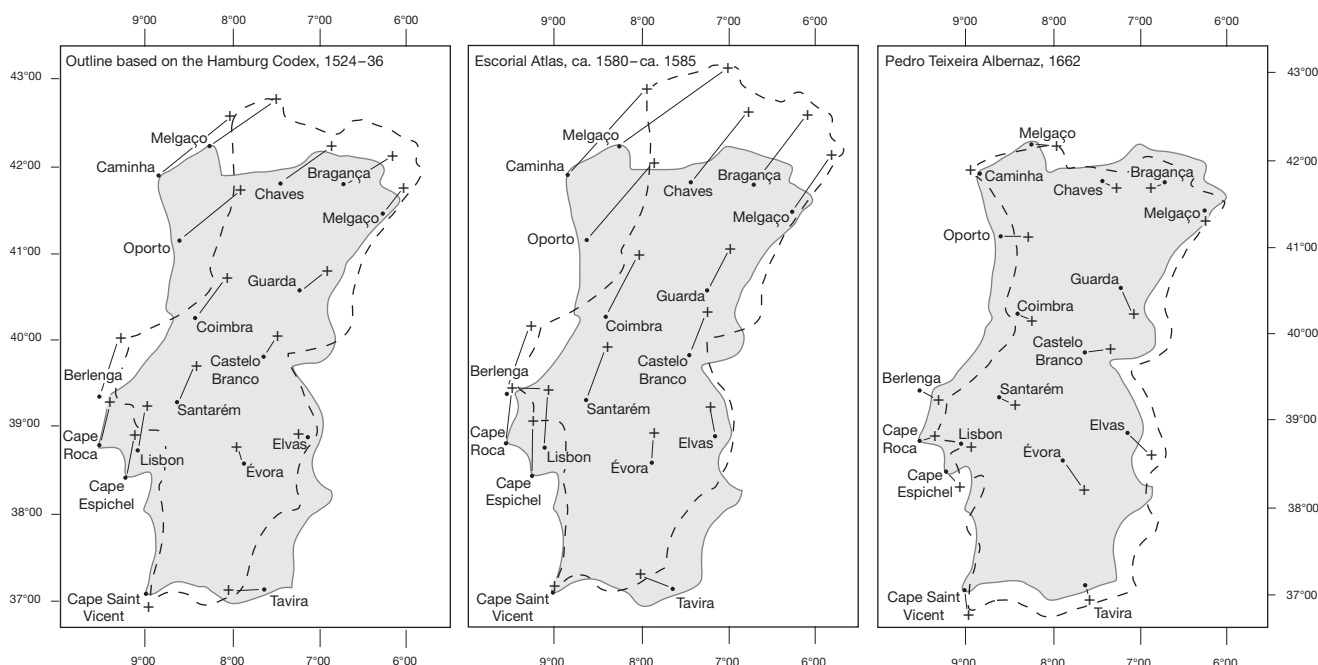


FIG. 38.33. COMPARISON OF LATITUDE AND LONGITUDE VALUES FROM THREE PORTUGUESE RENAISSANCE SOURCES. Coordinates for eighteen locations in the Hamburg Codex (ca. 1524–36), in the Portuguese section of

the Escorial Atlas (ca. 1580–ca. 1585), and in the map of Pedro Teixeira Albernaz (1662) are used to delineate a general outline of the country. Table 38.3 gives the latitude values for five of the places.

previously elaborated “a general table . . . in which one could see . . . the location of any place,” adding: “We made the complete description, usage, and demonstration of this table in the book *De astrolábio* that we would publish together with other works of ours, if we had people capable of engraving and printing as there are presently, in abundance and skills, in France and Germany.”³³⁴ This list or table appears to have been strongly similar to the Hamburg Codex.

Other possible participants in preparing the map may have been Tomás de Torres, the mathematician who taught the rudiments of cosmography to João III, and the cartographer Lopo Homem. As for the coordination of the enterprise, it could very well have been conducted by António de Ataíde, a favorite of João III, *vedor da fazenda* (finance minister) after 1530, and count of Castanheira in 1532.

The precise date of the survey from which the Hamburg Codex was composed is not known, but a range of dates can be suggested. The codex contains the bridge of Olivença that Duarte de Armas said was under construction in 1509 and that appears to have been completed before Manuel’s death in 1521. The most likely period for the assumed map and survey would be the end of the 1520s or the beginning of the 1530s, perhaps around 1530.

The map that can be reconstructed from the data in the Hamburg Codex (fig. 38.33 and table 38.3) suffers from a deformation that becomes progressively more pro-

nounced heading north, which seems to be fundamentally a result of the original choice of the 37°00’ and 40°00’ latitudes for Cape St. Vincent (Cabo de São Vicente) and the Berlenga Islands, respectively, according to sailors’ tradition. A complete reconstruction of the map, already sketched by Kaufman, is currently in progress.³³⁵

It does not appear that there was a close functional correlation between the two large-scale, almost contemporary, enterprises of the *Numeramento* and the Hamburg Codex. The first would have been primarily based on the existence of numerous commercial, administrative, or military routes, such as those described in the “*Livro das Fortalezas*” (views of the fortresses defending Portugal’s inland border, discussed later) by Duarte de Armas in 1509 and by Fernando Colombo in 1517.³³⁶ The making or compiling of maps seems above all to have been the result of military concerns, mainly focused on the eastern borderlands separating Portugal and Spain. In this sense,

334. The 1546 quotation can be found in Pedro Nunes, *Obras*, new ed., 4 vols. (Lisbon: Imprensa Nacional, 1940–60), 3:214. On Nunes, see Cortesão, *Cartografia e cartógrafos portugueses*, 1:85–112.

335. Kaufman, “Portuguese Geographical Index.”

336. Armas, *Livro das fortalezas*, and Fernando Colón, *Descripción y cosmografía de España*, 3 vols. (Madrid: Impr. de Patronato de Huérfanos de Administración Militar, 1908–15), and a facsimile edition, idem, *Descripción y cosmografía de España*, 3 vols. (Seville: Padilla Libros, 1988).

TABLE 38.3 Latitude Values for Selected Places, Renaissance Sources versus Modern

Place	Hamburg Codex, 1524–36	Portuguese Section of Escorial Atlas, ca. 1580–85	Pedro Teixeira Albernaz Map of Portugal, 1662	Modern
Caminha	42°30′	42°51′	41°54′	41°52′
Berlenga	40°00′	40°08′	39°20′	39°25′
Lisbon	39°13′	39°24′	38°43′	38°41′
Évora	38°45′	38°58′	38°20′	38°34′
Cape St. Vincent	37°00′	37°06′	36°50′	37°01′
Difference between Caminha and Cape St. Vincent	5°30′	6°04′	4°59′	4°51′

the creation of the large-scale views in the “Livro das Fortalezas” appears to have been a direct predecessor to the mapping of the country.

THE MAP OF FERNANDO ÁLVARO SECO, CA. 1560

The well-known map of Fernando Álvaro Seco is known through rare impressions of two versions. One was engraved by Sebastiano di Re, published by Michele Tramezzino with papal and Venetian senatorial privilege, and printed in Venice sometime after 1561 (fig. 38.34). The other was engraved by Joannes van Doetecum, published by Gerard de Jode in Antwerp, and dated 1565.³³⁷ Both were dedicated to Cardinal Sforza by a Portuguese humanist, Achilles Estaço, who worked as a librarian for the cardinal between September 1562 and 1564, the year of Sforza’s death. Both contain the name of the author in the dedication, and in the Antwerp version the name is repeated in the banner title “vernando Álvaro secco avctore.”

The wording of the two dedications is almost identical, even down to the formal closing of the dedication, which reads “VALE: ROMAE XIII KAL IVN MDLXI” in the Italian version and “Vale: Romae XIII Cal lun MDLX” in the Antwerp version. The correct version must be that of Antwerp, because it corresponds exactly to the day (20 May 1560) when the oath of obedience was given in Rome to the new pope, Pius IV (crowned 6 January 1560) by the Portuguese ambassador, Lourenço Pires de Távora, on behalf of the young King Sebastian.³³⁸ The year in which the Italian version was printed was probably 1562, because that was the year when Achilles Estaço went as a librarian to the house of Cardinal Sforza. This map, far from having left Portugal clandestinely, as had been the case of the so-called Cantino map of 1502, seems to have been an official or semiofficial product.³³⁹

The deformation of the country as a whole on the Álvaro Seco map is similar to that suggested by the Ham-

burg Codex—with distortion increasing to the north—but slightly less pronounced. Latitude degrees are indicated in both versions, yet these are divided not into minutes but rather into leagues, using the value of 17.5 leagues to a degree generally acknowledged by Portuguese sailors. Yet the latitudes are grossly inaccurate, for they are based on the 40° latitude attributed to Lisbon (the modern value is 38°41′), which is clearly spelled out in the map’s margin (“Lisboa grad. 40”). This value, closer to Ptolemaic values, is the one indicated in the Madrid Almanac from 1321–39.³⁴⁰ But by the thirteenth century, sailors had taken this to be incorrect and attributed a 40° latitude in-

337. The Italian and Antwerp editions are reproduced in *PMC*, vol. 2, pls. 197 and 198. See also these important studies: Frazão de Vasconcelos, “O primeiro mapa impresso de Portugal e notas genealógicas sobre a família Seco,” *Arqueologia e História* 8 (1930): 27–33; Alves et al., “O mais antigo mapa de Portugal,” with a good reproduction of the 1570 version; Fernando Castelo-Branco, “Algumas notas sobre o mapa de Álvaro Seco,” *Boletim da Sociedade de Geografia de Lisboa* 98 (1980): 112–23; and Suzanne Daveau, “A rede hidrográfica no mapa de Portugal de Fernando Álvaro Seco (1560),” *Finisterra* 35 (2000): 11–38.

338. The essential part of the documentation on Lourenço Pires de Távora’s embassy can be found in Luiz Augusto Rebello da Silva and António Ferrão, eds., *Corpo diplomático português contendo os actos e relações políticas e diplomáticas de Portugal com as diversas potências do mundo* (Lisbon: Academia Real das Ciências, 1862–1936), vols. 8–10. On Achilles Estaço, see José Gomes Branco, “Un umanista portoghese in Italia: Achilles Estaço,” in *Relazioni storiche fra l’Italia e il Portogallo: Memorie e documenti* (Rome: Reale Accademia d’Italia, 1940), 135–48; idem, “Os discursos em latim do humanista Aquiles Estaço,” *Euphrosyne* 1 (1957): 3–23; and Belmiro Fernandes Pereira, *As orações de obediência de Aquiles Estaço* (Coimbra: Instituto Nacional de Investigação Científica, 1991).

339. The diplomatic gift of a *mappamundi* to Prester John by a Portuguese ambassador on behalf of the governor of India in 1520 is related by Francisco Álvares in *Verdadeira informação das terras do Preste João das Índias*, new ed. (Lisbon: Imprensa Nacional, 1889), 148–49.

340. Luís de Albuquerque, *Os almanaques portugueses de Madrid* (Coimbra: Imprensa de Coimbra, 1961).



FIG. 38.34. MAP OF PORTUGAL BY FERNANDO ÁLVARO SECO, AFTER 1561.

Size of the original: 35.5 × 67.5 cm. Photograph courtesy of the BNF (Rés. Ge DD 626 [20]).

stead to Berlenga Island (modern value 39°25'), represented at about 40°40' on the Álvaro Seco map.³⁴¹

The small variations in latitude for identical places between the two versions probably reflect the margin of accuracy in manual copying.³⁴² One can thus appreciate the degree of uncertainty that generally affected contemporary maps when the location of a place was easily subject to errors that could range from five to ten minutes of a degree (about 10 to 20 km).

The toponyms on both printed versions of Álvaro Seco's map are similar to those of the Hamburg Codex, although some variations suggest that a systematic comparison of the differences between the two would be useful. From various toponyms not in the Hamburg Codex or the 1527–32 *Numeramento*, one can deduce some of the circumstances in which the manuscript for this printed map was drawn, in 1558 at the earliest. The toponyms in the map allude to individuals who were probably involved in its production. Near the indicator for Tomar, the wording “Quinta dos Secos” confirms that the map's author belonged to this family, whose best-known member at the time was Pedro Álvares Seco, *desembargador* (high court judge) of the Casa da Suplicação and author of two books about the military Order of Christ that had succeeded the Knights Templar in Portugal. The map also includes the boundaries of the ecclesiastical district of Tomar, seat of the order. The order's *comendador-mor* (chief commander), D. Afonso de Lencastre, was the Portuguese ambas-

sador in Rome before Lourenço Pires de Távora. South of the mouth of the Tagus, references appear to the “Quinta Távora,” a *morgadio* (hereditary estate) belonging to the new ambassador, and the Mosteiro da Descida, a monastery he had founded in 1558 shortly before going to Rome. Finally, two places in Peniche are mentioned, “Nova Lisboa” and “Castelo do Conde,” which have been interpreted as depicting the work begun for the building of the fortress of Peniche in 1557.³⁴³ The “Conde” (Count) was the count of Atouguia, Luís de Ataíde, a close relative of the finance minister, the count of Castanheira, and of the ambassador, Lourenço Pires de Távora.

In the Italian version of the map, the Portuguese territory appears situated in a vast, almost empty, space stretching from the Strait of Gibraltar to the northern coast of Galicia, surrounded by a dotted line roughly evoking its border.³⁴⁴ The limits of the bishoprics are

341. Martín Cortés, *Breue compendio de la sphaera y de la arte de nauegar con nuevos instrumentos y reglas* (Seville: Anton Aluarez, 1551), and a facsimile edition, idem, *Breue compendio de la sphaera y de la arte de nauegar* (Valencia: Vicent García, 1996), fols. 65–66; see also figure 38.38.

342. Cortés, *Breue compendio*, fols. 63–64.

343. Alves et al., “O mais antigo mapa de Portugal” (1957): 23–24.

344. João Carlos Garcia, “As fronteiras da Lusitânia nos finais do século XVI,” in *Miscellanea Rosae* (Budapest: Mundus, 1995), 137–53, and idem, “A configuração da fronteira luso-espanhola nos mapas dos séculos XV a XVIII,” *Treballs de la Societat Catalana de Geografia* 41 (1996): 293–321.

carefully indicated by dotted lines, even those most recently created, such as Leiria (1543), Miranda do Douro (1545), and Portalegre (1549), which would presumably have been of interest to the Vatican. Portugal's ancient coat of arms appears alongside its modern one. The main rivers bear Latin designations in addition to their modern names. Numerous bridges are represented all over the map, but because they were of more economic and military than ecclesiastical concern, they were probably derived from the map associated with the Hamburg Codex, for which these concerns were more appropriate.

The Antwerp version of 1565 is clearly aimed at a more diverse audience. In it, bridges as well as bishopric boundaries have disappeared, and the title has become "Portvgalliae qvae olim Lvsitania" (Portugal, formerly Lusitania). Small differences in the transcription of names of places and rivers show that the Antwerp version was not directly derived from the Italian one, but that both probably derived from a common prototype.³⁴⁵

From 1570, Álvaro Seco's map gained widespread and lasting international diffusion in Abraham Ortelius's *Theatrum orbis terrarum*. It also appeared in De Jode's atlas *Speculum orbis terrarum* (1578). Those versions are very similar to the central section of the Italian edition, although not all the bridges are shown and several place-names are mangled. An exaggerated Aveiro lagoon on Portugal's western coast, protruding into the ocean and bounded by two prominent, almost symmetrical shoals, characterizes the version in the *Theatrum*. Another widely diffused version was that produced by Jodocus Hondius after 1600 for the Mercator-Hondius atlas. In it, the Aveiro lagoon is drawn with a broad shoal to the north and the opening to the ocean has been moved farther south, but the town of Aveiro is erroneously placed on the north bank. It is based on a representation in Lucas Jansz. Waghenaer's *Spiegel der zeevaert* (1586). The Álvaro Seco map continued to be the basis for maps of Portugal in manuscript and printed forms until the appearance of Pedro Teixeira Albernaz's map of 1662—nearly a full century later.³⁴⁶ For example, a simplified copy of Hondius's version was included in the "Descrição do Reino do Algarve" by Alessandro Massai (1621).³⁴⁷

MANUSCRIPT MAPS OF PORTUGAL

The few specimens of sixteenth- and seventeenth-century manuscript maps of Portugal are interesting because they give some hints of cartographic sources other than the Álvaro Seco map. A fragment of a map of Portugal drawn on parchment that was used in mending a book cover was recently found (plate 36).³⁴⁸ Drawn with ink and in four shades of watercolors, this map fragment is highly legible and shows a section containing the Aveiro lagoon and the town of Viseu. To the east of Viseu, a portion of the an-

cient arms of Portugal is visible. The map's approximate scale is 1:400,000, and it presents a feature unusual in a terrestrial map—a dense network of rhumb lines on land and sea, with wind roses of thirty-two rhumbs. Some place-names were added to the original map with a paler ink and less careful handwriting. One of these names lies partly over the coat of arms. As for the rhumb line network, it clearly was added last, because it overlays all of the other elements of the map.

This fragment is possibly from the map of Portugal offered to the king of Spain, Philip II (Philip I of Portugal), by Luís Jorge de Barbuda as a testimony of his knowledge. Juan Bautista Gesio wrote of that gift in a letter to the king dated 21 July 1579, referring to it as a "description of the kingdom of Portugal in which one finds depicted, in lifelike fashion, all of the cities, towns, places, sea and land harbors, hills, valleys, woods, and rivers of that kingdom, all very distinctly presented, so that Your Majesty can take pleasure at seeing the whole situation of that kingdom at a glance, as often as Your Majesty wishes." In the same letter, Gesio claimed that Barbuda was a "man skilled in geography and chorography, in painting maps, places, and provinces."³⁴⁹ From 1571 on, this cartographer was in the service of Juan de Borja, Spanish ambassador in Portugal from 1569 to 1573, who then attempted to take him to Spain. Yet Barbuda managed to escape from Portugal in 1579 only with Gesio's help. The map that he took as a credential would probably have been drawn prior to the date of his flight (perhaps between 1571 and 1573). The rhumb line network on the map is not mentioned in Gesio's letter, but it may have been added to the map once it was in Spain.

This type of terrestrial map with rhumb lines has one well-known precedent. There is a map of the kingdom of

345. Daveau, "A rede hidrográfica no mapa."

346. Numerous maps of Portugal derived from Fernando Álvaro Seco's map are reproduced and discussed in Resende, *Cartografia impressa*, and in António Campar et al., eds., *Olhar o Mundo, ler o território: Uma viagem pelos mapas* (Coimbra: Instituto de Estudos Geográficos, Centro de Estudos Geográficos, Faculdade de Letras da Universidade de Coimbra, 2004).

347. The codex is conserved in Lisbon, Museu da Cidade. It was published by Lívio da Costa Guedes in "Aspectos do Reino do Algarve nos séculos XVI e XVII: A 'Descrição' de Alexandre Massai (1621)," and "Aspectos do Reino de Portugal nos séculos XVI e XVII: A 'Descrição' de Alexandre Massai (1621) (II Tratado)," *Boletim do Arquivo Histórico Militar* 57 (1988): 21–269, and 58 (1989): 15–215.

348. A reproduction was published in Carmen Manso Porto, *Cartografia histórica portuguesa: Catálogo de manuscritos, siglos XVII–XVIII* (Madrid: Real Academia de la Historia, 1999), 30–31. The map was given the improbable date of 1600.

349. Pedro Longás Bartibás, "Carta del astrólogo italiano Juan Bautista Gesio al Rey Felipe II," in *Publicações*, 6:167–72, and Ursula Lamb, "Nautical Scientists and Their Clients in Iberia (1508–1624): Science from Imperial Perspective," *Revista da Universidade de Coimbra* 32 (1985): 49–61.

France that André Homem, a Portuguese cartographer and son of the famous Lopo Homem, finding himself a refugee in Paris after 1560, offered to King Charles IX in 1564 at the insistence of the Portuguese ambassador.³⁵⁰ Jean Nicot, French ambassador to Portugal in 1559–60, mentioned it in his *Thrésor de la langue françoise* (1606):

There are terrestrial maps styled after the fashion of those of the sea, as I was shown in the year 1564 one of that kingdom . . . made by a Portuguese cosmographer at the request of the ambassador of the king of Castile, that I have sent with said cosmographer to the king Charles IX . . . so that he would retain the said map as pernicious to his State and the designer and cosmographer in his service, as he did. They are maps for war, able to serve a foreign enemy to lead an army across the whole country drawn on said map, without need of a guide who knows the country and with just the help of a quadrant or a compass.³⁵¹

Maps for war, such as that of France and the Portuguese map fragment, are known only because they were clandestinely transmitted to foreign countries. Normally, the originals would have been carefully guarded by the military leaders of their country of origin and protected from any diffusion (ambassador Nicot found it strange to have seen one). This type of map is also interesting because it is an example of a technique of nautical origin's influencing terrestrial cartography, revealing how both types of cartography, although considered different techniques for different uses, nevertheless permitted contacts and exchanges between their practitioners and users.

There is a map of the Iberian Peninsula from about 1585, on twenty-one sheets of paper, that is generally referred to as the Escorial Atlas. The originality of the Portuguese part of this Spanish atlas was highlighted by Reparaz-Ruiz, who dedicated several studies to the topic.³⁵² He hypothesized that the Portuguese part of this atlas might have been derived from a prototype map that may also have served as the basis for Álvaro Seco's work. He suggested that its survey might have been conducted under the direction of Pedro Nunes. The great similarity of toponymic content of the Portuguese part of the Escorial Atlas, the fragment of the map of Portugal just described, Álvaro Seco's map, and the Hamburg Codex seems to confirm the general lines of his hypothesis. The study of a Stockholm codex with the coordinates of three thousand Spanish locations that refers to the Escorial Atlas will surely enable us to reach more concrete conclusions.³⁵³

In 1597, Luís Teixeira or his son João Teixeira Albernaz I designed the world map and the coastal outlines of maps for a thirty-two-sheet atlas in Spanish known as the Lavanha Atlas.³⁵⁴ At that time, the completion of the atlas was interrupted due to the death of its intended recipient, Philip II's daughter Catarina. The work was com-

pleted only in 1612 by João Baptista Lavanha, who drew the rivers, hills, and towns for the maps, as well as writing the texts and drawing the cosmographical diagrams. In the map of Portugal, one notices that the coast, in addition to the Tagus Valley as far as Santarém, is presented in the same manner as on a portolan chart, with very rich toponymy in contrast to the rest of the country. The representation of the coast is far more detailed than in Álvaro Seco's map.

Two manuscript maps representing Portugal (or a large part of it) date from the beginning of the seventeenth century. The first, considered to be from 1617, belongs to the so-called Cadaval Codex, an atlas of forty-three charts and plans attributed to Luís de Figueiredo Falcão.³⁵⁵ The map of Portugal in the codex represents a large part of the country, except its northeast regions. It shows an eastward shift that increases northward, but is much less pronounced than in Álvaro Seco's map and its derivatives (fig. 38.35). The central feature is the network of rivers, somewhat simplified compared to that in earlier maps, accompanied by several place-names; the coastline has been improved. The shape of the Aveiro lagoon, as well as that of the region south of Sines, has also been improved. In earlier representations, this southern area opened up to a vast bay, peppered with numerous islets. Yet in this map, one finds a curious detail: a south-pointing cape near Faro fronted by an island, a detail that recalls, in an exaggerated fashion, the form that would be widely diffused later in the 1662 map by Pedro Teixeira Albernaz. This enigmatic map appears to be proof of the little-known activity of the state agencies that, little by little, corrected the cartographic image of the country for restricted internal use, while the image for external use—largely diffused by Dutch printed atlases—remained relatively constant although outdated.

The so-called Gulbenkian map is a large mural map drawn on six parchment sheets that was discovered in Italy in 1964 (fig. 38.36). Its state of conservation is rather poor, because an abusive cleaning wiped out several details on

350. Bourdon, "André Homem," 260–66.

351. Quoted in Bourdon, "André Homem," 287 (doc. 3).

352. Gonzalo de Reparaz-Ruiz, "La cartographie terrestre dans la Péninsule Ibérique au XVI^e et au XVII^e siècle et l'œuvre des cartographes portugais en Espagne," *Revue Géographique des Pyrénées et du Sud-Ouest* 11 (1940): 167–202; idem, *España, la tierra, el hombre, el arte*, 2 vols. (Barcelona: A. Martín, 1954–55), 75–88; and idem, "Une carte topographique du Portugal au seizième siècle," in *Mélanges d'études portugaises offerts à Georges Le Gentil* (Lisbon: Instituto para a Alta Cultura, 1949), 271–315.

353. Geoffrey Parker, "Maps and Ministers: The Spanish Habsburgs," 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), 124–52, esp. 130.

354. Turin, Biblioteca Reale; see *PMC*, 4:73–76, pls. 425–40.

355. IAN/TT, Casa Cadaval, Codice LFF.



FIG. 38.35. MAP OF PORTUGAL IN THE CADAVAL CODEX, 1617.

Size of the original: ca. 41.1 × 128.5 cm. Photograph courtesy of the IAN/TT (Cód. Casa Cadaval, no. 29).



FIG. 38.36. MURAL MAP OF PORTUGAL ATTRIBUTED TO JOÃO TEIXEIRA ALBERNAZ I.

Photograph courtesy of the Fundação Calouste Gulbenkian, Lisbon (Ref. J22/87).

various parts of its surface. Attributed to João Teixeira Albernaz I (who signed most of his work “João Teixeira”) based on the style of drawing, it is thought to date from between 1629, when the Convento do Buçaco was built in the enclosed wooded area that is clearly emphasized on the map to the northeast of Coimbra, and 1650, the date of the presumed author’s death.³⁵⁶ The fact that this map presents only the coat of arms of the kingdom of Portugal and that it has two allusions to English landings in the regions

of Peniche and Cape St. Vincent (in 1587 and 1589?) persuaded Cortesão that it was produced after 1640, the year of the restoration of Portugal’s independence. But the form of the coast is little improved when compared to that of the Álvaro Seco map, as if its author had access to only the re-

356. Armando Cortesão, “Um velho mapa de Portugal descoberto em Itália,” *Colóquio, Revista de Artes e Letras* 30 (1964): 31–34, and *PMC*, 6:111–12.

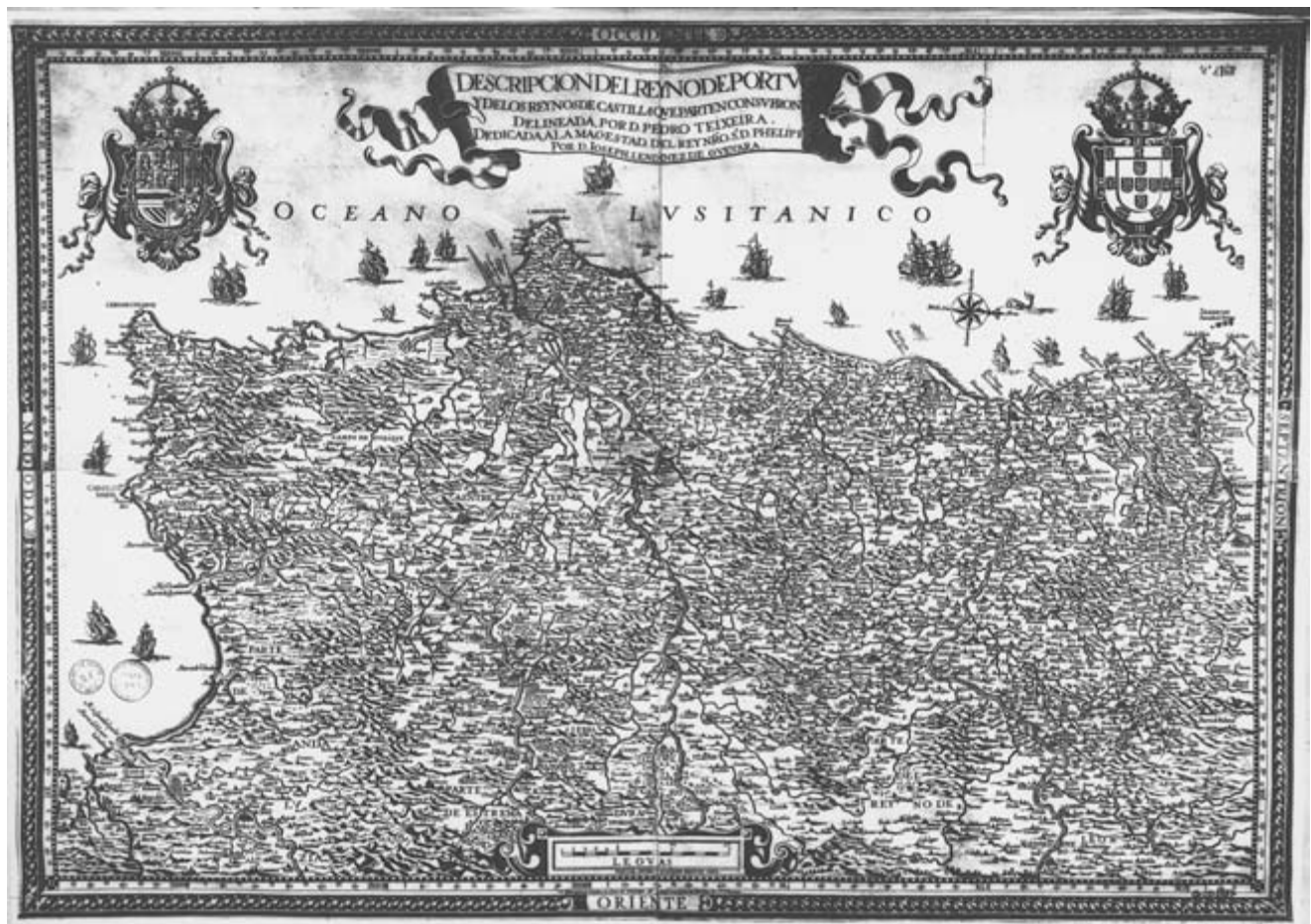


FIG. 38.37. THE *DESCRIPCION DEL REYNO DE PORTV* OF PEDRO TEIXEIRA ALBERNAZ, 1662. Engraved in four sheets.

Size of the original: 75 × 105.5 cm. Photograph courtesy of the BNF (Ge DD 2987).

stricted number of cartographic documents that existed in Lisbon at the time, because most of them would have been transferred to Madrid.

THE MAP OF PEDRO TEIXEIRA ALBERNAZ, 1662

The *Descripcion del Reyno de Portugal* of Pedro Teixeira Albernaz, engraved by Marcos Orozco and printed in Madrid in 1662 (fig. 38.37), provides an end point for our period.³⁵⁷ In 1722, Azevedo Fortes called it a very faulty map, “except for the maritime shores, which are less poorly oriented.”³⁵⁸ The map was printed during wartime, when the Spanish army was concentrated along the Alentejo border preparing for the invasions of the following two years. It was dedicated to Philip IV of Spain. At the top, the map bears the complex coat of arms of the king of Spain on the left and that of Portugal on the right. In addition to the Portuguese territory, the map includes, as the title confirms, the “kingdoms of Castile that share its border.” The map is oriented to the west, as if to show

the invasion route for the Spanish army, but the cluttered hill signs do not suggest use as a practical strategic tool.

The map might have been at least partially based on the coastal surveys that its author, Pedro Teixeira Albernaz, conducted between 1622 and 1630.³⁵⁹ These surveys

357. *PMC*, 4:159–60, pl. 519, and Carmen Litér and Francisca Sanchis, *Tesoros de la cartografía española*, exhibition catalog (Madrid: Biblioteca Nacional, 2001), 105–8.

358. Manoel de Azevedo Fortes, *Tratado do modo o mais facil, e o mais exacto de fazer as cartas geograficas* (Lisbon: Na Officina de Pascoal da Sylva, 1722), preface.

359. Antonio Blázquez y Delgado-Aguilera, “La descripción de las costas de España por Pedro Teixeira Albernaz, en 1630,” *Revista de Archivos, Bibliotecas y Museos* 19 (1908): 364–79; idem, “Descripción de las costas y puertos de España de Pedro Teixeira Albernaz,” *Boletín de la Real Sociedad Geográfica* 52 (1910): 36–138 and 180–233; and *PMC*, 4:153–59. The text of the *Descripción* is reproduced in Pedro Teixeira [Albernaz], *Compendium geographicum*, facsimile ed. (Madrid: Museo Naval, 2001). See also Felipe Pereda and Fernando Marías, eds., *El Atlas del rey planeta: La “Descripción de España y de las costas y puertos de sus reinos” de Pedro Texeira (1634)* (Madrid: Nerea Editorial, 2002).

were part of the great effort of reconnaissance and fortification of the western coast of the Iberian Peninsula that the Spanish crown was forced to undertake because of its almost constant engagement in a naval war with England.

Alegria demonstrated that the part of the map south of the Tagus included 286 localities, 50 more than on Fernando Álvaro Seco's map.³⁶⁰ Twenty-three places had disappeared, but seventy-three new places had emerged, situated mainly between Lisbon and Évora, in the Alto Alentejo, and on the Algarve coast, some of which had resulted from contemporary surveys. Analysis of the hydrographic network and the geographic coordinates shows that there had been marked improvement from earlier maps.³⁶¹ However, curious archaic aspects persist, in particular the imaginary island around Alcoutim in the lower valley of the Guadiana.

Even though it was carefully engraved, this map is not easy to read because it contains many fanciful drawings of mountains and forests and uses four symbols to differentiate categories of inhabited places. It contains a 15-league scale, and its border contains meridian degrees of 17.5 leagues each and parallel degrees of 14.5 leagues each. The circumstances of its publication in Madrid, when Castile was at war with Portugal, confirm that terrestrial cartography fell to the competency and responsibility of the military, itself under the control of the central political authority. It replaced the Álvaro Seco map as the prototype for printed maps of Portugal by various countries for about a century. For example, it is thought to have been used as a source for maps of Portugal by Robert de Vaugondy (1749) and Johann Baptist Homann (1704).

MAPMAKING TECHNIQUES IN SIXTEENTH- AND SEVENTEENTH-CENTURY PORTUGAL

From the early sixteenth century, easily accessible printed texts circulated throughout Europe explaining the techniques used by cartographers to design and construct maps. The *Cosmographia* of Peter Apian (1524), with Gemma Frisius's practical additions from 1533 appended and translated into Spanish in 1548, indicated in a simple fashion, with very clear explanatory illustrations, how to accomplish the "description" of any region by one of three techniques: using latitude and longitude values for places; using latitude and distance values; or, "without knowing either the longitude or the latitude or the distances," by the simple measurement of angles, the technique that Gemma considered the easiest.³⁶²

In 1530, Oronce Fine clearly explained how he had constructed his map of France using a net of parallels and meridians in which he had situated localities whose latitude and longitude were known.³⁶³ It seems evident that not all of the coordinates that he cited were astronomically determined. In 1546, discussing the "errors" of Fine,

Pedro Nunes revealed that Fine's book had been known in Portugal since the year after its publication in Paris (1532), and he claimed that the various techniques cited in the book had been known in Portugal for a long time, "not only by the mathematicians, but also by those artisans who make planispheres, trace maritime charts, and measure differences of longitude on the globe and with the astrolabe, by latitudes and angles of position, or by the itinerary distances."³⁶⁴

In 1551, in his *Breue compendio*, Martín Cortés explained that in order to prepare the scale or the *tronco de légua* of the maritime charts, "in our Spain they use a pair of compasses to measure the distance from the Cape Saint Vincent to the middle of the biggest Berlenga Island, [measuring] three degrees," that is, 52.5 or 50 leagues, depending on the value adopted for each degree (either 17.5 or 16 leagues per degree).³⁶⁵ A sketch substantiates this explanation, attributing 37°00' to Cape St. Vincent and 40°00' to the Berlenga Islands (fig. 38.38). Uzielli thought this was the place where the Portuguese determined the length of the generally adopted meridian degree (17.5 leagues).³⁶⁶ This convention served as the basis for the map that we can reconstruct from the Hamburg Codex. It is the false value of the meridian degree that explains the gradually more pronounced deformation of this map to the north.

360. Maria Fernanda Alegria, "O povoamento a sul do Tejo nos séculos XVI e XVII: Análise comparativa entre dois mapas e outras fontes históricas," *Revista da Faculdade de Letras: Geografia* 1 (1986): 179–208.

361. Suzanne Daveau, "Géographie historique du site de Coruche, étape sur les itinéraires entre Évora et le Ribatejo," *Revista da Faculdade de Letras* 5 (1984): 115–35, esp. 128, and Daveau, "A rede hidrográfica no mapa."

362. Peter Apian, *Libro dela Cosmographia de Pedro Apiano, el qual trata la descripcion del mundo, y sus partes, por muy claro y lindo artificio, aumentado por el doctissimo varon Gemma Frisio . . .* (Enveres: Bontio, 1548), 55–55v.

363. Oronce Fine, *De cosmographia*, published in Fine's *Protomathesis* (Paris, 1532); the *Cosmographia* is said to have been first published separately in 1530. See Lucien Gallois, "La grande carte de France d'Oronce Fine," *Annales de Géographie* 44 (1935): 337–48, and François de Dainville, "How Did Oronce Fine Draw His Large Map of France?" *Imago Mundi* 24 (1970): 49–55.

364. Nunes, *Obras*, 3:213.

365. Cortés, *Breue compendio*, fols. 63–66.

366. Gustavo Uzielli, *La vita e i tempi di Paolo dal Pozzo Toscanelli* (Rome: Ministero della Pubblica Istruzione, 1894), 411. See also Jaime Cortesão et al., "Influência dos descobrimentos dos Portugueses na história da civilização," in *História de Portugal*, 8 vols., ed. Damião Peres (Barcelos: Portucalense Editora, 1928–37), 4:179–528, esp. 230–31, and two publications by Rolando A. Laguarda Triás: *La aportación científica de mallorquines y portugueses a la cartografía náutica en los siglos XIV al XVI* (Madrid: Instituto Histórico de Marina, 1964), and "Interpretacion de los vestigios del uso de un método de navegación preastronómica en el Atlántico," *Revista da Universidade de Coimbra* 24 (1971): 569–93.

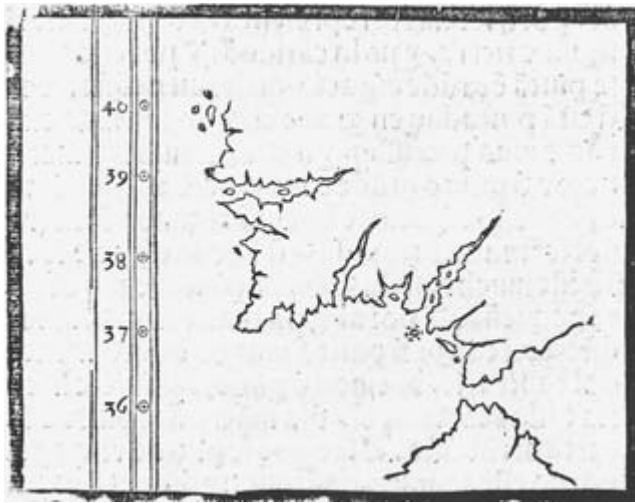


FIG. 38.38. MAP OF THE SOUTHWEST COAST OF THE IBERIAN PENINSULA, FROM CORTÉS'S WORK. The map shows Cape Saint Vincent at $37^{\circ}00'$ and the Berlenga Islands at $40^{\circ}00'$.

Size of the original: ca. 10.3×11.9 cm. Martin Cortés's *Breue compendio* (1551 edition), fol. 65. Photograph courtesy of the BL (C.54.k.4).

When the Portuguese cartographer João Baptista Lavanha, in the service of the king of Spain, conducted the survey for his map of Aragon in 1610, he continued to use a very simple traditional method based on the measurement of directions from high points, combined with recalculated distances, either ones supplied to him by local practitioners or ones that he himself had measured.³⁶⁷ The main technical improvement that he introduced was the use of a goniometer that allowed for the measurement of angles with precision to half a degree. Lavanha adjusted the data collected in the field based on a small number of astronomic measurements.

Interesting conclusions can be reached by comparing the geographic coordinates of a few chosen locations in the Hamburg Codex (1525–36), in the Portuguese section of the Escorial Atlas (ca. 1580–ca. 1585), and in Pedro Teixeira Albernaz's map (1662) (see fig. 38.33) with the values of latitude supplied in the "Esmeraldo de situ orbis" by Duarte Pacheco Pereira. The "Esmeraldo," a cosmographical and navigational treatise, originally contained maps, which have been lost, but the written text dates to 1505–8, and the latitudes given were already much more exact than Ptolemaic data. The existence of data for Portuguese and Castilian inland locations in the "Esmeraldo" confirms that astronomical determinations of latitude unrelated to navigation were already in progress at the time.

But the latitude values of the Hamburg Codex differ from those of the "Esmeraldo," and these differences show that the latitude values of the codex are, to a great extent, the result of indirect estimates. Since the latitudes are close to modern values in the far southern part of the

country and progressively more exaggerated toward the north, there is an increasing distortion of the country to the northeast, and it appears that there was a lack of trustworthy astronomical measurements in the north. The mapmaker was not aware that the displacement of Berlenga Island about sixty-five kilometers to the north would provoke a considerable stretching of the country.

In contrast, the latitudinal position of Évora is almost correct in the Hamburg Codex ($38^{\circ}45'$, modern value $38^{\circ}34'$). Pedro Nunes reported that he had evaluated this latitude in 1533 at around $38^{\circ}20'$, in the presence of the king and Prince Henry "shortly before sunset," to demonstrate the effectiveness of the "shadow toll" (*instrumento de sombras*) that he had invented, which permitted determination of the latitude of a place at any hour of the day.³⁶⁸ Such a demonstration implies that the latitude, normally measured at noon, was well known by that time and close to the value obtained.

The versions of Fernando Álvaro Seco's map present minor variations of latitude, within the range one would expect between versions derived from one another or from a prototype. But the versions of the map use the traditional Ptolemaic latitude value attributed to Lisbon— $40^{\circ}00'$ north—neglecting the far more accurate values used by sailors. This is yet another argument for conceiving of the original Álvaro Seco map as the work of humanists, not navigators.

In figure 38.33 and table 38.3, we can see that the most latitudinally "stretched" outline of the country is that in the Escorial Atlas, with a difference of $6^{\circ}04'$ between the latitudes of Caminha and Cape Saint Vincent (compared with the actual value of $4^{\circ}51'$). The latitudes on the map of Pedro Teixeira Albernaz are much closer to modern values, varying only a few minutes except for some inland locations. One can therefore confirm that this map was the result of new surveys conducted with techniques that were very different from those used to draw the map associated with the Hamburg Codex at the beginning of the sixteenth century.

It is not certain that the first maps of Portugal were drawn from a previous grid of coordinates. It is most probable that they were produced by triangulation, from distances and angles, and certainly not, as was formerly stated, by trigonometry.³⁶⁹ The maps of the Escorial Atlas have a square grid, with degrees of 16 leagues, and the map of Pedro Teixeira Albernaz (1622) has a rectangular grid, with longitude degrees of 14.5 leagues and latitude degrees of 17.5 leagues. Only this last map was probably drawn on a grid.

367. On João Baptista Lavanha, see *PMC*, 4:63–76, map of Aragon, pl. 423; João Baptista Lavanha, *Itinerario del reino de Aragón*, with a prologue by Faustino Sancho y Gil (Zaragoza, 1895); and Hernando Rica, *La imagen de un país*.

368. See Nunes, *Obras*, 1:218.

369. Alves et al., "O mais antigo mapa de Portugal."

EARLY REGIONAL AND LOCAL CARTOGRAPHY

The Reconnaissance of the Border

The first known cartographic representations of the Portuguese territory at the local scale were linked to attempts to establish the country's border on the ground. The Christian *reconquista* ended in 1249 with the occupation of the Algarve, the southernmost region of the Iberian Peninsula's Atlantic front, thus defining the southern border. The last important adjustment of territory with Castile in the east dates from 1297. Portugal has since maintained the same political limits and is, in this sense, a unique case in the context of European continental history. The central authority sought to define this line precisely at the local level using the exact location of border landmarks that were often destroyed or changed in areas of dispute. The border was marked by a strategic network of fortifications in Portugal that faced a corresponding military system on the Spanish side of the border.

In 1454, Afonso V ordered an *inquirição* concerning a section of the border between Alentejo and Spanish Extremadura. A schematic drawing (*debuxo*) is found in the codex containing the *inquirição* that represents the alternative political limits between Olivença and Alconchel, including the location of landmarks on the ground (fig. 38.39).³⁷⁰ Six decades later, in 1515, a little to the north, another attempt at fixing the jurisdictional limits between neighboring fortified villages, Oguela and Albuquerque, justified a detailed plan of the area.³⁷¹ Relief, the hydrographic network, settlements, and paths are rudimentarily located; the plan was accompanied by complementary texts.

The political centralization that occurred in Portugal from the end of the fifteenth century explains, to a large extent, the reconnaissance and inventorying of the territory that took place during the reign of Manuel (r. 1495–1521). Not only did cities take an interest in the terrestrial border, but the central authority, too, organized overall surveys that were directly related to the problems of military defense.

In 1489 and 1507, Duarte de Armas, *escudeiro* (squire) to the royal household, took part in two expeditions to the Moroccan coast, where he executed surveys of the main rivers' harbor bars near Azamor, Salé, and Larache. Based on his reputation for producing a good *debuxo* (sketch), he traveled the length of the Luso-Spanish border, executing views and plans of the main fortresses and inquiring about problems and flaws in the defense structures from Castro Marim to Caminha in 1509. That year he spent seven months visiting frontier locations, drawing natural views and numerous plans of castles. Upon returning to the capital, he selected and recopied the sketches, producing the following year a group of 114 panoramic drawings of fifty-seven fortresses (two views and one castle plan per

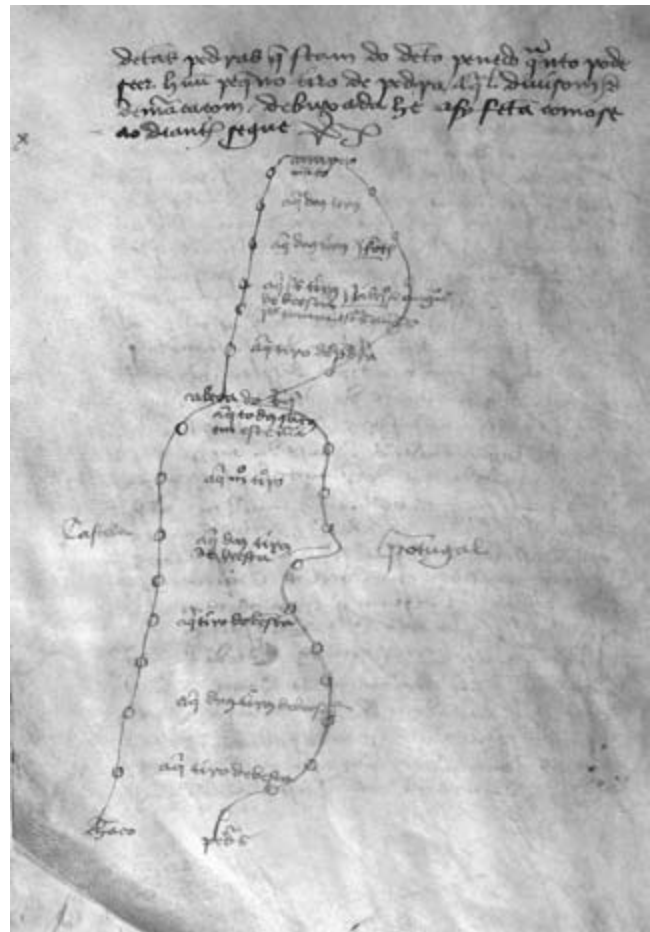


FIG. 38.39. COPY OF A MAP OF THE LIMITS BETWEEN OLIVENÇA AND ALCONCHEL, 1438–81. Copied from “Livro das demarcações e pazes,” fol. 23.

Size of the original: ca. 29.6 × 21.2 cm. Photograph courtesy of the IAN/TT (Núcleo Antigo 310, fol. 26v).

fortress, on average), bound in a famous parchment codex titled “Livro das Fortalezas” (fig. 38.40).³⁷²

A second preparatory codex drawn on paper once existed in the same archive, but disappeared between 1655 and the second quarter of the eighteenth century, the decades of war between Portugal and Spain. In 1910 and 1921, two parts of this codex were rediscovered in

370. See Rita Costa Gomes, “A construção das fronteiras,” in *A memória da nação*, ed. Francisco Bethencourt and Diogo Ramada Curto (Lisbon: Livraria Sá da Costa Editora, 1991), 357–82, esp. 374–75.

371. IAN/TT (Gav. XVII, maço 5, nº 3). See Gomes, “A construção das fronteiras,” 377–79.

372. The work had its first edition in 1943, Duarte de Armas, *Reprodução anotada do Livro das fortalezas de Duarte Darmas*, ed. João de Almeida (Lisbon: Editorial Império, 1943); it is included in *PMC*, vol. 1, and there are the two previously mentioned editions by Castelo Branco. It is from the text of Castelo Branco that we draw our reference to Duarte de Armas.

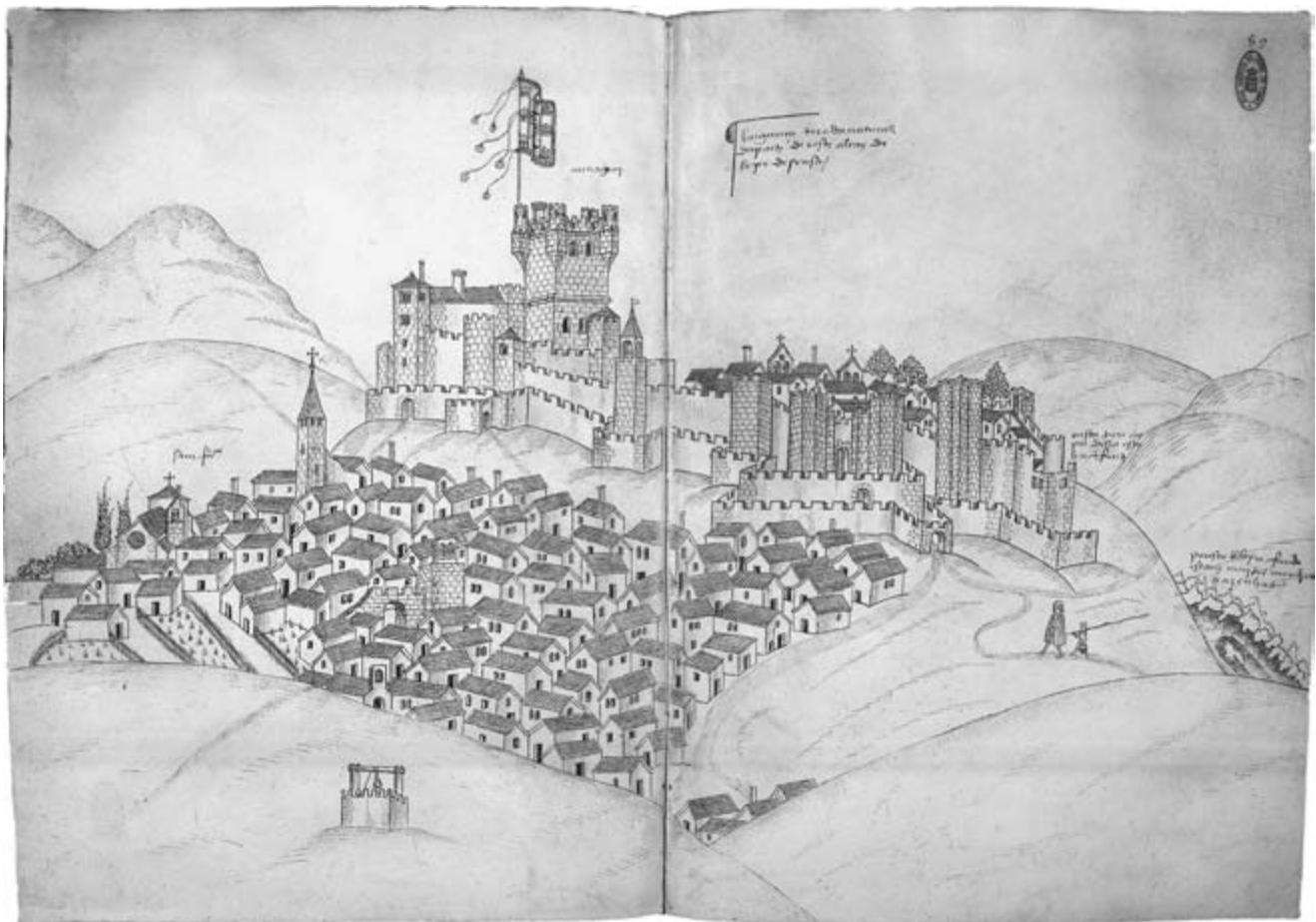


FIG. 38.40. VIEW OF BRAGANÇA BY DUARTE DE ARMAS, 1509.
Size of the original: 35 × 49 cm. From Duarte de Armas,

“Livro das Fortalezas,” fol. LXXXIX. Photograph courtesy of the IAN/TT (Casa Forte, Cod. 159)

Madrid, where they still are today.³⁷³ This partial copy, an likely example of cartographic espionage, has fewer drawings (seventy-one) than the “Livro das Fortalezas,” but a larger number of captions providing information about each fortress.

The interest in the codex during the seventeenth-century wars, while Portugal’s borders were constantly threatened, is also confirmed by a manuscript copy made by Brás Pereira de Miranda in 1642 titled “Fronteira de Portugal justificada pellos Reys deste Reyno.”³⁷⁴ In it, the pictures are preceded by a map of Portugal derived from a version of Fernando Álvaro Seco’s map, with the different borderline fortresses indicated.

Surveys of the Coast

There are two main reasons why successive cartographic surveys of the coast were conducted—for nautical reasons, such as detecting shoals or havens, and for military reasons, such as choosing places to fortify, detecting

beaches where landings were possible, and verifying the state of the fortresses. Both reasons normally coexisted, but their relative importance depended on the specific historical period and context.

During the period of union of the Iberian crowns (1580–1640), it was exceedingly important for the Spanish monarchs to defend the Portuguese coast in the face of the perennial attacks, especially from the British. Italian architects—Filippo Terzi, Giovanni Battista Cairato, Giovanni Vincenzo Casale, and Alessandro Massai—were therefore imported to study, plan, and coordinate the construction of numerous fortifications, resulting in the production of abundant maps.³⁷⁵

373. Madrid, Biblioteca Nacional (Reservados, Cod. 9241).

374. Lisbon, Biblioteca Nacional (Il. 192).

375. See Rafael Moreira, “Os grandes sistemas fortificados,” in *A arquitectura militar na expansão portuguesa* (Lisbon: CNCDP, 1994), 147–60, and idem, “Arquitectura: Renascimento e classicismo,” in *História da arte portuguesa*, 3 vols., ed. Paulo Pereira (Lisbon: Temas e Debates, 1995), 2:302–75, esp. 327–32. Manuscript examples of



FIG. 38.41. CHART FROM THE CADAVAL CODEX, 1617.

Size of the original: ca. 34.7 × 53.5 cm. Photograph courtesy of the IAN/TT (Cód. Casa Cadaval, No. 29, p. 66).

Examples of these cartographic works include five plans of Portuguese coastal fortifications drawn by Italian architects kept at the Arquivo General de Simancas. To Giacomo Fratini, an engineer who went to Portugal in the retinue of the Duke of Alba, is ascribed a plan of the S. Julião da Barra fortress at the mouth of the Tagus near Lisbon, a building planned in 1553 and commenced in 1559.³⁷⁶ Regarding the fortifications around the harbor at Angra, on the island of Terceira (in the Azores), three plans from about 1589 can be associated with Tiburzio Spanochi and Giovanni Vincenzo Casale.³⁷⁷ Finally, there is an original drawing by Filippo Terzi of the castle of S. Filipe in Setúbal dating from 1594.³⁷⁸ Terzi worked in Portugal after 1577, when he was called by King Sebastian to make arrangements for new military defenses on the Tagus, Sado, and Lima harbor bars, as well as in Peniche and on the shores of the Algarve and the Alentejo. The resulting maps testify to the concerns for military defense of the Portuguese coast in three of the most strategic areas: on the Tagus and the Sado harbor bars and on the archipelago of the Azores in the center of the North Atlantic.

There is much more information about maps of other coastal areas made at even earlier dates, for example, the works of Simão de Ruão, who studied architecture and

military engineering in Italy and Germany and who completed fortification projects in Porto, Vila do Conde, and Viana do Castelo in 1567–68.³⁷⁹ But if these examples were separate plans made to complement reports and memorials, they quickly became miscellaneous composite atlases and cartographic collections representing the Portuguese coast.

For example, the untitled codex called the Cadaval Codex dating from 1617 by Luís de Figueiredo Falcão contains detailed charts of sections of the shores from the Algarve to Pederneira (fig. 38.41), and also includes an overall map depicting the entire coast from Galicia to An-

military plans of Faro, Forte da Ilha das Lebres (Tavira), and Silves, dating from 1617–21, attributed to Alessandro Massai and conserved at the Real Academia de la Historia in Madrid, were recently brought to light by Manso Porto in *Cartografia histórica portuguesa*, 7–16.

376. Simancas, Arquivo General (XVI-7); the manuscript plan is appended to documentation dating from 1581. See A. Teixeira da Mota, "Arquitectos e engenheiros na cartografia de Portugal até 1700" (unpublished manuscript, n.d.), 44.

377. Simancas, Arquivo General (XV-35, 36, 37).

378. Simancas, Arquivo General (VII-135).

379. See Mário Jorge Barroca, *As fortificações do litoral português* (Lisbon: Edições Inapa, 2001), 59–61.

dalucia. The charts make reference to and are based on the surveys and drawings of the previously mentioned Italian architects and engineers Fratini, Spanochi, Casale, and Terzi, and also the famed master Leonardo Turriano, *engenheiro-mor do reino* (chief royal engineer) in 1597, and Massai, who had moved from Naples to Portugal with Casale (his uncle) in 1586.

Massai completed a manuscript codex of maps, his “*Descrição do Reino do Algarve*,” in 1621.³⁸⁰ According to Teixeira da Mota, Massai’s “*Descrição*” was “the best work that has come down to us concerning a region of Portugal in the seventeenth century.”³⁸¹ It not only covers the Algarve but also includes the military structures of the Alentejo coast and the Sado and the Tagus estuaries in a geographic sequence from Cacela to Cascais. There are roughly thirty large-scale charts to which are appended maps of the coast between Cabo da Roca and the mouth of the Mondego, of the Algarve, and of Portugal. The maps complement a voluminous text on the Algarve and are organized by sections of the coast. They include hydrographic and topographic charts as well as drawings and projects for the network of coastal fortifications. The descriptions referring to the Algarve and to the Alentejo coast seem to be based on surveys carried out by Massai and those referring to the Lisbon region on the works of Casale.

Following the surveys conducted by Pedro Teixeira Albernaz between 1622 and 1630 along the shores of the Iberian Peninsula, this well-known cartographer wrote a detailed geographic description that has come down to us in five manuscripts.³⁸² Although only one of them contains maps,³⁸³ we know that the text originally included maps and detailed charts of the Portuguese coast. One of the texts alludes to “tables” (or maps) more than once, such as in this fragment from a description of the entrance to the Tagus: “. . . as one more distinctly and clearly can see on the table where the bottom of these two entrances and harbor bars is shown by numbers.”³⁸⁴ It remains to be discovered whether Pedro Teixeira Albernaz conducted a precise survey of the coast (which appears to have already existed in Massai’s time), or only local surveys of specific features. Already after the restoration of Portugal’s independence (1640), Pedro’s brother, João Teixeira Albernaz I, was conducting coastal surveys that were summarized in the “*Descrição dos portos marítimos do reino de Portugal*,” a collection of sixteen charts that depict, sequentially, sections of the shore in a rather simple design (fig. 38.42). Five originals dating from 1648 and a copy from 1669 are known.³⁸⁵

The Absence of Regional Maps

Detailed textual descriptions of various Portuguese regions survive from the middle of the sixteenth century, but the maps that correspond to them either were de-

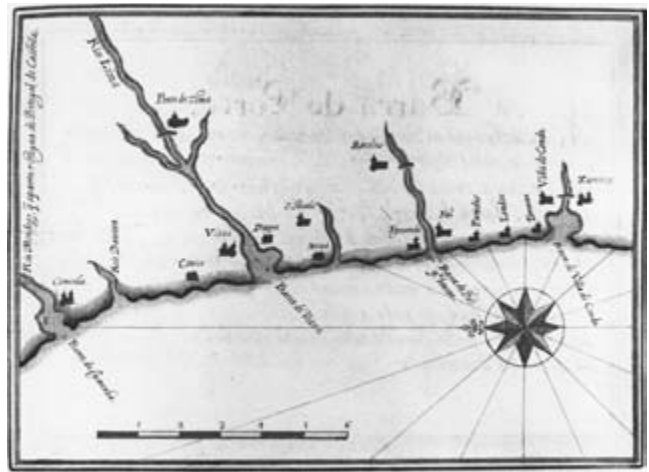


FIG. 38.42. MAP OF THE COAST OF MINHO FROM THE “*DESCRIPÇÃO DOS PORTOS MARITIMOS DO REGNO DE PORTUGAL*” BY JOÃO TEIXEIRA ALBERNAZ I, 1648. Size of the original: 15 × 20 cm. Biblioteca Nazionale Centrale, Florence (Codex Palatino, 1044, tav. 3). By concession of the Ministero per i Beni e le Attività Culturali della Repubblica Italiana.

stroyed or are still lost today in the midst of other documentation. In his 1608 work, an apology for Lisbon in dialog form, Luís Mendes de Vasconcelos had one of the characters recall a “topographia” of the region, observing the locations of the innumerable places within the limits of Lisbon.³⁸⁶

A rather different type of cartography is found in the “*Livro que tem todas as plantas e perfis das igrejas e vilas do preorado do Crato*,” written by Pedro Nunes Tinoco, which dates from 1620 and contains plans and profiles of churches and towns in Crato.³⁸⁷ The author was a disciple of João Baptista Lavanha and the head of a family of renowned architects. In 1615, he was the architect of Crato, a small priorate in the center of Portugal. From the middle of the fourteenth century, the priorate of Crato had been the seat of the Hospitaller order (the Order of Malta),

380. Lisbon, Museu da Cidade (Col. Vieira da Silva, n° 460). See Guedes, “Aspectos.”

381. Teixeira da Mota, “Arquitectos e engenheiros,” 12.

382. Vienna, Österreichische Nationalbibliothek (MS. 5563 Re. 7639 and MS. 5707 Rec. 376); BL (Add. MS. 28497); Madrid, Biblioteca Nacional; and the Uppsala Universitetsbibliothek.

383. Manuscript from the Uppsala Universitetsbibliothek facsimile edition, Teixeira, *Compendium geographicum*.

384. Vienna, Österreichische Nationalbibliothek, “*Dela forma, grandeza, fertilidade e riqueza de España*” (MS. 5707 Rec. 376).

385. The examples are conserved in Lisbon, Sociedade de Geografia; Vienna, Österreichische Nationalbibliothek (two); and the BL. One last example that the authors of *PMC* thought was lost has been found in Florence, Biblioteca Nazionale Centrale (Manoscritti Palatini, 1044); see *PMC*, 4:79, 141–43, and pls. 509A–H and 510A–H. The 1669 copy is in the BNF.

386. Vasconcelos, *Do sitio de Lisboa*.

387. Codex at the seminary of Sernache do Bonjardim.

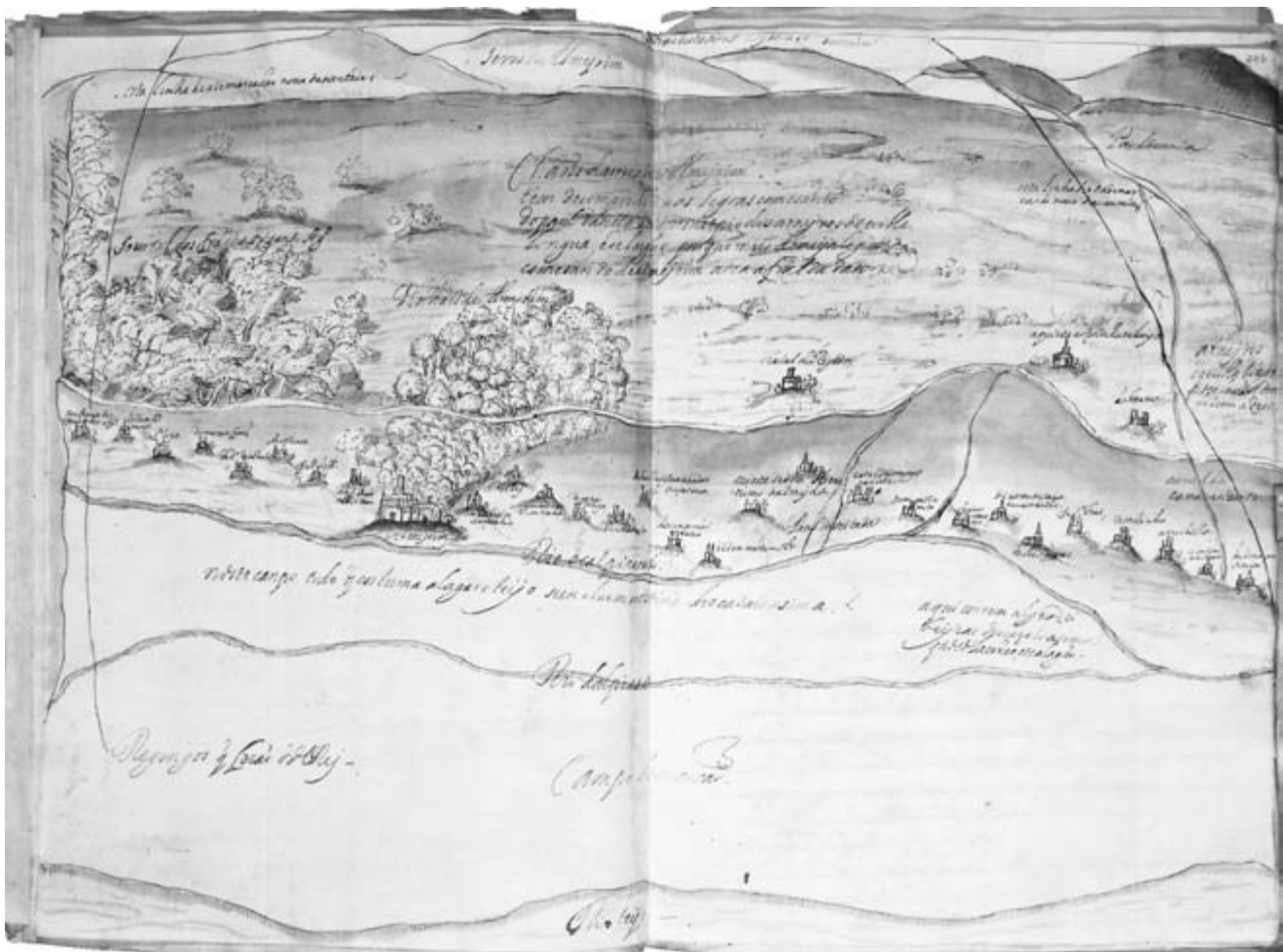


FIG. 38.43. ANONYMOUS MAP OF THE AREA OF ALMEIRIM, 1632.

Photograph Henrique Ruas, courtesy of the Biblioteca da Ajuda/IPPAR, Lisbon (51-X-3, fols. 24–25).

and its prior had exercised an almost absolute authority over the lands of that dominion.³⁸⁸ In 1615, Tinoco traveled all over the priorate, sketching all of the villages and churches in a total of more than twenty drawings and constructing the plans for some of them. The colored and carefully designed elevated views depict the small agricultural nuclei of the Tagus Valley and of the eastern Alto Alentejo on a large scale (plate 37).

A curious sketch of the Almeirim area from 1632 has survived. Almeirim was a place often frequented by the court and situated in the fertile *lezírias* (floodplain) of the Tagus in the Ribatejo region.³⁸⁹ The sketch is an oblique view, probably executed from the lofty castle of Santarém bordering the Tagus (fig. 38.43). The settlement was situated on the south bank, beyond the reach of the highest floodwaters. The anonymous map accompanies documentation that specifies the economic situation of the local villages.

We know of three manuscript maps referring to different Portuguese administrative districts of the seventeenth

century: the *correições* of Tomar, Santarém, and Guarda.³⁹⁰ The background of each is composed of a hierarchized network of rivers. The administrative limits that permit a clear reading of the outlines of the diverse *correições* are rigid and perfectly rectilinear without the least claim to exactitude. The inhabited places were put on the maps in the form of standardized models that served to distinguish the various categories of villages and towns. Using the stylistic evidence of the drawings, Cortesão and Teixeira da Mota judged them works of João Teixeira Albernaz I, based on a detail in the course of the rivers in the

388. Tude de Sousa, "Algumas vilas, igrejas e castelos do antigo priorado do Crato (Crato-Flor da Rosa-Amieira)," *Arqueologia e História* 8 (1930): 53–82, esp. 54–55.

389. See José Manuel Garcia, "Tesouros da cartografia portuguesa em Portugal," in *Tesouros da cartografia portuguesa*, exhibition catalog (Lisbon: CNCDP, 1997), 35–114, esp. 59.

390. The first two are preserved in Lisbon, Biblioteca Nacional (Iconografia, D 95 R and D 96 R), and the last in Évora, Biblioteca Pública (Gav. 4, Pasta A, n° 2.).

Sorraia basin, and they suggested a date between 1640 and 1646.³⁹¹ But their argument does not appear sufficiently convincing, for the course of these rivers was always unsteady.³⁹² In order to achieve a correct dating, a thorough study of the three maps is needed, comparing them with the detailed history of the variations of the administrative boundaries of Portugal. There are signs that these documents might date from the eighteenth century.³⁹³

Manuscript and Printed City Views

Views or city plans by Portuguese cartographers also date from the beginning of the sixteenth century. Most of the limited number that have survived are small and are integral parts of illuminated manuscripts. This is the case of both the view of Lisbon inserted in Duarte Galvão's "Crónica de D. Afonso Henriques," attributed to António de Holanda and dating from about 1520, and the view of Évora, attributed to Duarte de Armas and dating from 1501, which serves as the title page to the city's *foral* (charter) granted by King Manuel.³⁹⁴ In both documents, buildings are densely concentrated inside walled areas with few empty areas. Palaces, churches, and convents stand out with identifying architectural details. In the areas surrounding the cities are depicted activities relating to the harbor and the coast (in the case of Lisbon) and agricultural activities (in the case of the inland city of Évora). Maps of the southern cities of Évora, Beja, and Santarém are attributed to António de Holanda. They illustrate the "Genealogia dos Reis de Portugal" by Simão de Bening and were probably executed about 1530.³⁹⁵ Because of Lisbon's economic importance at the time, several sixteenth-century depictions of the city are known, including the illumination attributed to Holanda in the "Genealogia" (fig. 38.44). One panoramic view of the capital, a large, highly detailed naturalistic drawing, dates from about 1570;³⁹⁶ another was drawn by Francisco de Hollanda (Holanda) and included in his work "Da fabrica que falece ha cidade de Lysboa" (1571);³⁹⁷ and a fourth was made by Simão de Miranda in 1575 portraying the western part of the city.³⁹⁸ Hollanda was a famous artist and a friend of Michelangelo, and his codex brought together his suggestions for the defense and embellishment of the capital. It includes a drawing of the banks of the Tagus between Lisbon and its mouth, with the whole system of fortifications built and projected.³⁹⁹ There are also details of Lisbon, including its streets and squares, in the "Livro de horas de D. Manuel" attributed to António de Holanda and dating from 1517–38.⁴⁰⁰

The images of some Portuguese cities—Lisbon, Coimbra, and Braga—were diffused in maps of sixteenth-century Europe in Georg Braun and Frans Hogenberg's *Civitates orbis terrarum*, from 1572.⁴⁰¹ The manuscript on which was based the image of Braga—one of the spiritual

centers of the Iberian Peninsula, where the archbishop primate resided—is attributed to Manuel Barbosa, an erudite citizen of Porto. Abraham Ortelius corresponded with Barbosa, who not only remarked on toponymic errors in Ortelius's maps, but was also one of the people entrusted by the publisher with the job of finding and sending maps of Portuguese cities, especially Porto and Braga.⁴⁰² But Ortelius had another informer in Braga: Gaspar Álvares Machado, an antiquarian close to Archbishop Agostinho de Castro, who expressly wished to see a picture of his capital published in the fifth volume of the *Civitates*; the city plan of Braga illustrated there is a small masterpiece. In August 1594, Machado wrote that he would be sending a map of Braga that he himself had drawn.⁴⁰³

INDEPENDENCE AND WAR MAPS (FROM 1640)

After the period of the union of the Iberian crowns (1580–1640), Portugal was engaged in a permanent war

391. PMC, 5:142.

392. Daveau, "Géographie historique du site de Coruche."

393. See Suzanne Daveau, "Lugares e regiões em mapas antigos," in *Lugares e regiões em mapas antigos*, by Isabel Cid and Suzanne Daveau (Lisbon: CNCDP, 1997), 13–44, esp. 37–38. Based on the watermarks on one of the maps, de Carvalho says they are from the eighteenth century. See his *Catálogo da coleção de desenhos*, 187.

394. Conserved at Cascais in the Museu-Biblioteca dos Condes de Castro Guimarães (inv. 14) and in Évora at the Arquivo Municipal de Évora, respectively.

395. Antonio de Holanda and Simão de (Simon) Bening, *A genealogia iluminada do infante dom Fernando* (Lisbon, 1962).

396. Leiden, Rijksuniversiteit (1-17 J 29-15-7831-110); the map measures 0.8 × 2.75 m.

397. Lisbon, Biblioteca da Ajuda (51-III-9, fols. 8v–9r). The work was published only in 1879 in Porto by Joaquim de Vasconcellos, but without engravings. The best facsimile edition remains that of Segurado, *Francisco d'Ollanda*.

398. Now in Turin. See *Lisboa quinhentista: A imagem e a vida da cidade* (Lisbon: Direcção dos Serviços Culturais da Câmara Municipal, 1983), 87 (no. 25).

399. Lisbon, Biblioteca da Ajuda (51-III-9, fols. 12v–13r).

400. Lisbon, Museu Nacional de Arte Antiga (inv. 14, fols. 25 and 129v). On the images of Lisbon in the sixteenth century, see Ana Cristina Leite, "Os centros simbólicos," in *História da arte portuguesa*, 3 vols., ed. Paulo Pereira (Lisbon: Temas e Debates, 1995), 2:69–90, esp. 70–72.

401. Georg Braun and Frans Hogenberg, *Civitates orbis terrarum*, "The Towns of the World," 1572–1618, 3 vols., intro. R. A. Skelton (Cleveland: World Publishing, 1966). The image of Lisbon is in vol. 1 (1572), and the images of Lisbon, Coimbra, and Braga are in vol. 3 (ca. 1598).

402. Abraham Ortelius, *Abrahami Ortelii (geographi antverpiensis) et virorum eruditorum ad evndem et ad Jacobum Colium Ortelianum . . . Epistolae . . . (1524–1628)*, ed. Jan Hendrik Hessels, *Ecclesiae Londino-Batavae Archivum*, vol. 1 (1887; reprinted Osnabrück: Otto Zeller, 1969), 608–10.

403. Ortelius, *Epistolae*, 593–95. Teixeira da Mota left manuscript notes about this possible authorship; see Garcia, "Tesouros da cartografia portuguesa," 54. Machado is not known for being a cartographer or artist and had a reputation as a plagiarizer and a forger.



FIG. 38.44. ANTÓNIO DE HOLANDA'S VIEW OF LISBON, CA. 1530–34.

Size of the detail: ca. 24 × 36.5 cm. Photograph courtesy of the BL (Add MS. 12531, fol. 8).

with Spain that lasted, with a few interruptions, until 1668. The cartography of the Portuguese territory acquired a vitality that was probably greater than at any previous time. One explanation for this was the creation of the Conselho de Guerra (War Council) and the subordinate Junta de Fortificações (Fortification Commission). Also, the creation of an Aula de Artilharia e Esquadria (School of Artillery and Drill) in Lisbon was suggested in 1641, a project that took shape with the inauguration of the Aula de Fortificação e Arquitectura Militar (School of Fortification and Military Architecture) at the Ribeira das Naus in 1647. This school was directed by Luís Serrão Pimentel, *cosmógrafo-mor* (chief cosmographer) from 1641 and *engenheiro-mor* (chief engineer) after 1673. He was the author of several theoretical works on military architecture, including the *Methodo Lusitanico de desenhar as fortificaçoens das praças regulares & irregulares*, which included numerous plans and model maps (fig. 38.45).⁴⁰⁴ But Pimentel was not only a theorist; he actively took part in the remodeling of the military defenses of southern Portugal. The Aula de Fortificação constituted an important school for the training of Por-

tuguese military engineers and architects, a school where instruction in cartography was central. But in fieldwork, foreign military technicians made decisive contributions. The presence of these experts was related to the diplomatic and military agreements between Portugal and other European countries—mainly France—against Spain.

Due to their urgent need for fortification, the main cities in the kingdom were likewise presented in precise city

404. Luís Serrão Pimentel, *Methodo Lusitanico de desenhar as fortificaçoens das praças regulares & irregulares* (Lisbon: António Craesbeeck de Mello, 1680). On the basis of an autographed (?) manuscript of the text dating from 1670 and dedicated by Pimentel to the grand duke of Tuscany, Cosimo III de' Medici, who visited Portugal in 1668–69, we know that the author consulted a specialized bibliography given to him by the Italian prince. See Joaquim Oliveira Caetano and Miguel Soromenho, eds., *A ciência do desenho: A ilustração na colecção de códices da Biblioteca Nacional* (Lisbon: Biblioteca Nacional, 2001), 67. On the *Methodo* as a treatise on fortification and on its context in contemporary bibliography, see Manuel C. Teixeira and Margarida Valla, *O urbanismo português, séculos XIII–XVIII: Portugal-Brasil* (Lisbon: Livros Horizonte, 1999), 129–31.

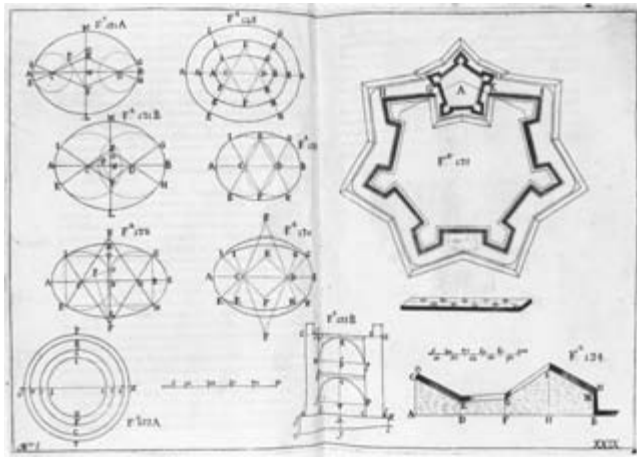


FIG. 38.45. AN EXAMPLE OF A “MODEL MAP” FROM LUÍS SERRÃO PIMENTEL’S *METHODO LUSITANICO*. Lisbon, 1680.

Size of the original: ca. 22.6 × 32.5 cm. Photograph courtesy of BL (8822.dd.5).

plans. In 1641, immediately following the restoration of Portugal’s independence, João IV appointed the Jesuit Simão Falónio, then professor at the Colégio de Santo António in Lisbon, *engenheiro-mor do reino* (chief royal engineer) and entrusted him with the job of reconnoitering and drawing the harbor fortifications of the Sado, as well as those of Setúbal, Arrabida, and Sesimbra.⁴⁰⁵ But particular importance was attached to areas where conflict was possible along the terrestrial and maritime borders.

Planning the Regional Strategy

During the long period of war, the planning of military action was organized geographically on a regional scale. Maps were compiled to support decisions relative to large areas of the country, remaining in manuscript to ensure secrecy and often containing little detail. Some examples have survived that represent the large borderlands of Minho and Alentejo, those more often attacked by the Spanish armies either through permanent local raiding or in strategic battles.

The “Carta do curso do rio Minho” (1652) has been attributed to one of the French engineers contracted as mercenaries and highly active in the region at the time: Anvers, Viele d’Athis, Jorge Duponsel, or Charles de Lassart.⁴⁰⁶ The map, drawn at a scale of 1:100,000, represents the area between the Lima and Minho Rivers with a detailed hydrographic network (fig. 38.46). But its main goal was to show the distribution of the fortifications in the Minho Valley, on both the Portuguese and Spanish sides, as well as the defenses for the main axes of transportation that provided access to the valley. Plans of the fortress of Santiago, of Viana do Castelo, and of the castle of Castro Laboreiro also appear.

The engineer Michel Lescolle authored another important manuscript map of the Minho that served as a strategic regional map, the “Carta Geografica da Provincia de Entre Douro e Minho,” dating from 1661.⁴⁰⁷ Lescolle’s activities in Portugal and Brazil covered the period between 1642 and 1684. In 1660, he was appointed general field master of the Minho army, and in 1676 he founded an artillery school in Viana do Castelo, converted into a fortification school in 1701.

None of the Minho charts were printed or copied, probably because, despite the region’s geostrategic importance, none of the large battles between Portugal and Spain took place there. The Alentejo was an entirely different case. All the known manuscript maps of the area likely date from the last years of the war (1660–68), when the Alentejo was where the fortunes of war and the independence of Portugal were decided. Two maps of somewhat similar composition concern a part of the borderlands of Alto Alentejo, both representing only general geographic information. One of these maps is inserted in the so-called “Livro de Nicolau de Langres,” from about 1660; the other is anonymous and unbound, dating from the same year.⁴⁰⁸ Allain Manesson-Mallet, a geographer and military engineer who worked in the Alentejo region from 1666 to 1668, is thought to have made his manuscript “Carte de l’Alenteie,” dating from 1667, based on the Langres image.⁴⁰⁹

One regional map with artistic insets of fortifications recalling those found in Ortelius’s *Theatrum* is the “Descrição da Ilha da Madeira” (ca. 1654) by Bartolomeu João, engineer and architect of the military fortifications on Madeira after 1618.⁴¹⁰ Only the uneven terrain and the distribution of settlements are represented in the island’s interior. In the context of the restoration of Portugal’s independence, the military interest lies in the six insets on the map’s right and lower margins showing views of Madeira’s principal fortresses.

405. See Caetano and Soromenho, *A ciência do desenho*, 56.

406. See Teixeira da Mota, “Arquitectos e engenheiros,” 40. Charles de Lassart was *engenheiro-mor do reino* from 1642, traveling the whole of the country reorganizing all of the border defenses, both terrestrial and maritime. On his cartographic activity in the fortification of the mouth of the Douro River, see Rafael Moreira, “Um exemplo: São João da Foz, de igreja a fortaleza,” in *A arquitectura militar na expansão portuguesa* (Lisbon: CNCDP, 1994), 56–70, esp. 65.

407. BNF (Col. Tralage, port. 189, n° 4163); see Teixeira da Mota, “Arquitectos e engenheiros,” 40.

408. Lisbon, Biblioteca Nacional (Cod. 7445 and Iconografia, Pasta I, n° 1). There is also a printed map related to eastern Alto Alentejo at the Centro de Estudos de História e Cartografia Antiga (CEHCA, 123), called *Theatro de la guerra en Portugal*, dating from the seventeenth century.

409. BNF (Col. Tralage, port. 189, n° 4164).

410. PMC, 5:92–93.

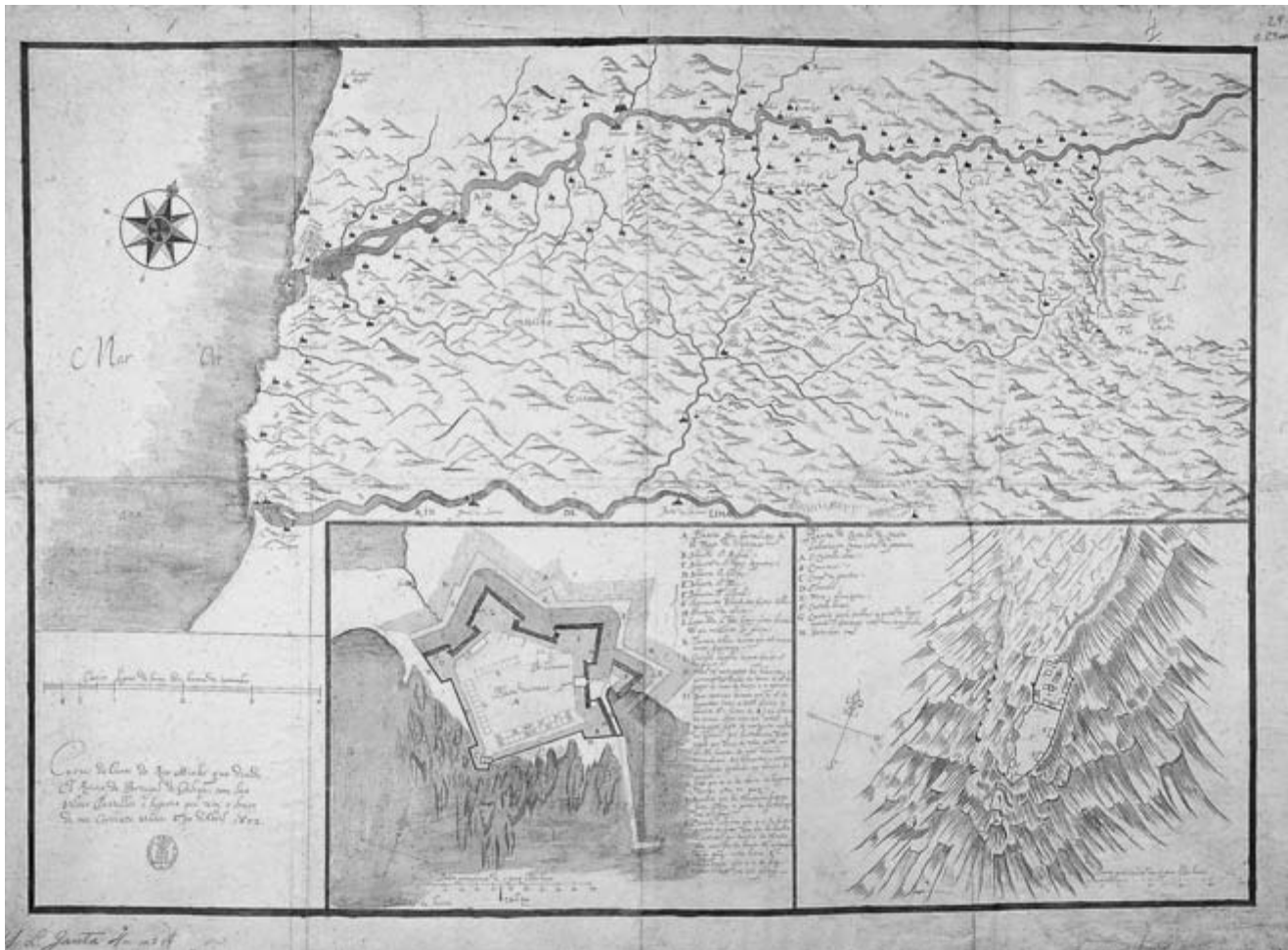


FIG. 38.46. "CARTA DO CURSO DO RIO MINHO," 1652.

Size of the original: 84 × 115 cm. Photograph courtesy of the Biblioteca Pública de Évora (Gav. 4, no 4).

In addition to these regional maps, one could cite the detailed charts of more limited areas that were often present in the baggage of messengers involved in the acts of espionage and counterespionage so common in territories during times of war. That may have been the provenance of two small, rudimentary maps that represent the border of the Guadiana Valley (settlements and hydrographic network) at scales of 1:270,000 and 1:620,000.⁴¹¹

Engineers, Architects, and Fortress Plans

Thanks to many French military architects and engineers in the service of the Portuguese army after 1641, numerous maps were drawn of the dense network of fortresses, both along the Atlantic coast and along the terrestrial border, as well as those that controlled the main axes of communication between the most important cities. Some of these fortress plans are known today, scattered throughout the principal Portuguese archives. Although they bear no signatures, they are attributable to the French engineers

because of their style. The plans are concerned with the three areas that were most threatened by invading armies, that is, the Minho, the Beira, and the Alentejo.

Among others, one can mention maps with dates between the first and last years of the war: the Campo Maior maps of Charles de Lassart (ca. 1642), the Setúbal map of João Gilot (ca. 1652), the anonymous maps of Monsaraz and Castelo Branco (ca. 1655), and the Castro Laboreiro map by Michel Lescolle (1658). Let us consider, for example, the Setúbal map by João Gilot (fig. 38.47). It was a working document with numerous corrections. The legends clarify the meaning of the colors

411. Évora, Biblioteca Pública (Gav. 4, Pasta A, nos. 18 and 19). On the espionage conducted by engineers and military architects on the Luso-Spanish border at the end of the seventeenth century, see Miguel Soromenho, "Descrver, registrar, instruir: Práticas e usos do desenho," in *A ciência do desenho: A ilustração na coleção de códices da Biblioteca Nacional*, ed. Joaquim Oliveira Caetano and Miguel Soromenho (Lisbon: Biblioteca Nacional, 2001), 19–24, esp. 23.

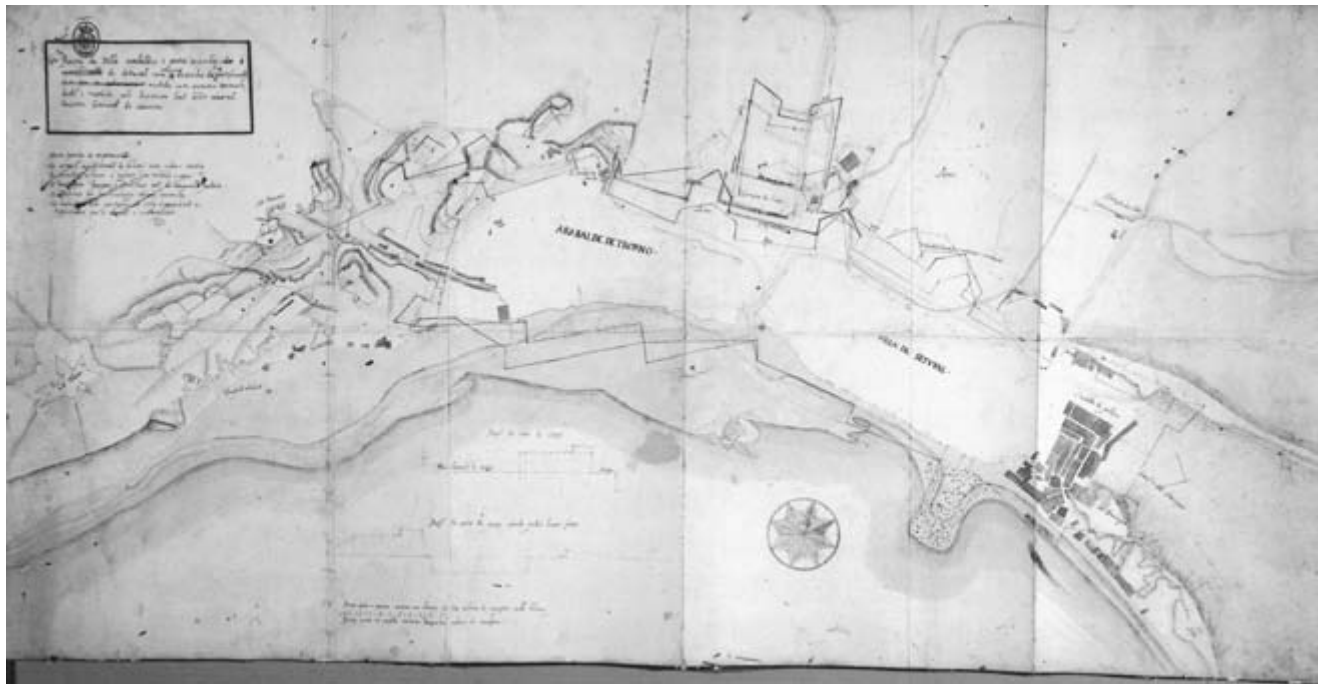


FIG. 38.47. MAP OF SETÚBAL BY JOÃO GILOT, CA. 1652. “Copia da Planta da Villa arabaldes e postos visinhos da notavel villa de Setuval cum alguns desenhos de sua fortificação cum que se podera sercar medida cum summa pontualidade

e tracada.”

Size of the original: 102.4 × 60 cm. Photograph courtesy of the Biblioteca Nacional, Lisbon (Iconografia, D. 46 R).

used to represent public, religious, and military buildings, as well as various planned military structures.

French engineers were not the only ones to depict Portuguese areas.⁴¹² The plans of the Lindoso Castle and of the fort of Nossa Senhora da Conceição facing Vila Nova de Cerveira (ca. 1665) testify that the Portuguese school was functioning. These plans are attributed to João Nunes Tinoco, an architect like his father, Pedro Nunes Tinoco, who had in turn been a pupil of João Baptista Lavanha. The Tinoco and Albernaz families are but two examples of remarkable families of cartographers.

In the limited domain of seventeenth-century Portuguese urban cartography, the Lisbon plan of João Nunes Tinoco dating from 1650 stands out. Only copies of it can be found today.⁴¹³ It replaced the sixteenth-century pictures diffused in the first and fifth volumes of the *Civitates orbis terrarum*, and it became the most faithful representation of the city of Lisbon prior to the devastating earthquake of 1755. Elaborated in the context of the Luso-Spanish wars, its main goal was undoubtedly to inventory and describe the existing urban resources and make it possible to plan the defense of the city in the face of a possible enemy attack.⁴¹⁴ Thus, the urban structure of the Portuguese capital was portrayed in detail (by block), and the main buildings were indicated. A new wall was being planned at the time following the trace established by foreign military engineers

Legarte, João Cosmader, and João Gilot, for which information about the meticulous topographic surveys completed at the time exists.⁴¹⁵

The primary plans of Portuguese fortresses compiled both by foreign and by Portuguese authors date from the last phase of the armed conflict. Their sources could be many and diverse, ranging from large-scale surveys elab-

412. See Edwin Parr, “As influências holandesas na arquitectura militar em Portugal no século XVII: As cidades alentejanas,” *Arquivo de Beja* 7–8 (1998): 177–90.

413. In Lisbon, for example, at the Museu da Cidade (MC. Des. 1084). An album of views of Portuguese cities called *Typis portugaliae*, dating from the end of the seventeenth century, was uncovered by Anselmo in 1989: Artur Anselmo, “Um documento iconográfico precioso e até agora desconhecido: Aguarela de Viana no século XVII,” *Cadernos Vianenses* 13 (1989): 107–12.

414. On the development of Portuguese cities in the seventeenth century as conditioned by defensive systems and fortifications, see Teixeira and Valla, *Urbanismo português*, 149–214, and Margarida Valla, “Espaço urbano no recinto fortificado do século XVII: A teoria e a prática,” and Margarida Tavares da Conceição, “Configurando a praça de guerra: O espaço urbano no sistema defensivo da fronteira portuguesa (primeiras impressões para os séculos XVII e XVIII),” both in *Universo Urbanístico Português, 1415–1822* (Lisbon: CNCDP, 2001), 383–92 and 825–39.

415. Ana Cristina Leite, “Lisboa, 1670–1911: A cidade na cartografia,” in *Cartografia de Lisboa, séculos XVII a XX* (Lisbon: CNCDP, 1997), 24–38, esp. 28.

orated by the enemy and obtained possibly through espionage, to smaller-scale foreign printed cartography. The previously mentioned compilation of maps, “Livro de Nicolau de Langres,” formally titled “Desenhos e plantas de todas as praças do Reyno de Portugal,” was just such a compilation of different cartographic sources.⁴¹⁶ Langres was a French military engineer who had served in the Portuguese army from 1644 and had achieved the rank of *engenheiro-mor* in 1659. In 1661, he adopted the Spanish cause, a common practice among mercenaries in seventeenth-century European wars. His change of sides—Langres worked for a long time in the fortification of the Portuguese borderlands—gave the enemy access to numerous pieces of military cartographic information. During the Battle of Ameixial in 1663 or at the time of the 1665 military campaigns (during which Langres died), the immensely important set of maps assembled in the “Livro de Nicolau de Langres” was again collected by the Portuguese, remaining for centuries in the possession of the counts of Castelo Melhor, a family closely linked to the Wars of Restoration. The cartographic set includes plans of most of the Portuguese fortresses on the Alentejo border, but also those on the coast between Cape Carvoeiro and the mouth of the Sado. The dimensions of the pictures vary, as well as their degrees of completion, confirming the typical features of a set of maps with practical utility for military planning.

João Nunes Tinoco compiled a new collection of plans based on the “Livro de Nicolau de Langres.” Its title was “Livro das praças de Portugal com suas fortificações,” and it dates from 1663.⁴¹⁷ After receiving a commission from the count of Torre, architect Tinoco executed this recompilation using the originals made by the French engineers (Cosmander, Gilot, Langres, Pierre de Sainte-Colombe, and others) related to strongholds from the Minho to the Algarve.

Another set of fourteen plans of fortifications of the Luso-Spanish border, of the same type and dating from about 1668, concerns the Beira and the Alentejo in particular. This set is integrated into the Atlas Stosch, a manuscript drawn and colored on paper of varying size. Among these documents is a plan signed by António Correia Pinto, an assistant engineer who worked on the Alentejo fortifications after 1666.⁴¹⁸

Some of the military plans of Portuguese cities and towns fortified during the Wars of Restoration witnessed a special diffusion through the press thanks to *Les travaux de Mars* (1671–72) by Allain Manesson-Mallet. Although he worked for only a short time in the Alentejo region, he continued to collect the abundant cartography of his predecessors, which, once redone, he published in Paris a few years later.⁴¹⁹ This plagiarism was quickly criticized by Luís Serrão Pimentel in his *Methodo Lusitanico* (1680).

Battles, Heroes, and Cartographic Propaganda

In the context of the restoration of Portuguese independence one finds a few maps, mostly printed, directly linked to the military campaigns in the central Alentejo and the contiguous part of Spanish Extremadura. These are not, strictly speaking, military maps, for those remained secret and in manuscript form. Instead, they are documents that celebrate battle victories and their military leaders. They display no originality of content, but we will discuss and illustrate two examples, and five similar maps are listed in appendix 38.9.

The only known specimen of a printed map of a part of the central Alentejo and the neighboring Spanish Extremadura is attributed to João Teixeira Albernaz I and dated from about 1644. This map has been referred to as the *Carta da fronteira do Alentejo* (fig. 38.48).⁴²⁰ The area represented on the map was the main center of the Alentejo military theater. It was the most open and defenseless area facing enemy military operations: the border section between the Tagus (to the north) and the Sierra Morena (to the south), itself the limit between Spanish Extremadura and Andalucia. There is no trace of manuscript sketches or final maps completed in those campaigns. The engraved chart, even if it benefited from them, clearly had a different purpose. At the center of an artistic panel and under a heraldic composition is the following dedication: “To Mr. Lourenço Skytte, Lord of Kongzbroo and Sättra, and Assistant to the Queen of Sweden at the Court of Portugal, VL dedicates this.” Lourenço Skytte was Lars Skytte, representative of Sweden at the Portuguese court between 1641 and 1647. Af-

416. The work of Nicolau de Langres was studied by Gastão de Mello de Mattos in *Nicolau de Langres e a sua obra em Portugal* (Lisbon: [Gráfica Santelmo], 1941).

417. Lisbon, Biblioteca da Ajuda (46-XIII-10).

418. Vienna, Österreichische Nationalbibliothek, Atlas Stosch (nos. 200, 203/1, 496, 498, 499, 500, 502, 504, 506, 508, 509, 510, 515, and 598); see *PMC*, 5:143. The collections of plans of fortifications would continue to be drawn, copied, remade, and augmented, as in the case of Cod. 5174 at the Biblioteca Nacional, Lisbon, titled “Tratado da fortificação” (dated after 1679), by Luís Serrão Pimentel and Francisco Pimentel, which presented the forts of the Beira and the Alentejo (see Caetano and Soromenho, *A ciência do desenho*, 70), or in the case of the album found in the same library (Iconografia, D.A. 7 A), which begins with the “Livro de varias plantas deste Reino e de Castela,” signed by João Thomas Correa and replete with printed and manuscript maps dated from between 1680 and 1743. On the album, see Mello de Mattos, *Nicolau de Langres*, 9.

419. Allain Manesson-Mallet, *Les travaux de Mars; ou, La fortification nouvelle tant reguliere, qu’irreguliere*, 3 vols. (Paris, 1671–72). The seventeen plans of Portuguese forts and fortified towns are almost all found in volume 1, and only some, such as the plans of Vila Viçosa and Lisbon, bear the inscription “Here is the plan and profile that I made there” (1:176 and 180).

420. *PMC*, 5:142, and João Carlos Garcia, “O Alentejo c. 1644: Comentário a um mapa,” *Arquivo de Beja* 10 (1999): 29–47.

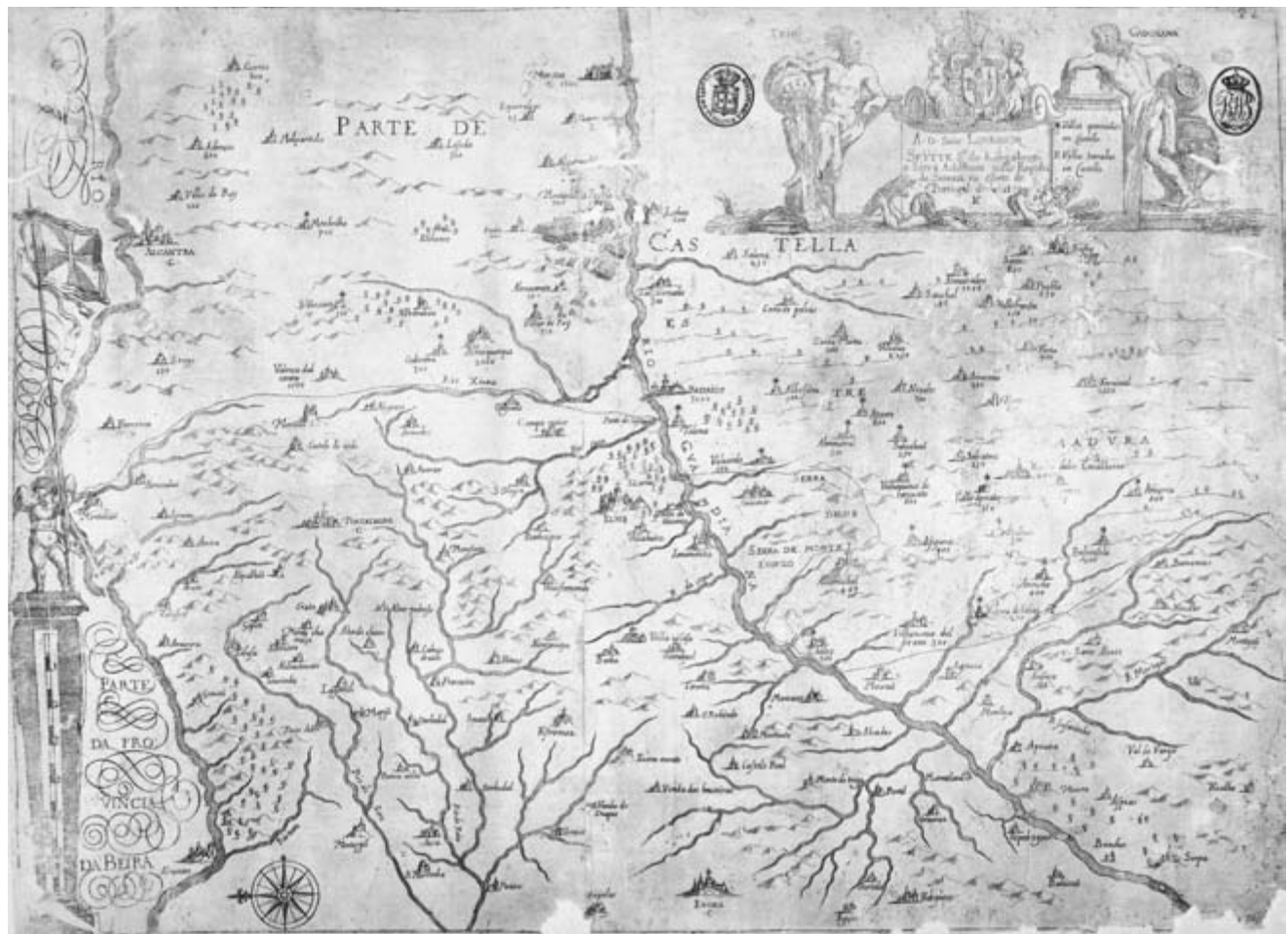


FIG. 38.48. CARTA DA FRONTEIRA DO ALENTEJO, ATTRIBUTED TO JOÃO TEIXEIRA ALBERNAZ I, CA. 1644. Drawn at a scale of about 1:370,000.

Size of the original: 43.6 × 59.5 cm. Photograph courtesy of the Biblioteca Nacional, Lisbon (Cartografia, CC 254 A).

ter the Portuguese embassy was sent in 1641 to the court of the future Queen Christina of Sweden, precious military help consisting of arms and munitions, as well as a diplomatic representative, was received in Lisbon.⁴²¹

Lars Skytte went down in history as the Lutheran ambassador who converted to Catholicism, but more important for our map was his presence in seventeenth-century Lisbon. With the country at war, many foreigners were concentrated in the capital—diplomats, military figures, and spies—all important, yet dangerous people who had daily interactions with each other and with Portuguese elites who shared their interests. Skytte left valuable reports of his life and of court life in Lisbon and the country.⁴²² We do not know if the map dedicated to him was conceived as an isolated document or as an appendage to a written text to be published (or that had already been published), perhaps by Paulo Craesbeeck.⁴²³ “VL,” who dedicated the map to Skytte, was in all likelihood Lucas Vorsterman, a famous engraver from Antwerp who was in

Portugal from 1645 to 1648, coinciding with the tenure of the Swedish ambassador.⁴²⁴ Vorsterman worked for

421. See Moses Bensabat Amzalak, ed., *A embaixada enviada pelo rei D. João IV à Dinamarca e à Suécia: Notas e documentos* (Lisbon: Instituto Superior de Comércio, 1930).

422. Karl Mellander and Edgar Prestage, *The Diplomatic and Commercial Relations of Sweden and Portugal from 1641 to 1670* (Watford: Voss and Michael, 1930), 43.

423. Craesbeeck had already published a book dedicated to Sytte: Paulo Craesbeeck, *Commentarios do grande capitam Ruy Freyre de Andrada* (Lisbon: Paulo Craesbeeck, 1647). See also H. Bernstein, *Pedro Craesbeeck & Sons: 17th Century Publishers to Portugal and Brazil* (Amsterdam: Hakkert, 1987), 38–39.

424. Ernesto Soares, *A gravura artística sobre metal: Síntese histórica* (Lisbon, 1933), 14 and 188–93. As for Vorsterman and his interest in geographic space as an engraver, see Henri Hymans, *Lucas Vorsterman: Catalogue raisonné de son oeuvre* (Brussels, 1893); reimpression under a slightly different title, *Lucas Vorsterman, 1595–1675, et son oeuvre gravé: Catalogue raisonné de l'oeuvre . . .* (Amsterdam: G. W. Hissink, 1972), 55.

Craesbeeck, and Craesbeeck had the technical capacity to print maps, for his house also printed musical works.⁴²⁵

The Alentejo map is oriented with east at the top. In the Spanish area, the hydrographic network almost disappears, but the settlement is shown with quantitative information. Only the enemy's resources are listed, showing the existing damage and parts still liable to be attacked. The legend states only “*small towns burned in Castile” and “P small towns captured in Castile.” The Portuguese side is depicted as idyllic territory with rivers, hills, and trees; the Spanish side is a platform where only small towns and villages are represented. Although it appears relatively minor in relation to the overall printed portion of the map, the main theme is the Battle of Montijo, the first major Portuguese victory (on 26 May 1644) that ensured the maintenance of the country's independence. Within the map is a small but detailed view of the battle and depictions of the infantry, the cavalry, and the artillery.

The fieldwork of Teixeira Albernaz around 1642 must have contributed in some way to the drawing of the map, but the map dedicated to Lars Skytte was produced in the context of military, political, and diplomatic events occurring rapidly during the last months of 1644. A copy of the map arrived at Stockholm or was confiscated by spies en route. In any case, the mission of the image was accomplished: to diffuse information about the battle and to demonstrate that the Portuguese knew the enemy's territory in detail. Allies or rivals could find out only what those who had produced the map wanted them to know.

From 1660 to 1665, the most decisive battles of the long war were fought. Once again, maps such as the *Descrição da Provincia de Alemtejo*, by architect Bartolomeu de Sousa (1665) and engraved by Felix da Costa and João Baptista, sought to capture those historical moments (fig. 38.49). The size and decorative quality of this map suggest that originally it was probably a separate document. Two prints are known.⁴²⁶

The map was dedicated to Luís de Vasconcelos e Sousa, third count of Castelo Melhor, the powerful minister of King Afonso VI, and was related to the Battle of Ameixial, which was fought in July 1663 and was probably the most important victory of the Portuguese army against the Spaniards. The area represented on Sousa's map included the territory between the Tagus and the Guadiana, from the boundary of Spanish Extremadura to the Atlantic. That was the area of Portugal most vulnerable to invasion—and the easiest attack route from the interior of the Iberian Peninsula to Lisbon. For that reason, the best-protected fortresses could be found there.

PRINTED CARTOGRAPHY IN PORTUGAL

During the fifteenth century and the first decades of the sixteenth, the great maritime discoveries and the terres-

trial explorations that followed were due mainly to the two Iberian peoples. But the diffusion of knowledge concerning the new worlds was mainly the work of citizens of other European countries. How can this fact be explained? By the technical lag in the graphic or printing arts on the peninsula? By the mistrust of the political authorities? The great literary works inspired by the Iberian discoveries were left in manuscript form (the “Esmeraldo,” ca. 1508; the “Livro” of Duarte Barbosa, prior to 1516; and the *roteiros* by João de Castro, 1538–41) or were published later (the *Décadas* of João de Barros and the *História* of Castanheda, after 1552, and *Os Lusíadas*, in 1572). In the cases in which a book was more precociously published, as was the *Geografia* published at Madrid in 1519 by the Castilian author Martín Fernández de Enciso, the text was put into circulation without the world map that was supposed to accompany it.

Only a few specimens of maps printed in Portugal in the sixteenth and seventeenth centuries are known, for three reasons: first, because of the characteristics and purposes of the cartography produced; second, because of the lack of qualified technicians and publishing houses, in the face of external competition; and third, because of the dimensions of the existing market. However, some attempts were made, particularly in the case of maps related to military cartography in Portugal between 1640 and 1668.

In 1604, the *Tratado das Batalhas, e sucessos do Galeão Sanctiago com os Olandeses na Ilha de Sancta Elena* by Melchior Estácio do Amaral was published in Lisbon by António Alvarez. It is a narrative of episodes of a maritime journey, like so many of its contemporaries. It contains a small chart of the *I. de Sancta Elena*, an important way station and, for that reason, a place repeatedly mapped.⁴²⁷

Another map related to naval war is the plan of the city of Salvador included in the *Iornada dos Vassallos da Coroa de Portugal, pera se recuperar a Cidade do Salvador, na Bahya de Todos os Santos* by the Jesuit Bartolomeu Guerreiro. This book was published in 1625 in Lisbon by Matheus Pinheiro, months after the Brazilian city that had been occupied by the Dutch was recuperated by the army and a Luso-Spanish squadron. The book was published at bookseller Francisco Álvares's expense. The detailed plan of São Salvador, engraved by Bento Meilhas, preserves the historical moment, complementing the narration of the facts found in the text.

425. See Nuno Daupias d'Alcochete, “L'officina craesbeeckiana de Lisbonne,” *Arquivos do Centro Cultural Português* 9 (1975): 601–37, esp. 634.

426. The second is in Lisbon, Mapoteca de Direcção dos Serviços de Engenharia (1-4-7, 4185).

427. In the BNF there is another printed map of the same island with toponymy in Portuguese that could also date from the seventeenth century, Ge DD 2987 (8439); see *PMC*, 5:91.



FIG. 38.49. *DESCRIPÇÃO DA PROVINCIA DE ALEM-TEJO*, BY BARTOLOMEU DE SOUSA, 1665.

Size of the original: 57 × 40.2 cm. Photograph courtesy of the Biblioteca Pública Municipal do Porto (Reservados, C [I]-36).

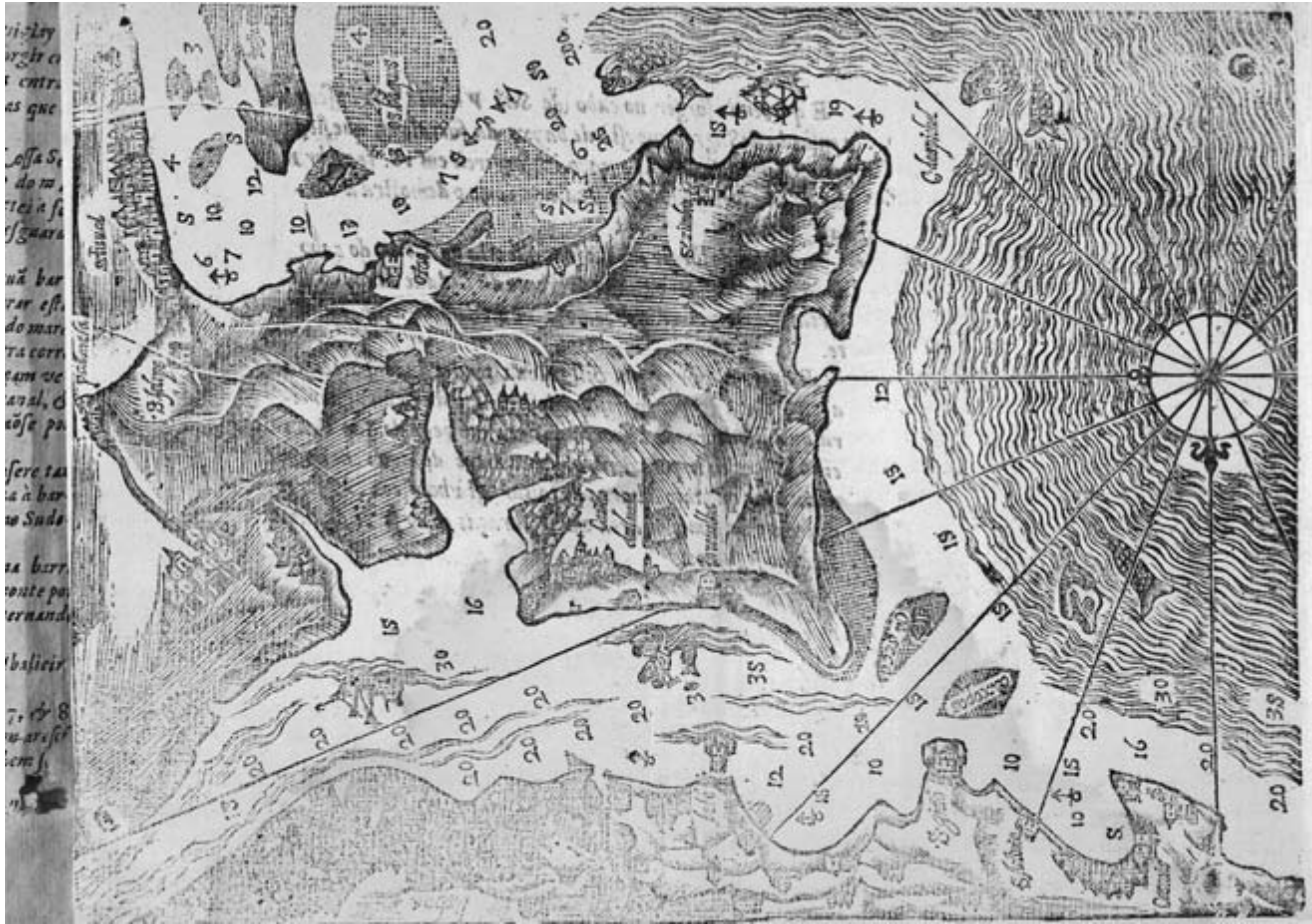


FIG. 38.50. MAPA DOS ESTUÁRIOS DO TEJO E DO SADO BY MANUEL DE FIGUEIREDO AND GASPAR FERREIRA REIMÃO, 1642.

Size of the original: 18 × 24 cm. In António de Mariz

Carneiro, *Regimento de pilotos e roteiro da navegação e conquistas do Brasil, Angola . . .* (Lisbon: Lourenço de Anveres, 1642). Photograph courtesy of the Biblioteca Nacional, Lisbon (Res. 1315 P).

Some of the first attempts at printing maps in Portugal were in the area of hydrographic cartography. In 1642, the *Regimento de pilotos e roteiro da navegação e conquistas do Brasil, Angola . . .* by António de Mariz Carneiro, *cosmógrafo-mor* after 1631, was published in Lisbon by Lourenço de Anveres. In a section at the end, it contained eleven woodcut coastal charts by Manuel de Figueiredo and Gaspar Ferreira Reimão covering Spain and Portugal from Cape Finisterre to the Strait of Gibraltar.⁴²⁸ These were, to a large extent, derived from previous nautical rutters, and were roughly drawn (fig. 38.50). The influence of foreign models is clear from the information they include, but even so they were pioneering examples that were to be followed later in the seventeenth century by the charts of Portuguese shores included in the *Arte pratica de navegar e regimento de pilotos* by Luís Serrão Pimentel, published in Lisbon in 1673 by António Craesbeck de Mello.

This little-studied domain of printed cartography in Portugal, which is still being inventoried, comprises in particular maps inserted into works of varying natures, ranging from geographic descriptions to historiography and episodes of battles. Artists working in Portugal, primarily

foreign ones, engraved the metal plates on the basis of sketches by Portuguese cartographers, just as publishers and booksellers of foreign origin based in Portugal prepared editions and distributed them to both domestic and European audiences. One needs only to recall how quickly the image on the map of Ethiopia by Manoel de Almeida (fig. 38.28), included in a book written in Portuguese and published in Portugal,⁴²⁹ spread throughout Europe to realize how effective and transnational was communication within circles of scientific interaction, even with regard to cartography.

428. PMC, 5:122. Lourenço de Anveres also published António de Mariz Carneiro, *Regimento de pilotos e roteiro das navegacoes da India Oriental . . .* (Lisbon: Lourenço de Anveres, 1642), which contains the same collection of maps.

429. Almeida, *História geral de Etiópia*. The map was also reproduced in Melchisédec Thévenot, *Relations de divers voyages curieux*, 4 vols. (Paris: De l'imprimerie de Jacques Langlois, 1663–72), and in Isaac Vossius, *De Nili et aliorum fluminum origine* (The Hague: Adriani Vlacq, 1666); afterward it was included in many of the images of the African continent.

APPENDIX 38.1 NUMBER OF CHARTS OF EACH AUTHOR REPRODUCED IN *PMC*
(CA. 1485–1660), LISTED BY AREA DEPICTED^a

Cartographers and People Responsible for Collections	The world	Mediterranean and Atlantic	Indian Ocean	Far East	Brazil	America except Brazil	Pacific + <i>Other Areas</i>	Total
João Teixeira Albernaz I	3	49	68	14	158	6	5 + 1	304
Diogo Homem	4	84	11	5	10	7		121
Fernão Vaz Dourado		19	17	17	16	19		88
Manuel Godinho de Erédia	1		53	21	2	1	1	79
João de Castro ^b			37					37
Luís Teixeira		12	5		19			36
Pedro Barreto Resende			35					35
Valentim Fernandes ^c		31						31
João Baptista Lavanha and Luís Teixeira		29						29
Francisco Rodrigues		7	6	12	1			26
Gaspar Viegas ^d		5	5	4	7	3		24
Sebastião Lopes		8	2	2	9	2	0 + 1	24
André Pereira dos Reis			20	3				23
Bartolomeu Velho		6	2	2	7	3		20
João Lisboa		5	6	2	5	1		19
João Teixeira Albernaz I and António Bocarro			16					16
Lázaro Luís		4	4	1	3	1		13
Pedro Barreto de Resende and António Bocarro			13					13
António Sanches	1	2	1	1	6		1	12
Gaspar Correia			11					11
Bartolomeu Lasso		4		1	5	1		11
Lopo Homem and Reinel family ^e		2	2	3	2			9
João Afonso		3				6		9
Pedro Reinel		3	2		1		0 + 1	7
João Freire		7						7
Lizuarte de Abreu			7					7
António de Mariz Carneiro			6					6
Diogo Ribeiro	4				1			5
Anonymous		37	45	14	42	11	1 + 2	152
Totals	13	317	374	102	294	61	8 + 5	1174

^a Authors with fewer than five charts were excluded.

^b Only one print of each codex was counted, even when more are reproduced in *PMC*.

^c There are four figures with thirty-one sketches of islands, which Fernandes must have copied.

^d Only the atlas of twenty-six charts was considered because the atlas of twenty-four charts is practically the same.

^e The *mappamundi* from this atlas, considered the work of Lopo Homem, was not counted.

APPENDIX 38.2 DISTRIBUTION OF THE CHARTS REPRODUCED IN *PMC*
(CA. 1485–1660), LISTED BY AREA DEPICTED^a

Area Depicted	Date of the First Chart	No. of Separate Charts	No. of Charts in Atlases and Compilations	Total
The world	1502	17	8	25
Mediterranean Sea and Atlantic Ocean	Ca. 1485	30	296	326
Indian Ocean	1510	11	374	385
Far East (Asia and Indonesia)	1510	5	103	108
Brazil	1506	44	271	315
American continent, except Brazil	Ca. 1537	0	61	61
Pacific Ocean	Ca. 1537	1	9	10
Other areas	Ca. 1537	1	4	5
Totals		109	1126	1235

^aMaps of continental Portugal and exclusively terrestrial maps were excluded.

APPENDIX 38.3 THE TWENTY-FIVE PORTUGUESE WORLD MAPS REPRODUCED
IN *PMC* (CA. 1485–1660)^a

1502	Cantino map (vol. 1, pls. 4–5)
1519	Lopo Homem and Reinel family (vol. 1, pl. 16)
Ca. 1519	[Jorge Reinel] (Kunstmann IV) (vol. 1, pl. 12)
1525	[Diogo Ribeiro] (Castiglione) (vol. 1, pl. 37)
1527	[Diogo Ribeiro] (vol. 1, pl. 38)
1529	Diogo Ribeiro (vol. 1, pl. 39; Biblioteca Apostolica Vaticana)
1529	Diogo Ribeiro (vol. 1, pl. 40; Herzogin Anna Amalia Bibliothek, Weimar)
Ca. 1545	Anonymous (vol. 1, pl. 79)
Ca. 1550	Anonymous (vol. 1, pl. 80)
1554	Lopo Homem (vol. 1, pl. 27)
1558	Diogo Homem (vol. 2, pl. 100D; fol. 4 in universal atlas)
1559	André Homem (vol. 2, pls. 187–91)
1561	Diogo Homem (vol. 2, pl. 126 left; fol. 13 in universal atlas)
Ca. 1565	Diogo Homem (vol. 2, pl. 171 left; fol. 15 in universal atlas)
1568	Diogo Homem (vol. 2, pls. 128C and D; fol. 24 in universal atlas)
1570	Fernando Oliveira (vol. 5, pls. 525A and B)
1573	Domingos Teixeira (vol. 2, pl. 238)
Ca. 1583	Anonymous, Sebastião Lopes (vol. 4, pl. 408)
1597 and 1612	João Baptista Lavanha and Luís Teixeira (vol. 4, pl. 426; fol. 3r in cosmographical atlas)
Ca. 1604?	Luís Teixeira (vol. 6, pl. 5 fragment)
Ca. 1615–22	Manuel Godinho de Erédia (vol. 4, pls. 414A and B; fols. 3r and 17r in miscellaneous atlas)
1623	António Sanches (vol. 5, pl. 527A)
Ca. 1628	João Teixeira Albernaz I (vol. 4, pl. 459A; first map in universal atlas)
1630	João Teixeira Albernaz I (vol. 4, pl. 464; fols. 2v–3 in universal atlas)
Ca. 1632	João Teixeira Albernaz I (vol. 4, pl. 482)

^aSome of the works were not signed but were attributed to the cartographer in brackets by the authors of *PMC*.

APPENDIX 38.4 PORTUGUESE CARTOGRAPHERS WHO WERE AUTHORS
OF CHARTS OF THE MEDITERRANEAN AND OF THE ATLANTIC
REPRODUCED IN *PMC* (CA. 1485–1660)^a

Cartographers or People Responsible for Collections ^b	Total Charts	Dates of the First and Last Chart
[Diogo Homem]	84	Ca. 1550–76
[João Teixeira Albernaz I]	49	1628–43
Valentim Fernandes	31	1506–10
João Baptista Lavanha and Luís Teixeira	29	1597–1612
Fernão Vaz Dourado	19	1568–80
[Luís Teixeira]	12	End of 16th century to 1602
[Sebastião Lopes]	8	Ca. 1555–ca. 1565
Francisco Rodrigues	7	1513
João Freire	7	1546
Bartolomeu Velho	6	Ca. 1560
[Gaspar Viegas]	5	Ca. 1517–37
João de Lisboa	5	Ca. 1560
Lázaro Luís	4	1563
Bartolomeu Lasso	4	Ca. 1575–90
Pedro Reinel	3	Ca. 1485–1504
João Afonso	3	Ca. 1543
Lopo Homem and Reinel family	2	1519
Pero Fernandes	2	1525–28
António Sanches	2	1633–41
Total authors with one chart ^c	7	1492–1654(?)
Total anonymous charts ^d	38	End of 15th century to 1636
Total	327	

^aExcluded are world maps, maps of South America (*vide* Brazil), and maps of the southeastern part of the Indian Ocean where a small part of the Atlantic is shown (*vide* Indian Ocean).

^bSome of the works were not signed but were attributed to the cartographer in brackets by the authors of *PMC*.

^cThese were Jorge de Aguiar (1492), Lopo Homem (ca. 1550), Bartolomeu Lasso/Petrus Plancius (1592–94), Pedro de Lemos (ca. 1594), Fernão de Sousa (ca. 1625), José Martins (1644), and Bartolomeu João (1654?).

^dEnd of the fifteenth century, fragment (1), end of the fifteenth century, “carta de Modena” (1), ca. 1510 (1), 1538 (9), 1547 (3), 1550–60 (7), ca. 1585 (7), 1604 (1), ca. 1622–27 (3), ca. 1630 (3), ca. 1636 (2).

APPENDIX 38.5 PORTUGUESE CARTOGRAPHERS WHO WERE AUTHORS
OF CHARTS OF THE FAR EAST (ASIA AND INDONESIA) REPRODUCED IN
PMC (CA. 1485–1660)^a

Cartographers and People Responsible for Collections ^b	Total Charts	Dates of First and Last Chart
Manuel Godinho de Erédia	21	1601–16
Fernão Vaz Dourado	17	1568–80
[João Teixeira Albernaz I]	14	Ca. 1628–49
Francisco Rodrigues	12	Ca. 1513
[Diogo Homem]	5	1561–68
Gaspar Viegas	4	Ca. 1537
André Pereira dos Reis	3	1654–56/60
Lopo Homem and Reinel family	2	1519
João de Lisboa	2	Ca. 1560
[Bartolomeu Velho]	2	Ca. 1560
[Sebastião Lopes]	2	Ca. 1565
Total authors with one chart ^c	10	1563–1646
Total anonymous charts ^d	14	Ca. 1535–1650
Total	108	

^aWorld maps were excluded.

^bSome of the works were not signed but were attributed to the cartographer in brackets by the authors of *PMC*.

^cThese were Lázaro Luís (1563), Luís Jorge de Barbuda (ca. 1575–84), Inácio Moreira (Monteiro) (ca. 1581), Bartolomeu Lasso (1590), Bartolomeu Lasso/Petrus Plancius (1592–94), Luís Teixeira (1595), Bartolomeu Lasso/Arnold Floris van Langren (1596), João Baptista Lavanha (1615), António Sanches (1641), and António Francisco Cardim (1646).

^dCa. 1535 (1), ca. 1630 (2), ca. 1636 (10), 1650 (1).

APPENDIX 38.6 PORTUGUESE CARTOGRAPHERS WHO WERE AUTHORS OF CHARTS OF BRAZIL REPRODUCED IN *PMC* (CA. 1485–1660)^a

Cartographers and People Responsible for Collections ^b	Total Charts	Dates of First and Last Chart
[João Teixeira Albernaz I] ^c	158	Ca. 1616–55
[Luís Teixeira] ^d	19	Ca. 1568–1610
Fernão Vaz Dourado	16	1568–80
[Diogo Homem]	10	1558–68
[Sebastião Lopes]	9	1558–83
[Gaspar Viegas]	7	1534–37
[Bartolomeu Velho]	7	1560–61
[António Sanches]	6	1633–41
[João de Lisboa]	5	Ca. 1560
[Bartolomeu Lasso]	5	Ca. 1584–96
Lázaro Luís	3	1563
[Cristóvão Álvares]	2	1629–38
Lopo Homem and Reinel family	2	1519
[Domingos Teixeira]	2	Mid-16th century to 1573
Manuel Godinho de Erédia	2	1615/22
Pascoal Roiz	2	1632
Total authors with one chart ^e	16	Ca. 1513–63
Total anonymous charts ^f	42	Ca. 1506–47
Total	313	

^aWorld maps were excluded.

^bSome of the works were not signed but were attributed to the cartographer in brackets by the authors of *PMC*.

^cThe map of 1655 could be by João Teixeira Albernaz I or by João Teixeira Albernaz II.

^dThe map of 1597/1612 was made by Luís Teixeira and João Baptista Lavanha.

^eThese were Francisco Rodrigues (ca. 1513), Jorge Reinel (1519), Diogo Ribeiro (1532), Pedro (?) Reinel (ca. 1535), Jorge (?) Reinel (ca. 1535), António Pereira (ca. 1545), Lopo Homem (ca. 1550), Fernando Oliveira (1570), Pero de Magalhães Gandavo (ca. 1574), Simão Fernandes (ca. 1580), Pedro de Lemos (1594), Cipriano Sanches (1596), Domingos Sanches (1618), António Vicente Cochado (1623), Bento Mealhas (1625), and Eleodore Ebano (?) (1653).

^fCa. 1506 (1), 1538 (7), 1547 (2), ca. 1550 (2), ca. 1550/60 (6), third quarter of the sixteenth century (not counted), 1585 (4), ca. 1600 (1), ca. 1620 (1), post-1625 (1), ca. 1630 (4), ca. 1635 (1), ca. 1636 (10), 1637 (1), and 1647 (1).

APPENDIX 38.7 PORTUGUESE CARTOGRAPHERS WHO WERE
AUTHORS OF CHARTS OF THE AMERICAN CONTINENT
REPRODUCED IN *PMC* (CA. 1485–1660)^a

Cartographers and People Responsible for Collections ^b	Total Charts	Dates of First and Last Chart
Fernão Vaz Dourado	19	1568–80
Diogo Homem	7	1558–68
João Afonso	6	Ca. 1543
João Teixeira Albernaz I	6	Ca. 1628–43
[Bartolomeu Velho]	3	Ca. 1560
[Gaspar Viegas] ^c	3	Ca. 1537
[Sebastião Lopes]	2	Ca. 1565
Total authors with one chart ^d	4	Ca. 1560–1615/22
Total anonymous, unidentified charts ^e	11	Ca. 1538–ca. 1630
Total	61	

^aWorld maps and charts that include Brazil were excluded.

^bSome of the works were not signed but were attributed to the cartographer in brackets by the authors of *PMC*.

^cThis cartographer made two practically identical atlases, one with thirty-four charts and the other with thirty-six; only the charts of the latter atlas were counted.

^dThese were João de Lisboa (ca. 1560), Lázaro Luís (1563), Bartolomeu Lasso (1590), and Manuel Godinho de Erédia (ca. 1615/22).

^eCa. 1538 (2), 1547 (1), ca. 1550–60 (2), ca. 1585 (3), ca. 1630 (3).

APPENDIX 38.8 COASTAL SITES REPRESENTED BY GASPAR CORREIA IN THE
“LENDAS DA ÍNDIA” (1563)

Current State	Place	Theme	Description in “Lendas” (vol:p)	Date of Occurrence Portrayed	Date of Author’s Presence on Site
Lost	Mouth of the Tagus River	Departure of the armada of Vasco da Gama	1:15	1497	Until 1512
Lost	Cochim	Fortress	1:213, 641	1506	1514, 1528
Hypothetical	Quiloa	?	1:276, 535	?	?
Hypothetical	Mombaça	?	1:544	?	?
Lost	Sofala	Fortress	1:577, 783	1506	Was not there
Lost	Soco (Socotorá)	Fortress and town	1:684	1507	Jan. 1513
Lost	Dabul	Entrance of the armada	1:925–26	Dec. 1508	Later than Dec. 1508
Original	Malaca	Town and fortress	2:250–51	1511	Never there
Original	Calicut	Fortress	2:330, 334	Nov. 1512	1512, 1514
Original	Aden	City, hills, armada, and assault	2:342–43	Feb. 1513	Feb. 1513
Copy	Coulão	Site and fortress	2:394–95	1515	?
Copy	Ormuz	Fortress and town	2:438	1515	1515
Copy	Judá	Site, city, and armada	2:494, 497	Mar. 1517	Never there
Copy	Columbo (Ceilão)	Site, fortress, and boats	2:540–41	Sept. 1518	Never there
Lost	São Tomé	“House”	2:789	1524	1521, 1534
Copy	Cananor	Site, town, and fortress	3:16–17	Feb. 1526	?
Original	Chale	Site and fortress	3:438–39	1531–32	?
Original	Diu	Stronghold	3:624–25	1535, 1545	1513, 1533–35
Original	Baçaim	Site and fortress	3:688–89	1536	1532–33

APPENDIX 38.9 EXAMPLES OF MILITARY OR PROPAGANDA MAPS

Title/Description/Author	Where and When Published	Location/Sources/Additional Information
Views of four Spanish frontier villages (Codiceira, Alconchel, Cheles, Villanueva del Fresno) attacked by the Portuguese (1641–42), by Manuel de Almeida. Engravings.	In Aries Varela, <i>Sucessos que ouve nas frontieras de Elvas, Olivença, Campo Mayor, & Ouguela . . .</i> (Lisbon, 1643)	One rare example with engravings is Biblioteca Nacional, Lisbon (Res. 877//2P). Nothing is known about the author of the etchings. See Ernesto Soares, <i>História da gravura artística em Portugal</i> , 2 vols., new ed. (Lisbon: Livraria Samcarlos, 1971), 1:65–66.
A small portion of the Spanish Extremadura between Badajoz and Villanueva del Fresno bordering Portugal, by António Moniz de Carvalho. Engraving. Ca. 1:540,000.	In António Moniz de Carvalho, <i>Francia interessada con Portugal en la separacion de Castilla</i> (Paris, 1644); in Castillian	Map engraved and printed in France, sources unknown. Book written to demonstrate advantages to the French state of the separation of Spain and Portugal. See João Carlos Garcia, “As razias da Restauração, notícia sobre um mapa impresso do século XVII,” <i>Cadernos de Geografia</i> 17 (1998): 43–48.
<i>Vestigium sive effigies Urbis Helviae</i> , by Pierre de Sainte-Colombe, a French military architect in service of the Portuguese; engraved by João Baptista in 1661. The map depicts the Battle of the Linhas de Elvas, January, 1659.	In A. C. de Jantillet, <i>Helvis obsidione liberata</i> (Lisbon, 1662)	Biblioteca Nacional, Lisbon (E. 1090 V). On the artist João Baptista (Coelho or Lusitano), see J. C. Rodrigues da Costa, <i>João Baptista, gravador português do século XVII (1628–1680)</i> (Coimbra, 1925).
<i>Praça de Elvas sitiada pello exercito Castelhana e levantamento do sitio e foçoa das armas portuguezas em 14 Jtº 1659</i> , by Roderigo Stoop.		Biblioteca Nacional, Lisbon (Iconografia E. 648 A). Stoop was a Dutch artist active in Portugal 1659–62. See Soares, <i>História da gravura artística em Portugal</i> , 2:619.
<i>Entrada do exercito del Rey de Castella, governado por D. Ioam de Austria, no Reino de Portugal</i> , anonymous (possibly French), undated. Depicts the Portuguese victory at Ameixial.	Ca. 1663	Biblioteca Nacional, Lisbon (Iconografia E. 649 A). Unbound. Image in two parts: the top depicts the frontier region with a background of possibly the João Teixeira Albernaz map engraved in 1644, and the bottom shows the battle in elevated view with silhouettes of Évora and Estremoz. The author could be Dirk Stoop. See Ernesto Soares, <i>Dicionário de iconografia Portuguesa</i> , suppl. (Lisbon: Instituto para a Alta Cultura, 1954), 234–35.